भाकृअनुप
ICAR

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut-250 110 (UP), India

अखिल भारतीय समन्वित कृषि प्रणाली अनुसंधान परियोजना
AICRP on Integrated Farming Systems




वार्षिक प्रतिवेदन 2014-15
Annual Report 2014-15

ICAR- IIFSR

ICAR-Indian Institute of Farming Systems Research (IIFSR) (formerly Project Directorate for Farming Systems Research-PDFSR), was established by Indian Council of Agricultural Research, New Delhi in April, 1989 at Modipuram, Meerut (Uttar Pradesh).

Vision

Management of natural resources for holistic improvement of small and marginal farmers through Integrated Farming Systems

Mission

Improve food, nutrition, livelihood and financial security of small and marginal households through climate smart Integrated Farming Systems (to make marginal and small households as bountiful)

Mandate

- Research in integrated farming systems on production technologies for improving productivity and resource use efficiencies.
- Develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations.
- On-farm testing, verification and refinement of system-based farm production technologies.
- Coordinate and monitor integrated farming systems research in the country.

All India Coordinated Research project on Integrated Farming Systems (AICRP on IFS) is an integral part of ICAR-IIFSR with 75 centres to undertake on-station main (25 no's), on-station sub (12 no's), on-station voluntary (6 no's) and on-farm research (32 no's) spread across length and breadth of the country. The institute is also leading a Network Project on Organic Farming (NPOF) with 20 centres.

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON
INTEGRATED FARMING SYSTEMS

Annual Report
2014–15

ICAR-Indian Institute of Farming Systems Research
(Indian Council of Agricultural Research)
Modipuram, Meerut- 250 110, India

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Important Notes:

- This compilation is a joint contribution of all the associated scientists and technical staff of 74 AICRP-IFS centers (data generation), ICAR-IASRI New Delhi (statistical analysis) and ICAR-IIFSR, Modipuram (report writing, compilation, editing and printing).
- The report is based on experimental data generated during *kharif, rabi* and summer seasons of 2013-14 (period ending June 2014), under 'on-station' and 'on-farm' research programmes of AICRP on Integrated Farming Systems. The other details are relevant to 31st March 2015.
- The report includes both processed and semi-processed data, generated in different sub-projects under AICRP on Integrated Farming Systems, and as such no material/ data should be reproduced in any form without prior written permission of the Director, ICAR-Indian Institute of Farming Systems Research and due credit to the concerned scientists.

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All India Co-ordinated Research Project on Integrated Farming Systems (AICRP-IFS) initiated in 2010-11 is operating with 25 main, 12 sub, 6 voluntary and 32 on-farm centres in 23 states and 2 union territories. The results of the experiments conducted during 2013-14 by all the co-operating centres are processed and compiled in the Annual Report 2014-15 of the scheme. I take this opportunity to record my sincere thanks to **Dr. T. Mohapatra**, Secretary, Department of Agricultural Research and Education and Director General, Indian Council of Agricultural Research, New Delhi for offering critical comments and guidance. I extend my gratitude to **Dr. K. Alagusundaram**, Acting Deputy Director General (Natural Resource Management) for his constant support extended to the scheme. The time to time guidance received from **Dr. S. Bhaskar**, Assistant Director General (Agronomy, Agroforestry and Climate Change) for improving the performance and output of the scheme is duly acknowledged. My sincere thanks also extended to **Dr. S. Ayyappan**, Former Secretary, Department of Agricultural Research and Education and Director General, Indian Council of Agricultural Research, New Delhi, **Dr. A.K. Sikka**, Former Deputy Director General (Natural Resource Management) and **Dr. B. Mohankumar**, Former Assistant Director General (Agronomy, Agroforestry and Climate Change) for their critical comments, reviews and suggestions on the performance and improvement of scheme over the years. Scientific inputs received from **Quinquennial Review Team (QRT), Research Advisory Committee (RAC)** and **Institute Management Committee (IMC)** are thankfully acknowledged as those inputs provided immense help in taking new initiatives, shaping and improvement of the programme for practical utility.

I am highly thankful to each and every one of the scientists and research fellows involved in the scheme at 13 centres for putting the meticulous effort to conduct the field experiments, lab analysis and generating data. The sincere efforts put forth by **Dr. N. Ravisankar**, Principal Scientist deserves appreciation for compilation and editing of the report. I also extend my appreciation to **Dr. M. Shamim,** Scientist, **Dr. Raghuveer Singh,** Scientist, **Mr. D. Tripathi,** Chief Technical Officer, **Dr. Brij Mohan Garg**, Assistant Chief Technical Officer and **Mrs. Jailata Sharma,** PA for their cooperation in compilation of the data, its statistical analysis, drafting and proof corrections. Thanks and appreciations are also due to **Dr. Kamta Prasad**, Former Programme Facilitator (Co-ordination Unit) and **Dr. J.P. Singh**, Former Director (Acting) for extending the cooperation in preparation of report.

The contributions of all the other scientific, technical, administrative and skilled supporting staff either directly or indirectly at various levels during preparation of this report are also acknowledged. I am sure; the significant findings obtained from the experiments especially region specific Integrated Farming System models, need based alternative cropping systems, resource management packages and refined farming system in farmer partcipatory mode are of practical in nature and can be adopted by small and marginal farmers for improving their livelihood.

(A.S. Panwar)
Director

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1. INTRODUCTION

The Genesis of the **"All India Coordinated Research Project on Integrated Farming Systems"** may be traced back to the visit of Dr A.B. Stewart of Macaulay Institute of Soil Research, Aberdeen U.K., somewhere in mid-forties. He was invited by the then 'Imperial Council of Agricultural Research' to (i) review the position in respect of soil fertility investigations, in general and manuring in particular, and (ii) suggest steps which might be taken in order to obtain, in shortest possible time, adequate information under different conditions of soil and climate to enable agricultural departments to give some advice to cultivators for increasing crop yields. His review reports, published in 1947, significantly affected philosophy and practices of fertilizers experimentation in the country, He stressed upon the need of conducting simple fertilizer trials on cultivators' fields and complex experiments at selected research centres. Prompted by these suggestions, a "Simple Fertilizer Trials at cultivators' Fields" scheme was initiated in 1953 under the Indo-American Technology Cooperation Agreement under "Soil Fertility and Fertilizer Use Project" with the following objectives:

i. To study crop responses to nitrogen, phosphorus and potassium when applied separately and in different combinations under the cultivators' field conditions.

ii. To investigate the relative response of different fertilizers in various broad soil groups and to work out the optimum fertilizer combinations for different agro-climatic regions.

iii. To study the relative performance of different nitrogen and phosphatic fertilizers for indigenous production.

iv. To demonstrate to the farmers the value of fertilizer use for the production of crops

Subsequently in 1956, experiments on carefully selected centers called 'Model Agronomic Experiments' were added to the project and started as all India Coordinated Agronomic Experiments Scheme (AICAES). The objectives of Model Agronomic Experiments were:

i. To study the interaction of amounts of fertilizer application with intensity and frequency of irrigation, sowing date and plant density.

ii. To work out the manure requirement of important crop rotations and their effect on soil fertility.

iii. To evaluate the relative efficiency of various sources of nitrogen and phosphorus for different crops and areas, and of different methods of application of nitrogenous and phosphatic fertilizers.

As knowledge progressed, new technology developed and the rate of growth in agriculture increased, the scheme went through various stages of evolution during which its scope expanded and its focus sharpened in accordance with newly acquired scientific knowledge. The scope of experimentation was, therefore, expanded to include agronomic research, embracing cultural practices, irrigation and nutritional requirements, chemical weed control and multiple cropping. But the emphasis continued on soil fertility and fertilizer use as influenced by soil and climatic factors and management,

In 1968-69, the scheme was sanctioned as All India Coordinated Agronomic Research Project (AICARP) with two components, viz.; 'Model Agronomic Experiments' and 'Simple Fertilizer Trials'. The main objectives of the experiments conducted at the research centres under the scheme were:

i. To obtain information of the response of high yielding varieties of cereal to different agronomic factors such as fertilizer (including micronutrients), irrigation ,weed control ,liming etc.;

ii. To study the manure requirements of important crop rotations and their effect on soil fertility;

iii. To evaluate various sources of nitrogen and phosphorus for different crops and areas;

iv. To work out the production potential per unit area, per unit time for different agro-climate condition of the country; and

v. To determine the most suitable cropping patterns and fertilizer responses under rainfed condition.

Under the revised scheme, the main objectives of the simple fertilizer trial were:

i. To study the responses of introduced high yielding and locally improved varieties to nitrogen and phosphorus applied alone and in combination and to potassium in the presence of nitrogen and phosphorus under irrigated as well as dry land condition;

ii. To compare different methods of application of nitrogen on cereals under dry-farming conditions;

iii. To study the contribution of package of soil and moisture conservation practices to increase crop production in dry farming areas;

iv. To study the relationship between crop response to fertilizer and soil test values; and

v. To formulate fertilizer recommendations for different soils and agro-climatic regions of the country.

But, during 1979 aforementioned objectives were further reviewed and redefined as under:

i. To develop, continuously update and test on cultivators' fields the technology for various crop based farming systems. For this patterns best suited for different agro-climatic zones may be identified, evolved for various emerging farming situations and package of practices developed to realize their production potential.

ii. To define/delineate all aspects of the use of fertilizers (recognizing that fertilizer is an important component of modern agricultural technology), including choice of materials maximize its use through recycling of agricultural wastes or employment of microbial aids,

iii. To provide facilities foe testing new varieties at their pre-release stage.

In mid-eighties, the policy planners duly recognized the importance of cropping systems approach of research to enhance resource use efficiencies for improved and sustainable crop productivity. Therefore, to strengthen all aspects of cropping systems research the 'Project Directorate for Cropping Systems Research' was established at Modipuram (Meerut) with effect from March 1989, with 'AICRP on Cropping Systems' as one of the constituent schemes of the Directorate with both the components, namely; 'On–Station Research' and 'On-Farm Research' remaining intact.

However, within two decades of existence of PDCSR, the mandate of the Directorate was broadened during 2009-10 to undertake research in integrated farming system mode and the Directorate was renamed as **'Project Directorate for Farming Systems Research (PDFSR)'** and mandate redefined as:

i. To characterize existing farming systems to know the productivity, viability and constraints.

ii. To develop resource efficient, economically viable and sustainable integrated farming system modules and models for different farming situations.

iii. To undertake basic and strategic research on production technologies for improving agricultural resource use efficiencies in farming system mode.

iv. To develop and standardize package of production practices for emerging cropping/

farming concepts and evaluate their long-term sustainability.

v. To act as repository of information on all aspects of farming systems by creating appropriate databases.

vi. To develop on-farm agro-processing and value addition techniques to enhance farm income and quality of finished products.

vii. To undertake on-farm testing, verification and refinement of system-based farm production technologies.

viii. To develop capacity building of stakeholders in Integrated Farming Systems through training.

The name and mandate of AICRP on Cropping Systems were also changed accordingly, with major emphasis on farming systems research and objectives modified as hereunder.

The Project Directorate for Farming Systems Research was renamed as ICAR-Indian Institute of Farming Systems Research (IIFSR) during November 2014 and the mandate was redefined further as given below.

- Research in integrated farming systems on production technologies for improving productivity and resource use efficiencies.
- Develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations.
- On-farm testing, verification and refinement of system-based farm production technologies.
- Coordinate and monitor integrated farming systems research in the country.

All India Coordinated Research project on Integrated Farming Systems (AICRP on IFS) is an integral part of IIFSR with 75 centres to undertake on-station and on-farm research across length and breadth of the country. The institute is also leading a Network Project on Organic Farming (NPOF) with 20 centres.

2. OBJECTIVES

On-Station Research

— To undertake applied and adaptive research in integrated farming systems (IFS), especially on production technologies for improving system productivity and resource use efficiencies.

— To develop efficient, economically viable and environmentally sustainable IFS models for different zones.

— To undertake capacity building and human resource development in IFS.

On-Farm Research

— To undertake characterization of existing farming systems for identification of production constraints and problem prioritization.

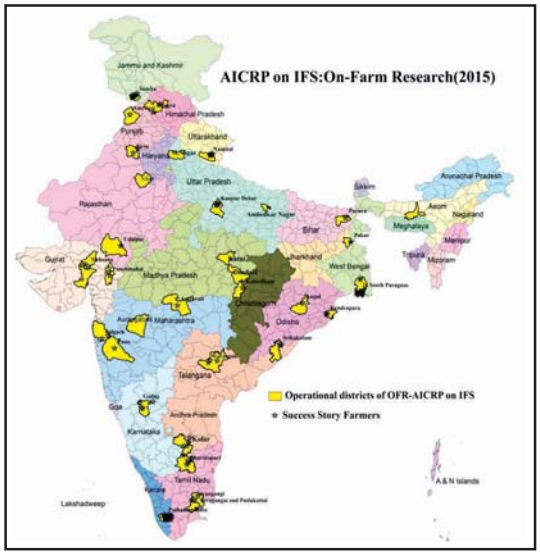
— To undertake on-farm testing and refinement of system-based farm production technologies.

— To optimize on-farm integration of farm enterprises for enhanced farm incomes, resource/ input use efficiencies, and employment opportunities.

3. LOCATION

Under the aegis of AICRP-IFS there are 25 main centers, 12 sub centers, 32 on-farm research centres and 6 voluntary centres. All main and sub centres are engaged in basic and applied research and are necessarily located at SAUs or their Regional Research Stations or Agricultural colleges of those general universities, where strong agricultural research base is available. Whereas, on-farm research centers (earlier known as Experiments on Cultivators' Fields/ ECF Centers) are engaged in farmers' participatory research and are located in different agro-climatic zones. These OFR centers remain shifted from one zone / farming situation to another, every 5 years. The voluntary centres are situated in ICAR institutes and are taking up only IFS model development activity. The location of different AICRP-IFS centers during the year under report (2013-14) is depicted in Map-1& 2, and details are given in Table-3/1.

Map 1. Locations of on-station research centres of AICRP-IFS during 2013-14



Map 2. Locations of on-farm research centres of AICRP-IFS during 2013-14

Table-3/1: Location of Different AICRP-IFS centres during the year under report (2013-14)

S. No.	State	Centre	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
1.	A&N	ICAR-CIARI, Portblair	Voluntary	Island	Island region	Northern Zone AN-1
2.	Andhra Pradesh	Maruteru (Dist. W. Godavari)	Sub Centre	Coastal	East Coast Plains and Hills Region/ South Coastal Andhra Sub-Region	Krishna Godavari Delta Zone (AP-1)
3.		Srikakulam	OFR Centre	Sub-Humid	East Coast Plains and Hills Region	North Coastal zone (AP-2)
4.	Assam	Jorhat	Main Centre	Humid	Eastern Himalayan Region/Upper Brahmaputra Valley Sub-Region	Upper Brahmaputra Valley Zone (AS-2)
5.		Kamrup	OFR Centre	Humid	Eastern Himalayan Region	Central Brahmaputra Valley (AS-3)
6.	Bihar	Sabour (Dist. Bhagalpur)	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ South Bihar Plains Sub-Region	South Bihar Alluvial Plain Zone (B1-3)
7.		Purnea	OFR Centre	Sub-Humid	Middle Gangetic Plains Region	North-east Alluvial Plain (B1-2)
8.		Patna	Vol. Centre	Sub-Humid	Middle Gangetic Plains Region	South Bihar Alluvial Plain Zone (B1-3)
9.	Chhatti-sgarh	Raipur	Main Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	Chhattisgarh Plain Zone (CG-1)
10.		Kabirdham	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	Chhattisgarh Plain Zone (CG-1)
11.	Delhi	New Delhi	Vol. Centre	Sub-Arid	Trans Gangetic Plains Region	Western Semi Arid (ND-1)
12.	Goa	Old Goa	Vol. Centre	Coastal	West Coast Plains & Hills Region	South Konkan Coastal
13.	Gujarat	S.K. Nagar (Dist. Banaskantha)	Main Centre	Arid	Gujarat Plains and Hills Region/ North Gujarat Sub-Region	North Gujarat Zone (GJ-4)
14.		Junagadh	Sub-Centre	Semi-Arid	Gujarat Plains and Hills Region/ South Saurashtra Sub-Region	South Saurashtra Zone (GJ-7)
15.		Navsari	Sub-Centre	Coastal	Gujarat Plains and Hills Region/ Southern Hills Sub-Region	South Gujarat Heavy Rainfall Zone (GJ-1)
16.		Mehsana	OFR Centre	Semi-Arid	Gujarat Plains and Hills Region/ North Gujarat Sub-Region	North Gujarat Zone (GJ-4)

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S. No.	State	Centre	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
17.		Derol	OFR Centre	Arid	Gujarat Plains and Hills Region/ North west Sub-Region	Middle Gujarat Zone (GJ-3)
18.	Haryana	Hisar	Main Centre	Arid	Trans –Gangetic Plains Region/ Arid Sub-Region	Western Zone (HR-2)
19.		Sirsa	OFR Centre	Semi-Arid	Trans –Gangetic Plains Region	Western (HR-2)
20.	Himachal Pradesh	Palampur (Dist. Kangra)	Main Centre	Humid	Western Himalayan Region/High Altitude Temperature Sub-Region	Mid-Hill Sub-Humid Zone (HP-2)
21.		Kangra	OFR Centre	Humid	Western Himalayan Region	Sub-Montane and Low Hills Sub-Tropical (HP-1)
22.	J & K	Chatha (Jammu)	Main Centre	Humid	Western Himalayan Region/High Altitude Temperature Sub-Region	Mid to High Altitude Plain Zone
23.		Samba	OFR Centre	Humid	Western Himalayan Region	Low altitude Sub-Tropical Zone (JK-1)
24.	Jharkhand	Kanke (Ranchi)	Main Centre	Sub-Humid	Eastern Plateau & Hills Region/ Chhota Nagpur, South and West Bengal Hills & Plateau Sub-Region	Western Plateau Zone (B1-5)
25.		Pakur	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	Central and North Eastern Plateau Zone (JH-1)
26.	Karnataka	Kathalgere (Dist. Davangere)	Main Centre	Semi-Arid	Southern Plateau and Hills Region	Southern Transition Zone (KA-7)
27.		Kolar	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	Eastern Dry Zone (KA-5)
28.		Siruguppa (Dist. Bellary)	Main Centre	Arid	Southern Plateau and Hills Region/ Northern Dry Region of Karnataka	Northern Dry Zone (KA-3)
29.		Gadag	OFR Centre	Arid	Southern Plateau and Hills Region	Northern dry Zone (KA-3)
30.	Kerala	Karamana (Dist. Thiruvanthapuram)	Main Centre	Coastal	West Coast Plains and Ghats / Mid land Sub-Region	Coastal Southern Zone (KE-2)
31.		Pathinamthitta	OFR Centre	Coastal	West Coast Plains and Ghats	Problem Areas Zone (KE-5)

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S. No.	State	Centre	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
32.	Madhya Pradesh	Jabalpur	Main Centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
33.		Indore	Sub-Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Malwa Plateau Zone (MP-10)
34.		Powarkheda (Dist. Hoshangabad)	Sub-Centre	Sub-Humid	Central Plateau & Hills Region/ Central Narmada Valley Sub-Region	Central Narmada Valley Zone (MP-6)
35.		Rewa	Sub-Centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
36.		Dindori	OFR Centre	Semi-Arid	Eastern Plateau and Hills	Northern hill zone of Chattisgarh (CG-3)
37.		Katni	OFR Centre	Semi-Arid	Central Plateau & Hills Region	Kymore Plateau and Satpura Hills (MP-1)
38.	Mahar-ashtra	Akola	Main Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Western Vidarbha Zone(MH-8)
39.		Amravati	OFR Centre	Semi-Arid	West Coast Plains and Ghats	Central Maharasthra Plateau (MH-7)
40.		Karjat (Dist. Raigad)	Main Centre	Coastal	Western Plains & Ghat Regions/ Coastal Hilly Sub-Region	North Konkan Coastal Zone (MH-2)
41.		Raigad	OFR Centre	Coastal	West Coast Plains and Ghats	North Konkan Coastal Zone (MH-2)
42.		Parbhani	Main Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Central Maharashtra Plateau Zone (MH-7)
43.		Aurangabad	OFR Centre	Semi-Arid	Western Plateau &Hills Region	Central Maharashtra Plateau Zone (MH-7)
44.		Rahuri (Dist. Ahemadnagar)	Main Centre	Semi-Arid	Western Plateau & Hills Region/ Scarcity Sub-Region	Scarcity Zone (MH-6)

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S. No.	State	Centre	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
45.	Megha-laya	Umiam	Vol. Centre	Humid	Eastern Himalaya Region	Sub Himalayan Region
46.		Pune	OFR Centre	Semi-Arid	Western Plateau & Hills Region	Western Maharashtra Plain Zone Ganeshkhind (MH-5)
47.	Odisha	Bhubaneswar	Main Centre	Sub-Humid Orissa Coastal	East Coast Plains and Hills Region/ Sub-Region	East and South –Eastern Coastal Plain Zone (OR-4)
48.		Chiplima (Dist. Sambalpur)	Sub-Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	West-Central Table Land Zone (OR-9)
49.		Angul	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	Mid-Central Table Land (OR-10)
50.		Kendrapara	OFR Centre	Coastal	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	East and South –Eastern Coastal Plain Zone (OR-4)
51.	Punjab	Ludhiana	Main Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Central Plain Zone (PB-3)
52.		Amritsar	OFR Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Central Plain Zone (PB-3)
53.	Rajasthan	Durgapura (Jaipur)	Main Centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Semi-Arid Eastern Plain Zone (RJ-5)
54.		Fatehpur	OFR Centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Transitional Plain Zone of Inland Drainage (RJ-3)
55.		Kota	Sub Centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Humid South –Eastern Plain Zone (South-Eastern Humid Plain Zone (RJ-9)
56.		Udaipur	OFR centre	Semi-Arid	Central Plateau & Hills Region/ Southern Plains of Rajasthan	Sub-Humid Southern Plain & Aravali Hills Zone (RJ-7)
57.	Tamil Nadu	Coimbatore	Main Centre	Semi-Arid	Southern Plateau and Hills Region/ Central Plateau of Tamil Nadu Sub-Region	Western Zone (TN-3)

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S. No.	State	Centre	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
58.		Thanjavur	Sub Centre	Coastal	East Coast Plains and Hills Region/ Thanjavur Sub-Region	Cauvery Delta Zone (TN-4)
59.		Paiyur	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	North western Zone (TN-2)
60.		Chettinad	OFR Centre	Semi-Arid	East Coast Plains and Hills Region	Sothern Zone (TN-5)
61.	Telangana	Rajendranagar (Dist. Rangareddy)	Main centre	Semi-Arid	Southern Plateau and Hills Region/ South Telangana Sub-Region	Southern Telangana Zone (AP-5)
62.		Rudrur (Dist. Nizamabad)	Sub Centre	Semi-Arid	Southern Plateau and Hills Region/ North Telangana Sub-Region	Northern Telangana Zone (AP-4)
63.		Warangal	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	Southern Telangana (AP-5)
64.	Uttar Pradesh	Kanpur	Main Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	Central Plain Zone (UP-6)
65.		Kanpur Dehat	OFR Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	Central Plain Zone (UP-4)
66.		Faizabad	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-9)
67.		Ambedkarnagar	OFR Centre	Sub-Humid	Eastern Himalayas Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-7)
68.		Bichpuri (Dist. Agra)	Sub Centre	Semi-Arid	Upper Gangetic Plains Region/ Western Plains Sub-Region	South-Western Semi-Arid Zone (UP-5)
69.		Varanasi	Sub Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains	Eastern Plain Zone (UP-9)
70.		Modipuram	Vol. Centre	Sub-Humid	Upper Gangetic Plains Region	Western Plain (UP-3)
71.		Modipuram	OFR Centre	Sub-Humid	Upper Gangetic Plains Region	Western Plain (UP-3)
72.	Uttara-khand	Pantnagar (Dist. US Nagar)	Main Centre	Sub-Humid	Western Himalayan Region/ Valley Temperate Sub-Region	Bhawar and Tarai Zone (UP-2)
73.		Nainital	OFR Centre	Sub-Humid	Western Himalayan Region/ High hill Temperate Sub-Region	Hill Zone (UK-1)
74.	West Bengal	Kalyani (Dist. Nadia)	Main Centre	Humid	Lower Gangetic Plains Region/ Central Alluvial Plains Sub-Region	New Alluvial Zone (WB-3)
75.		24-Parganas South	OFR Centre	Humid	Lower Gangetic Plains Region	Coastal Sline Zone (WB-6)

4. SOIL AND CLIMATE

The major group of soils (centre-wise), on which on-station experiments of CSR were conducted during the year 2013-14, and geographical coordinates (Latitude and Longitude) of the different research locations are given in table-4/1. The general climatic conditions for the experimental locations are described below in brief.

Table-4/1: Soil type and geographical coordinates of different on-station CSR centres

S.No.	Centre	Soil Type	Latitude	Longitude
1.	Rajendranagar	Udic Ustochrepts, black soils	18° 59' N	78° 55' E
2.	Maruteru	Chromusterts clayey, medium black soils	16° 38' N	81° 44' E
3.	Rudrur	Chromusterts clayey, deep (90 cm depth), deep black soils	18° 30' N	77° 51' E
4.	Jorhat	Fluaquents/ Udicaquents association, very deep (90 cm depth), alluvial sandy clay loam soils	26° 47' N	94° 12' E
5.	Sabour	Eutrochrepts (Very deep), low and clay soils	25° 23' N	87° 07' E
6.	Raipur	Ochraquals association, deep black soils	21° 16' N	81° 36' E
7.	S.K. Nagar	Haplaquals, deep medium black soils	24° 19' N	72° 19' E
8.	Junagadh	Ustochrepts deep medium black soils	21° 30' N	70° 30' E
9.	Navsari	Vertic Ustochrepts deep black soils	20° 57' N	72° 54' E
10.	Hisar	Ustochrepts, very deep silty alluvial soils	29° 08' 55"N	74° 41'16" E
11.	Palampur	Udic Haplustalfs, red soils	32° 06' N	76° 03' E
12.	Chatha (Jammu)	Eutrochrepts very deep clay soils	32° 05' N	74° 04' E
13.	Ranchi	Ultic Palustalfs, very deep (90 cm) red soils	23° 17' N	85° 19' E
14.	Kathalagere	Alfisols, dark reddish brown sandy clay loam	13° 02' N	76° 15' E
15.	Siruguppa	Type Chromusterts, very deep (90 cm) black soils	15° 38' N	76° 54' E
16.	Karamana	Typic Tropofluvents, very deep (90 cm depth)	11° N	77° E
17.	Jabalpur	Chromusterts, very deep (90 cm depth), medium to deep black soils	23° 10' N	79° 57' E
18.	Indore	-	22° 04' N	79° 57' E
19.	Powarkheda	-	23° 25' N	73° 98' E
20.	Rewa	Ustochrepts-Vertic Ustochrepts association, fine loamy soils	24° 41' N	81° 15' E
21.	Akola	Medium deep black clayey soil	20° 42' N	77° 02' E
22.	Karjat	Haplustults Udic-Fluvents, red soils	18° 33' N	75° 03' E
23.	Parbhani	Chromusterts, deep (90 cm depth), deep black soils	19° 08' N	76° 05' E
24.	Rahuri	Chromusterts, fine clayey soils	19° 47' N	74° 18' E
25.	Bhubaneswar	Haplustalfs, very deep (90 cm depth), medium textured lateritic soils	20° 15' N	85° 52' E
26.	Chiplima	Haplaquents, very deep (90 cm depth) clay, ill-drained soils	20° 21' N	80° 55' E

Contd..../-

S.No.	Centre	Soil Type	Latitude	Longitude
27.	Ludhiana	Ustochrepts-Ustic Psamments Association, very deep (90 cm depth), alluvial sandy and sandy-loam soils	30° 56' N	75° 52' E
28.	Durgapura (Jaipur)	Torrid-Psamments/ Torrid-Fluvents Association, sandy loam soils	26° 55' N	75° 49' E
29.	Kota	Chromsterts-Paleusterts Association, very deep (90 cm depth) clay loam soils	25° 26' N	75° 30' E
30.	Coimbatore	Udic Rhodustalfs, fine loamy red sandy soils	11° 59' N	78° 55' E
31.	Thanjavur	Typic Pellusterts, clayey very deep (90 cm depth)/ deep black soils of deltaic origin	10° 47' N	79° 10' E
32.	Kanpur	Udic Ustochrepts, alluvial soils	26° 28' N	80° 21' E
33.	Faizabad	Udic Fluvents-Fluaquents Association, lowland clayey soils	26° 47' N	82° 12' E
34.	Bichpuri	Ustochrepts, very deep (90 cm depth) alluvial soils	27° 02' N	77° 09' E
35.	Varanasi	Aeric Chroquals very deep (90 cm depth) alluvial clayey soils	25° 18' N	83° 03' E
36.	Pantnagar	Hapludolls, very deep (90 cm depth) alluvium coarse loamy soils	29° 08' N	79° 05' E
37.	Kalyani	Fluventic Eutrochrepts, very deep (90 cm depth) alluvial soils	23° 40' N	88° 52' E
38.	ICAR-IIFSR, Modipuram	Sandy loam	29° 4'36" N	77° 42'22" E
39.	ICAR-RC, Patna	Old Alluviam, Sandy loam to clay	25° 50' N	84° 45' E
40.	ICAR-RC, Umiam	Silty clay loam	25° 41'21" N	91° 55'85" E
41.	ICAR-RC, Goa	Laterite, sandy loam	15° 29'22" N	73° 55'10" E
42.	ICAR-CIARI, Port Blair	Sandy clay loam	6° 29'11" N	92° 55'10" E

Weather conditions at different farming systems research centres during 2013-14

The annual conditions of important weather parameters e.g., rainfall, monthly average maximum temperature and minimum temperature prevailed during the reporting period (2013-14) at the various Integrated Farming Systems Research Centers of the AICRP on IFS are depicted in figures 1-3 and described below.

Akola: During the reporting period, 694.0 mm rainfall was received out of this 92% rainfall was precipitated during the *kharif* season. Rainfall was evenly distributed in the *kharif* season and July was found to be the wettest month during the reporting period where about 1/3rd of total rainfall was precipitated. Among other months February and March were found to be the wet months and rest of other months was remained dry. The highest (34.4°C) and lowest (29.3°C) monthly average maximum temperature were recorded during March and December respectively whereas, December was observed as coldest (10.9°C) month of the year.

Bhubaneswar: Fairly higher total rainfall (1581.0 mm) received during the reporting year over the previous year. 95 per cent of total rainfall was precipitated during the *kharif* season. Distribution of rain was fairly good during *kharif* season

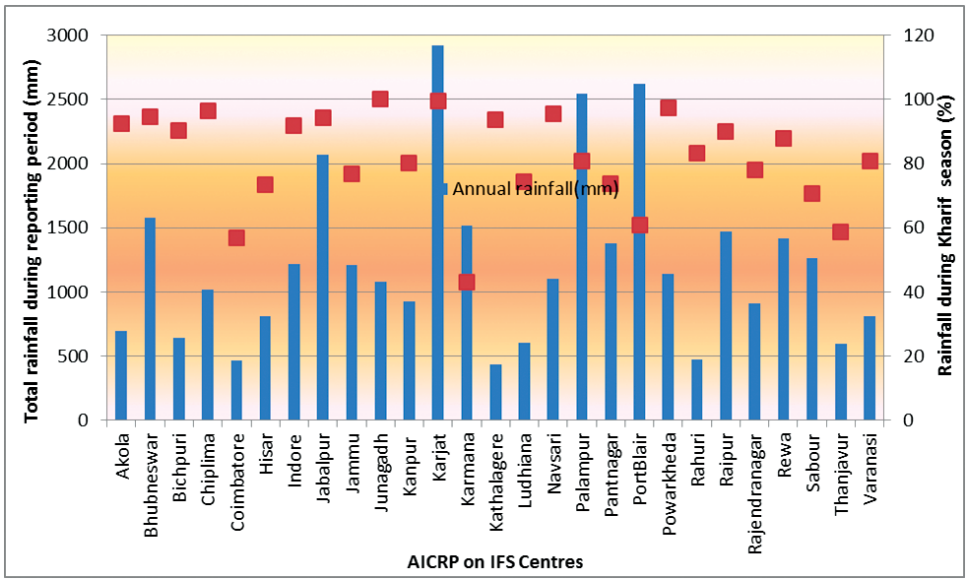


Fig. 1. Annual rainfall (mm) and percentage rainfall precipitated during *kharif* season during the reporting year (2013-14) at various centers of the AICRP on IFS

however terminal heavy rain (734.0 mm) was recorded in the month of October. February, March and April were found to be other wet months between November to June. The monthly average maximum temperature ranged between 28.9-38.7°C. The monthly average minimum temperature dropped to 14.0°c in the month of December.

Bichpuri: Comparatively good rain (643.0 mm) was received during the reporting period over the last crop season. About 90 per cent of the total rainfall was precipitated during the *kharif* season. With 371.0 mm rainfall, July was found to be the wettest month however, distribution of the rain was fairly good in the season. The highest monthly average maximum temperature (41.1°C) was recorded during the May whereas; lowest monthly average maximum temperature (18.3°C) was recorded in January. December was found to be the coldest months where mercury dropped down to 7.9°C.

Chiplima: During the reporting period a 1019.0 mm rainfall was recorded at the centre where 96 per cent of total rain was received during *kharif* season. Though the total rainfall precipitated during the period was lesser than the previous season but distribution was excellent in the whole *kharif* season. With 454.6 mm rain July was found to be the wettest month of the season. Only two months between November to June namely February and May were found to be wet and rest other months were dry. May was observed as hottest (40.0°C) during the year whereas, December was very cool and dry with 8.6 °C monthly minimum temperature.

Coimbatore: The total rainfall (464 mm) received during the reporting year, out of which only 57 per cent of total rain was down poured during the *kharif* season. Distribution of rainfall was quite good throughout the whole season however, January, February, March and June were found to be dry months. The summer season i.e., March, April and May were hot and monthly average maximum temperature was reported highest (36.3°C) during April whereas it was lowest in December. The winter season was also remained moderately warm where monthly average minimum temperature remained above 19.6°C.

Hisar: In comparison to last crop season higher rainfall (810.0 mm) was received at the centre during the reporting period. Kharif season received about 73 per cent of total rainfall with good distribution. Among all the months of reporting period, only December month was found to be dry. A good amount of rain received from the receding monsoon during September. As usual summer was very hot and monthly maximum temperature

(41.0°c) was reported highest during the June and winter was severe during which average monthly minimum temperature dropped below 5.6°C in January.

Indore: The centre received 1214.0 mm rainfall during the reporting period. 92 per cent of the total rainfall with god distribution was precipitated during the kharif season. With 737.6 mm rain July was found to be the wettest month during the period. Rainfall was recorded in all the months from June to February except November. The range of the monthly maximum temperature was 23.4 to 32.9°C. With 7.1°C minimum temperature, January was recorded as coldest month during the period.

Jabalpur: More than double rainfall occurred during the last season was recorded under the reporting period (2067.0 mm). Out of which 94 per cent was received during season. Rainfall was fairly distributed in *kharif* season however, July with 568.0 mm rain was found to be the wettest month under the report period. Rainfall was also recorded during January to March. Summer season was hot and the range of monthly average maximum temperature was 22.8 to 31.9°C. The mercury reached up to dropped up to 8.5°C during December.

Jammu: The centre received 1206.0 mm total rainfall.77 per cent of total rainfall precipitated during the kharif season. Not a single month of the reporting period was found to be dry. With 496.7 mm rain, August was recorded as wettest month. The range of monthly average maximum temperature was 18.9 39.7°C. January month was fond to be coldest where night temperature was dropped to 4.9°C.

Junagarh: The rainfall received during reporting period was 1081.0 mm and these were July, August, September and October which poured all the rain at the centre. Rest other eight months of the reporting period was found to be dry. The highest monthly average maximum temperature (39.9°C) was observed during May whereas, lowest minimum temperature (12.1°C) was recorded during January.

Kanpur: The total rainfall of 929.0 mm was recorded during the reporting season which was about 30% higher over the previous season. 80 per cent of total rainfall was precipitated during the kharif season. Good distribution of rain fall was observed during the year where only two months *viz.,* November and May were found to be dry during the reporting period. S-W monsoon contributed about 90% rain to the total annual rainfall at the centre. With 41.4°C monthly average maximum

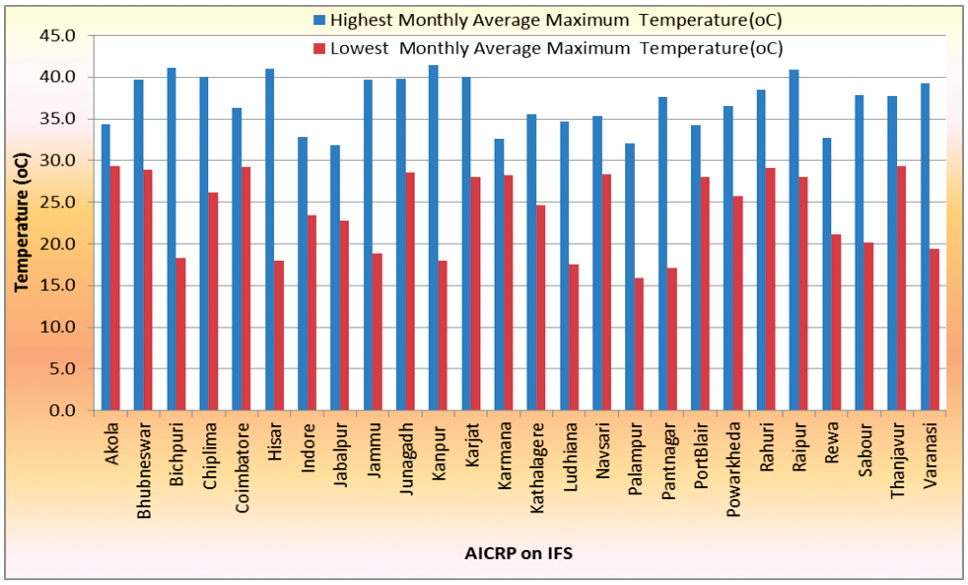


Fig. 2. Highest and lowest monthly average maximum (°C) temperature during the reporting year (2013-14) at various centers of the AICRP on IFS

temperature, April was recorded the hottest month whereas day temperature remained above 18.0°C even in January where mercury dropped to 7.2°C during night time.

Karjat: The rainfall received during reporting period was 2921.0 mm. 99.6 per cent of total rainfall was precipitated during July to October, however November and December months also received very less amount of rain. Rest six months from January to June was found to be dry. The range of monthly average maximum temperature 28.1 to 40.0°C. The night temperature was moderate in January where mercury dropped to 15.5°C.

Karmana: During the reporting period, the total rainfall (1519.0 mm) was received at this center. The distribution of rain was good throughout the year and only it was the June which was deprived of the rain. 57 per cent of total rainfall was precipitated during N-E monsoon. With 333.3 mm rainfall, April was fund to be the wettest month during the reporting period. The range of monthly average maximum temperature was 28.2 to 32.6°C. Night temperature remained above 22.0°C during the reporting period.

Kathalagere: Total rainfall received during the reporting period was only 434.0 mm which was only much higher than the previous season. 94 per cent of the total rainfall with good distribution was received during *kharif* season. The range of monthly average maximum temperature was 24.6 to 35.5°C. Lowest monthly average minimum temperature was recorded during December.

Navsari: The reporting period received 1105.0 mm rainfall where 95 per cent of total rain was received during July to September. The highest monthly mean maximum temperature (35.4°C) was observed during March whereas, lowest monthly mean minimum temperature (14.2°C) was recorded during January.

Palampur: Total rainfall received during the reporting was 2548.0 mm out of which 2061.0 mm rain was precipitated during the kharif season with smooth distribution. No any month except June was found to be dry. With 846.9 mm rain, August month was recorded as the wettest month in entire season. The range of average monthly maximum temperature was 15.9 to 32.1°C. Mercury was dropped to 3.7°C in during the night of January.

Pant Nagar: The rainfall received during reporting period was 1383.0 mm. With 74 per cent to the total rainfall, well distributed was received during the *kharif* season. Except November and June all the months were found to be wet whereas, with 429.6 mm rain July month was recorded as wettest

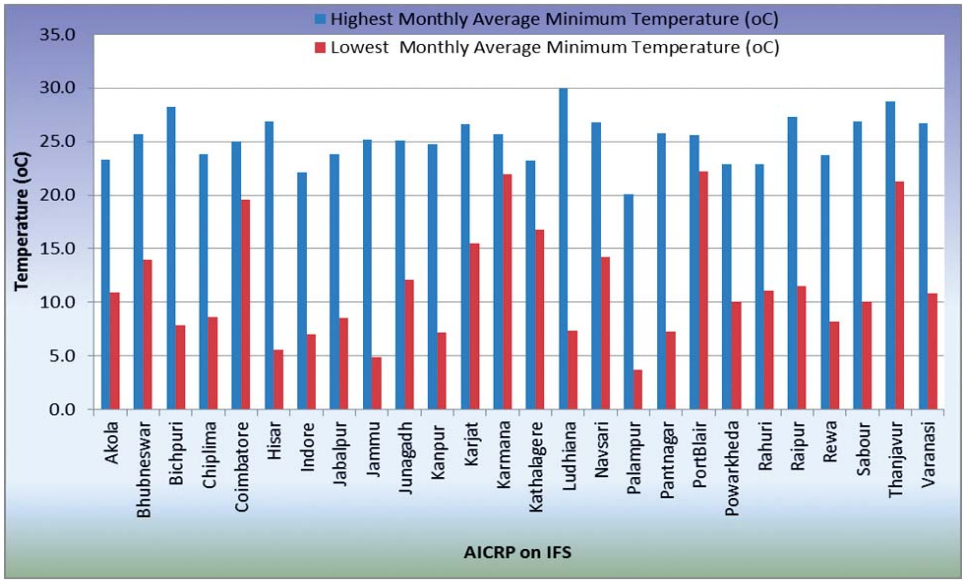


Fig. 3. Highest and lowest monthly average minimum (°C) temperature during the reporting year (2013-14) at various centers of the AICRP on IFS

in the entire season. The highest monthly average maximum temperature (37.4°C) was recorded in the month of May however, average minimum temperature (7.3°C) was observed during the month of December.

Portblair: The total rainfall recorded during the reporting period was 2622.0 mm where 61 per cent of the total was poured down in the *kharif* season. Three continuous months February, March and April were found to be dry. With 624.4 mm rain, July was the wettest month of the season. The highest average monthly maximum temperature (34.2°C) was recorded during April whereas lowest minimum temperature (22.2°C) was recorded during February.

Powarkheda: Total rainfall recorded during the reporting year was 1142.0 mm which about 10 per cent higher than the previous season. About 97 per cent rain was occurred during kharif season and it was highly distributed in the entire season. July was found to be wettest of the season and 588.9 mm rain was precipitated during this month. The range of monthly average maximum temperature was 25.7 to 36.6°C whereas, December was observed as coldest month and monthly mean minimum temperature was 10.1°C.

Rahuri: Total annual rainfall precipitated during the reporting period was 472.0 mm that was lower than the preceding year whereas 83 per cent of total rain was precipitated during the *kharif* season. It was fairly distributed in the season. The highest average monthly maximum temperature (38.5°C) was recorded during May whereas lowest minimum temperature (11.1°C) was recorded during December.

Raipur: The total annual rainfall received during the reporting period was 1474.0 mm which was about 17 per cent higher than the previous crop season. Distribution of rainfall was good during the *kharif* season but July was observed as very wet and 606.5 mm rain was precipitated in this month. The highest monthly mean maximum temperature (40.9°C) was observed during May whereas, lowest minimum temperature (11.5°C) was recorded during December.

Rajendra Nagar: Nearly 100 mm lower rainfall to the preceding year was recorded during the reporting period i.e., 912.0 mm out of which 711 mm (78 %) rain was received during *kharif* monsoon. The distribution of rain was fairly good during the *kharif* season. December, January, February and April months were found to be dry where no rainy days was observed.

Rewa: Total rainfall recorded during the reporting period was 1417.0 mm and 88 percent rainfall with very good distribution was poured down during the *kharif* season. December, April, May and June were deprived of the rain while rest other months received rain. The range of average monthly maximum temperature was 21.1 to 32.7°C whereas December was recorded as the coldest month with 8.2°C night temperature.

Sabour: During the reporting year, the total rainfall received was 1261.0 which was about 25 per cent higher rain in the previous crop season. Kharif season received very good amount of rain (891.0 mm) with smooth distribution in the entire season. May was observed as hottest (37.8°C) during the year whereas, December was very cool and dry with 10.1 °C monthly minimum temperature.

Thanjavur: The total rainfall received during the reporting period was lower than the preceding year and it was 599.0 mm. About 59 per cent rain fall occurred during the *kharif* season. With 127.0 mm rain May was recorded as the wettest month in entire reporting period. The lowest monthly average maximum and minimum temperature recorded during the year was 37.4°C and 21.3°C respectively.

Varanasi: A higher rainfall than the preceding year was observed during the reporting year i.e., 808.0 mm. 81 per cent of the total rainfall was precipitated during the *kharif* season and it was highly distributed. November, December, March and June months were deprived of the rain and no rainy days was observed in these months. With 248.6 mm rain, August was recorded as the wettest month in the entire period. The highest average monthly maximum temperature (39.3°C) was observed during May whereas; lowest minimum temperature (10.8°C) was recorded during January.

5. STAFF POSITION

Out of 618 total staff sanctioned for different centers, 459 staff were actually in position as on 31st March 2015, suggesting that 25.7 per cent of total posts were vacant (Table-5/1 and Appendix-III).

Table-5/1: Staff position under AICRP-IFS (university-wise) as on 31.3.2015

S.No.	Name of the University	Scientific		Technical		Administrative		Supporting	
		Sanctioned	Filled	Sanctioned	Filled	Sanctioned	Filled	Sanctioned	Filled
1.	**ANGRAU, Hyderabad**	8	8	23	16	5	3	3	1
2.	AAU, Jorhat	5	3	11	10	2	2	2	2
3.	BAU, Sabour	4	4	11	5	2	1	2	2
4.	IG KV, Raipur	5	4	11	7	2	2	2	2
5.	SDAU, S.K. Nagar	5	5	11	8	2	2	2	2
6.	JAU, Junagadh	1	1	3	3	1	1	-	-
7.	NAU, Navsari	1	1	3	2	1	0	-	-
8.	AAU, Anand	1	1	8	6	1	0	1	0
9.	CCS HAU, Hisar	5	5	11	7	2	2	2	0
10.	CSK HPKVV, Palampur	4	4	11	11	2	2	2	1
11.	SKUAST, Jammu	4	4	11	11	2	1	2	2
12.	BAU, Ranchi	4	4	11	11	2	2	2	2
13.	UAS, Bangalore	5	4	11	2	2	0	2	1
14.	UAS, Dharwad	1	1	8	7	1	0	1	0
15.	UAS, Raichur	3	3	3	3	1	1	1	1
16.	KAU, Thrissur	5	5	11	10	2	2	2	2
17.	JNKVV, Jabalpur	8	7	23	11	5	2	3	1
18.	RVS KVV, Gwalior	1	1	3	1	1	1	-	-
19.	MPKV, Rahuri	5	5	11	9	2	2	2	1
20.	MAU, Parbhani	4	3	11	7	2	0	2	0
21.	DPD KV, Akola	4	3	11	6	2	0	2	2
22.	DBS KKV, Dapoli	4	3	11	10	2	0	2	1
23.	OUAT, Bhubaneswar	7	7	22	21	4	4	3	3
24.	PAU, Ludhiana	4	4	11	8	2	2	2	2
25.	SK RAU, Bikaner	4	2	11	7	2	0	2	2
26.	MP UAT, Udaipur	3	3	8	7	2	1	1	1
27.	TNAU, Coimbatore	7	7	22	16	4	4	3	3
28.	CSA UAT, Kanpur	4	4	11	8	2	1	2	2
29.	ND UAT, Faizabad	4	3	11	9	2	2	2	1
30.	ICAR-IIFSR, Modipuram	1	0	8	0	1	0	1	0
31.	BHU, Varanasi	1	1	3	0	1	1	-	-
32.	RBS College, Bichpuri	1	1	3	2	1	1	-	-
33.	GBP UAT, Pantnagar	5	4	11	7	2	0	2	1
34.	BC KVV, Kalyani	4	3	11	11	2	1	2	2
	TOTAL	**132**	**117**	**360**	**259**	**69**	**42**	**57**	**41**

6. BUDGET

S. No.	Name of University/ ICAR Institute	Pay & allow.	T.A.	Other contingencies	Contr. Services	POL/Veh. Hiring	NRC	Total
				Fin. Year 2013-14				
1.	ANGRAU, Hyderabad	148.57	1.25	39.50	8.00	2.00	0.00	199.32
2.	HPKVV, Palampur	91.50	0.50	10.00	6.00	0.20	0.00	108.20
3.	GBPUA&T, Pantnagar	61.42	0.50	10.00	6.00	0.20	0.00	78.12
4.	CSAU&T, Kanpur	49.00	1.00	9.70	6.00	0.20	0.00	65.90
5.	NDUA&T, Faizabad	6.72	0.50	10.00	6.00	0.20	0.00	79.42
6.	BHU, Varanasi	30.00	0.25	5.00	6.00	0.10	0.00	41.35
7.	BAU, Ranchi	29.00	0.50	15.83	6.00	0.70	1.00	53.03
8.	BAU, Sabour	34.65	0.50	8.00	5.33	0.20	0.00	48.68
9.	BCKVV, Kalyani	65.00	0.50	19.00	9.10	0.95	0.00	94.55
10.	AAU, Jorhat	52.00	0.80	7.50	3.25	0.50	0.00	64.05
11.	PAU, Ludhiana	106.62	0.50	10.00	6.00	0.40	0..00	123.52
12.	HAU, Hisar	65.00	1.00	9.50	5.00	0.20	0.00	80.70
13.	RAU, Bikaner	52.50	0.70	10.00	5.00	0.20	0.00	68.40
14.	SDAU, S.K. Nagar	70.00	0.70	16.05	6.50	0.95	0.00	94.20
15.	NAU, Navsari	15.00	0.20	5.00	1.00	0.10	0.00	21.30
16.	JAU, Junagadh	25.20	0.20	5.00	1.00	0.10	0.00	31.50
17.	AAU, Anand	13.00	0.25	10.25	2.00	0.60	0.00	26.10
18.	JNKVV,Jabalpur	89.00	1.00	26.25	8.00	1.00	0.00	125.25
19.	RVSKVV, Gwalior	22.00	0.20	5.00	1.00	0.00	0.00	28.20
20.	IGKV, Raipur	31.00	0.65	22.47	4.50	1.	0.00	60.07
21.	OUAT, Bhubaneswar	134.00	1.00	12.50	6.00	1.45	0.00	154.00
22.	PDKV, Akola `	30.85	.050	10.00	6.00	0.50	0.00	47.55
23.	MAU, Parbhani	34.00	0.50	10.00	6.00	0.20	0.00	50.70
24.	MPKV, Rahuri	80.91	1.00	10.00	6.00	0.20	0.00	98.11
25.	KKV, Dapoli	68.48	1.50	22.75	7.00	0.70	0.00	100.43
26.	UAS, Raichur	12.00	0.20	5.00	6.00	0.20	0.00	23.40
27.	UAS, Dharwad	12.00	0.30	5.00	1.00	0.10	0.00	18.40
28.	UAS, Bangalore	57.00	0.25	19.55	4.20	0.85	0.00	81.85
29.	UAHS, Shimoga	13.00	0.20	1.50	2.00	0.10	0.00	16.80
30.	TNAU, Coimbatore	140.00	2.40	25.60	7.20	1.25	0.00	176.45
31.	SKUAST, Jammu	1000.10	0.50	10.00	6.00	0.20	0.00	116.80
32.	KAU, Thrissur	97.90	0.50	7.00	6.00	0.20	0.00	111.60
33.	MPUAT, Udaipur	51.00	0.80	13.80	8.50	1.45	0.00	75.55
34.	RBS College, Bichpuri	15.00	0.20	3.00	1.00	0.10	0.00	19.30
35.	PDFSR, Modipuram	0.00	0.40	7.00	9.00	0.20	0.00	16.60
36.	ICAR Res. Comp., Patna	0.00	0.25	8.50	6.95	0.95	0.00	16.65
37.	ICAR Res. Comp., Umiam	0.00	1.80	19.50	12.75	5.75	0.00	39.80
38.	ICAR Res. Comp., Old Goa	0.00	0.25	11.50	4.25	0.20	0.00	16.20
39.	CARI, Port Blair	0.00	0.50	13.55	6.95	0.95	0.00	21.95
	TOTAL	**1959.42**	**24.75**	**469.80**	**214.48**	**24.55**	**1.00**	**2694.00**

Funds (Rs. In Lakhs) released during financial year 2014-15 under AICRP on integrated farming systems (ICAR share only)

S. No.	Name of University/ ICAR Institute	Pay & Allow.	T.A.	Other Contingencies	Contr. Services	POL/Veh. Hiring	NRC	TSP (including all NRC)	Total
1	ANGRAU, Hyderabad	121.00	1.63	10.08	5.42	0.12	3.00	25.02	166.27
2	HPKVV, Palampur	114.00	0.78	5.44	3.42	0.08	1.50	0.00	125.22
3	GBPUA&T, Pantnagar	66.00	0.79	5.44	5.42	0.08	1.25	0.00	78.98
4	CSAU&T, Kanpur	65.00	0.78	5.44	4.42	0.08	2.00	0.00	77.72
5	NDUA&T, Faizabad	71.00	0.78	5.44	3.42	0.08	2.50	0.00	83.22
6	BHU, Varanasi	25.40	0.44	3.98	3.42	0.05	1.00	0.00	34.29
7	BAU, Ranchi	26.50	0.28	0.72	1.42	0.05	1.00	15.58	45.55
8	BAU, Sabour	43.00	0.68	3.52	4.42	0.08	1.00	0.00	52.70
9	BCKVV, Kalyani	50.00	0.48	3.14	1.95	0.05	1.00	21.50	78.12
10	AAU, Jorhat	18.00	0.28	2.23	2.50	0.05	1.50	0.00	24.56
11	PAU, Ludhiana	82.00	0.94	5.44	3.00	0.08	1.00	0.40	92.86
12	HAU, Hisar	75.00	0.94	5.44	5.42	0.08	1.00	0.00	87.88
13	SKNAU, Jobner	62.00	0.78	5.44	4.42	0.08	1.00	0.00	73.72
14	SDAU, S.K. Nagar	70.00	0.91	5.00	4.42	0.08	2.00	14.51	96.92
15	NAU, Navsari	9.61	0.23	2.73	0.58	0.05	1.00	0.00	14.20
16	JAU, Junagadh	20.00	0.28	3.00	1.08	0.05	1.00	0.00	25.41
17	AAU, Anand	10.17	0.43	0.00	0.00	0.00	1.00	9.50	21.10
18	JNKVV,Jabalpur	74.00	0.80	6.13	4.42	0.15	2.00	17.98	105.48
19	RVSKVV, Gwalior	32.00	0.58	4.25	1.58	0.05	1.00	0.00	39.46
20	IGKV, Raipur	61.00	0.68	3.73	3.42	0.05	1.50	17.98	88.36
21	OUAT, Bhubaneswar	125.00	1.17	8.92	6.00	0.11	3.00	0.00	144.20
22	PDKV, Akola	51.00	0.78	5.20	4.92	0.08	2.25	0.00	64.23
23	MAU, Parbhani	51.00	0.78	5.20	5.42	0.08	1.00	0.00	63.48
24	MPKV, Rahuri	64.00	0.78	5.40	6.00	0.08	1.00	0.00	77.26
25	KKV, Dapoli	56.00	0.78	4.23	6.00	0.08	1.00	12.23	80.32
26	UAS, Raichur	30.00	0.55	3.73	6.00	0.08	1.00	0.00	41.36
27	UAS, Dharwad	25.00	0.43	3.98	1.08	0.05	1.00	0.00	31.54
28	UAS, Bangalore	16.50	0.23	2.53	1.00	0.03	1.00	13.52	34.81
29	UAHS, Shimoga	23.50	0.59	3.73	5.00	0.08	1.00	0.20	34.10
30	TNAU, Coimbatore	120.00	1.17	9.42	6.00	0.12	3.00	17.53	157.24
31	SKUAST, Jammu	83.50	0.83	5.40	5.00	0.08	1.50	0.00	96.31
32	KAU, Thrissur	88.00	0.83	5.40	5.00	0.08	1.50	0.00	100.81
33	MPUAT, Udaipur	28.00	0.36	0.70	0.00	0.00	1.00	23.98	54.04
34	AU, Kota	9.50	0.28	2.25	1.08	0.05	1.00	0.00	14.16

S. No.	Name of University/ ICAR Institute	Pay & Allow.	T.A.	Other Contingencies	Contr. Services	POL/Veh. Hiring	NRC	TSP (including all NRC)	Total
35	RBS College, Bichpuri	6.00	0.13	0.75	0.58	0.03	1.50	0.00	8.99
36	ICAR-IIFSR, Modipuram	0.00	0.34	4.25	9.00	0.10	0.00	0.00	13.69
37	ICAR-IIFSR (Coord.Unit.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	ICAR Res. Comp., Patna	0.00	0.34	1.50	3.39	0.08	0.00	10.09	15.40
39	ICAR Res. Comp., Umiam	0.00	0.24	2.08	4.25	0.20	0.00	16.41	23.18
40	ICAR Res. Comp., Old Goa	0.00	0.34	4.25	3.39	0.08	0.00	0.00	8.06
41	ICAR-CIARI, Port Blair	0.00	0.34	2.42	3.39	0.08	0.00	18.57	24.80
	Total	**1872.68**	**24.78**	**167.93**	**146.65**	**2.96**	**50.00**	**235.00**	**2500.00**

Rearing of catfish and fishery unit in IFS model at Kalyani centre (West Bengal)

On farm intervention of vermicompost preparation and application in betalvine at South 24-Paragnas district (West Bengal)

7. RESEARCH RESULTS

7.1 INTEGRATED FARMING SYSTEMS

7.1.1 DEVELOPMENT OF REGION-SPECIFIC ON-STATION IFS MODELS

Network project on "Development of Region Specific Integrated Farming Systems Research Models" was initiated in the year 2010-11 at 32 AICRP-IFS centres representing all the 15 agro-climatic regions of the country. However, because of several technical and administrative formalities, field execution in real sense was started during 2011-12. The compiled annual progress report 2015-16 for all the 32 AICRP-IFS centres contains the data and results/findings on various aspects of the study mainly on the composition of IFS models at respective AICRP-IFS centres (Table-7.1 and table-7.2)) , observations on important aspects viz; total farm production , cost on variable inputs, net returns IFS V/S prevailing farmer practice, saving in market inputs through on farm recycling, employment generation and family savings (Table-3) calculated after meeting household domestic food/fodder/feed/fuel needs (Table-4) and trend in variable cost of production during the year 2014-15 and also last four four years (2011-12 to 2015-16) of the study .

1. Western Himalayan Region

AICRP-IFS programme running in Western Himalayan Region is spread in three states including Uttrakhand, Himachal Pradesh and J&K and are stationed at three independent centers at i) HNB, Garhwal Univ. Pantnagar (Uttrakhand), ii) CSKHP, KVV,Palampur and iii) SKUAS&T, Jammu at Chhata. The data given in table below and predicted in figures 1 revealed that diversification in prevailing farming system through integration of cost effective interventions brought out significant change in production, profits and besides generating more employment opportunities economized cost of production through recycling of farm wastes, crop residues, GM and adopting several resource conservational practices. This all reduced use of inorganic fertilizers and promoted organic farming thus improvement in soil conditions. During the year under report average farm production (t/ha) was considerably higher 33.17 t/ha at Pantnagar followed by 21.52 at Chhata and low at Palampur (15.15 t/ha) . However, net returns were considerably higher (Rs.3,06,202) at Chhata followed by Pantnagar (Rs.2,37,777) and lowest at Palampur (Rs.1,77,896) . The data shows two to three times more returns compared to farmer practice. The role of diversification and residue recycling was reflected in resource saving (%) , increased employment opportunities and ultimately family savings (After meeting family consumption and production cost). Saving in farm inputs ranging from 7.50% at Palampur, 14.82% at Chhata and as much as 33.20 % at Pantnagar was reported. Similarly, family savings were Rs.1,15,826 at Pantnagar, Rs.1,09,614 at Chhata and Rs. 7,189 at Palampur. Not only this but diversification of farming system enabled to generate more employment (527 to 586 Man Days/ha/year).

Center/State	Component of IFS Model	Total Production (REY) t/ha		CC		Man Days
		14-15	Mean	14-15	Mean	Mean
Chhata (J&K)	Crops+Dairy+Horti.+Veg.+ Apiary + Fish.+ Poult.+VC	21.52	22.42	297365	243576	527
Palampur, (H.P.)	Crops+Dairy+ Horti+ Fodder + Agroforestry	15.15	16.57	230324	212505	579
Pantnagar (U.K.)	Crop+dairy+Hort.+ Plantation crops+ Vermico-mpost	33.17	24.25	217486	177563	586

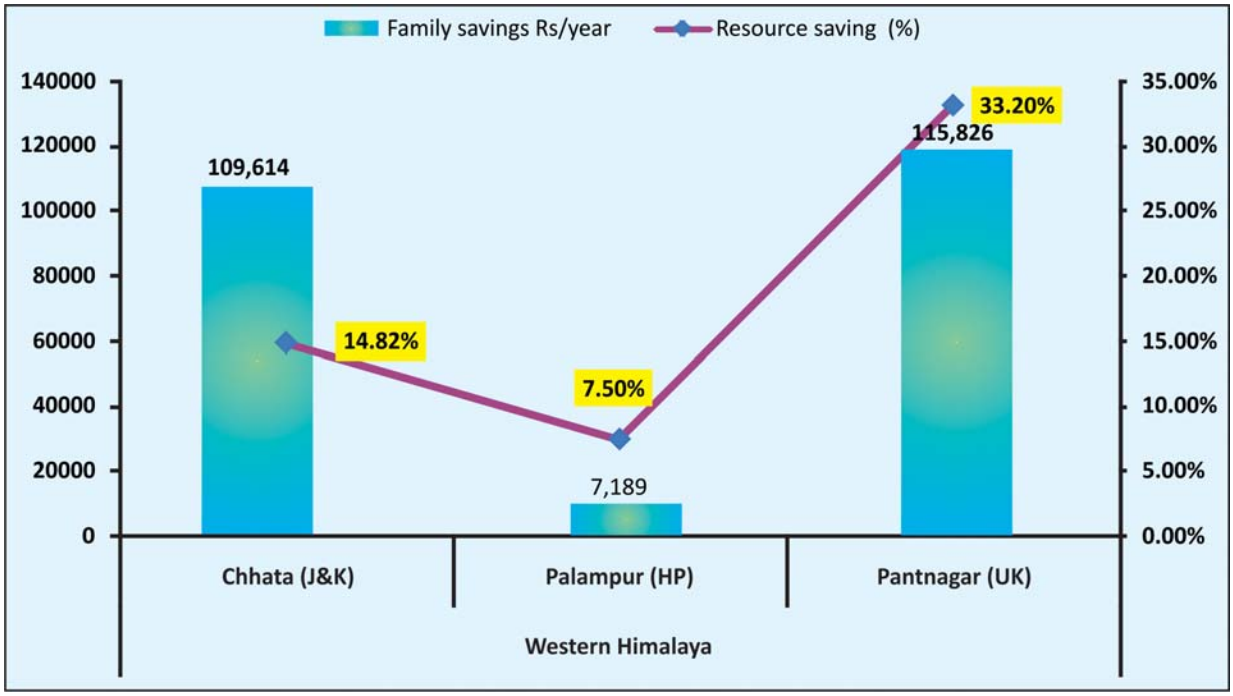


Fig. 1. Family savings (GR-CC- FC) and savings in market inputs through on – farm recycling

2. Eastern Himalayan Region

AICRP-IFS programme running in Eastern Himalayan Region is located at two AICRP-IFS centers ICAR Research Complex, Umaim (Meghalaya) and AAU,Jorhat (Assam) The data on farm production, profits, employment generation, recycling of farm resources, family savings after meeting household consumption and production costs given in table below and predicted in figures 2 revealed that diversification of existing farming system and adopting scientific approach of farming brought out significant change in total farm production, profits and besides generating more employment opportunities economized cost of production and thus making farming more profitable and sustainable. During the year under report average farm production (t/ha) was considerably higher 27.3 t/ha at Jorhat closely followed by Umiam (25.3 t/ha). Similar trend was of net returns Rs.160262 at Jorhat and Rs.139334 at Umiam showing 168.64 and 231.74 % increase in profits compared to farmer practice. Family savings were Rs.27,875 at Jorhat and Rs.77576 at Umiam. Diversification of farming system enabled to generate more employment (274 at Umiam to 414 Man Days/ha/year at Jorhat).

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Jorhat (Assam)	27.3	22.05	160262	180306	59656	124364	154408	414
Umiam (Meghalaya)	25.3	20.65	139334	155820	42000	305235	240969	274

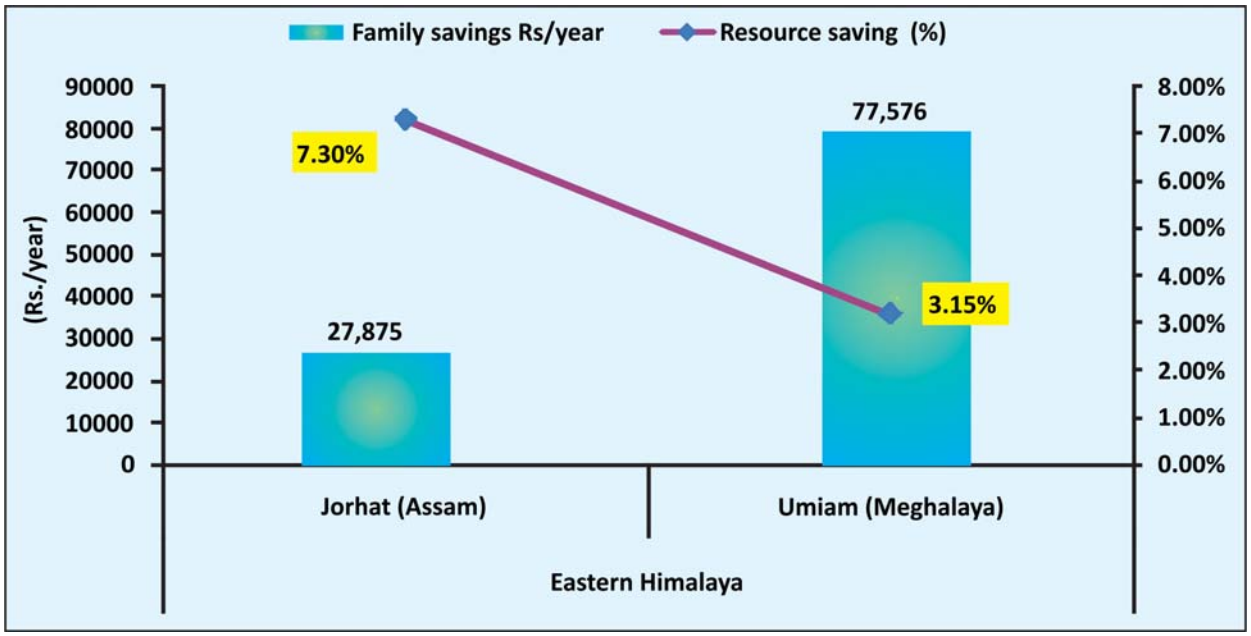


Fig. 2. Saving in farm resources along with family saving (GR-CC-FC)

3. Trans Gangetic Plains Region

In Trans Gangetic Plains Region, IFS Models have been developed at two most representative AICRP-IFS centers namely PAU, Ludhiana (Punjab) and CCHAU, Hisar . Results and impact of the IFS approach on farm production, profits and livelihood improvement during last four years is described below;

Crop + Dairy is the dominate farming system of the region with an average annual net returns of Rs.1,63,938 and Rs.61855/ha/year in Ludhiana and Hisar districts. The data given in table below and predicted in figures 3 revealed that diversification in prevailing farming system could produced total farm production in the reported year as high as 52.4 t at Ludhiana and 40.44 t/ha/year at Hisar with two to three times more net returns (Rs.3,80,308 and Rs. 2,15,905 /ha/year , respectively) as compared to prevailing system of farming. Besides generating more employment opportunities (224 to 328 Man Days/year) recycling of farm wastes, crop residues, GM and adopting several resource conservational practices economized cost of production by 16% at Ludhiana and 21% at Hisar. This all reflected in significantly higher family saving ranging from Rs.2,47,573 at Ludhiana and Rs.1,28,599 at Hisar thus confirming the significance of the IFS approach in livelihood security as well as improvement.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)		Cost of Cultivation (Rs/ha)		Man Days/ year
	14-15	Mean	14-15	Mean	14-15	Mean	Mean
Ludhiana Punjab)	52.4	35.54	380308	268106	368103	235024	328
Hissar (Haryana)	40.44	30.07	215905	152555	87306	86315	224

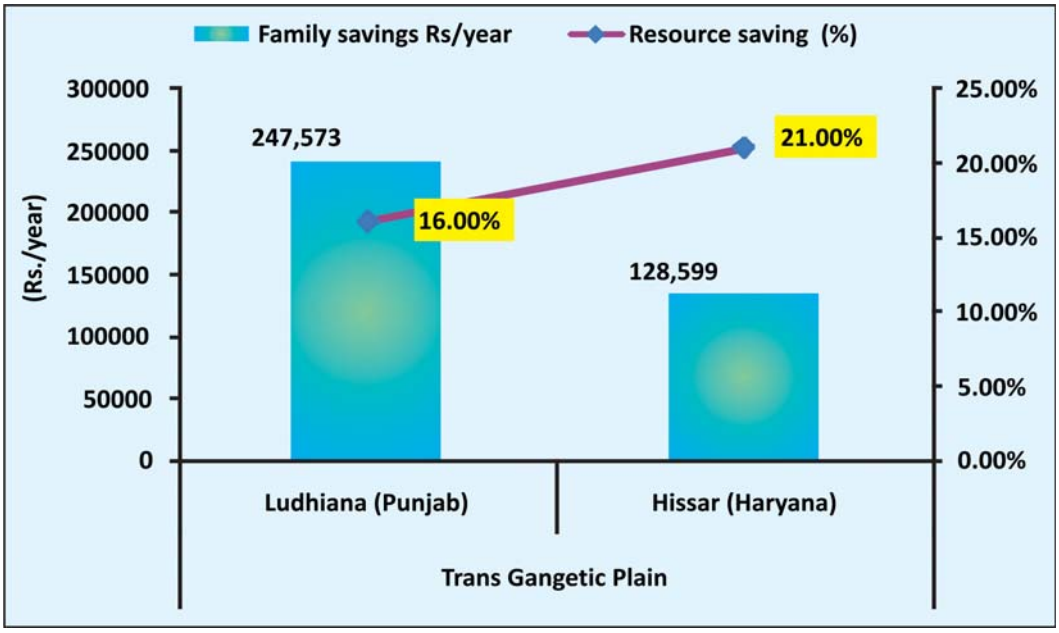


Fig. 3. Saving in farm resources alongwith family saving (GR-CC-FC)

4. Upper Gangetic Plains Region

Two AICRP-IFS centers one at PDFSR, Modipuram, Meerut (U.P.) a voluntary ICAR institute and another one CSAUA&T, Kanpur (U.P.) are representative centers in the region for the study on "Development of Region specific IFS Models". Based on benchmark survey, Crop + Dairy is the dominate farming system of the region with an average annual net returns of Rs.64,300 and Rs.67754/ha/year in Modipuram and Kanpur districts, respectively. The data given in table below and predicted in figures 4 revealed that diversification in prevailing farming system could brought considerably higher increase in farm production and profitability at Modipuram center with total farm production of 36.2t and net returns of Rs.2,67,447, four times more than prevailing farming system, however results were not similar at Kanpur center wherein production as well as profits both were below average because of crop losees due to adverse climatic conditions (heavy rains and hailstorms in rabi season) and no crop in summer because of paucity of funds . Besides generating more employment opportunities (439 and 379Man Days/year) recycling of farm wastes, crop residues, GM and adopting several resource conservational practices economized cost of production by 32.82% at Modipuram and 39% at Kanpur. This all reflected in significantly higher family saving ranging from Rs.97,376 at Modipuram and Rs.66,654 at Kanpur thus confirming the significance of the IFS approach in livelihood security as well as improvement.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Modipuram (U.P.)	36.26	31.93	267447	192839	64300	291161	256470	439
Kanpur (U.P.)	8.68	16.09	67307	97833	67754	156619	135126	379

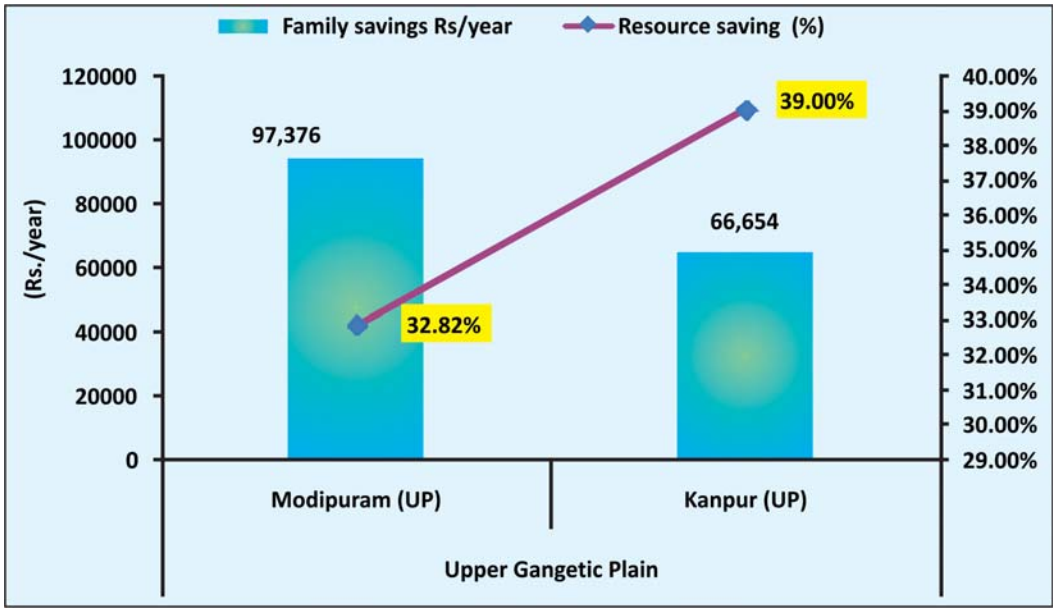


Fig. 4. Saving in farm resources along with family saving (GR-CC-FC)

5. Middle Gangetic Plains Region

Four AICRP –IFS Centers, two in eastern part of Uttar Pradesh namely IAS,BHU, Varanasi and NDUA&T, Kumarganj, Faizabad and two in Bihar one ICAR Research Complex for eastern region, Patna and another one BAU, Sabour-Bhagalpur (Bihar) are the centers representing MGPR. Impact of IFS approach towards production, profitability and livelihood of small land holders alongwith contribution of the approach towards cost reduction and family savings after meeting household consumption of farm commodities and meeting production cost is reflected in the results of fourth year of the study. The total farm production t/ha (RYE) and net returns Rs./ha/year were significantly higher at Sabour (62.60t & Rs. 3,52,243) and Varanasi (49.90t & Rs. 2,50,465) followed by Kumarganj (26.60t & Rs. 1,58,916) and Patana (17.60t & Rs. 86,521). The net returns were two to six time higher than prevailing system of farming in the respective regions. In regard to saving in market inputs, as a result of proper management of farm resources and recycling of farm wastes, all type of crop residues, GM and use of bio-fertilizers etc., the saving was reported as much as 41.30% at Sabour and 21 to 25% at other centers of the region. Diversification through adding additional enterprises in existing system could create demand of farm labour as high as 848 Man Days at Patna closely followed by Sabour (659 Man Days). In regard to family savings after meeting household consumption of farm commodities and meeting production cost, the highest saving was reported at Sabour (Rs. 2,77863) closely followed by Varansi (Rs. 1,04169).

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Kumarganj (U.P.)	26.6	18.07	158916	128493	59240	186979	145246	450
Varanasi (U.P.)	49.9	47.05	250465	218500	44450	460166	457978	-
Sabour (Bihar)	62.6	46.45	352243	242383	74350	335852	264268	659
Patna (Bihar)	17.6	33.44	86521	217697	65270	153201	271185	848

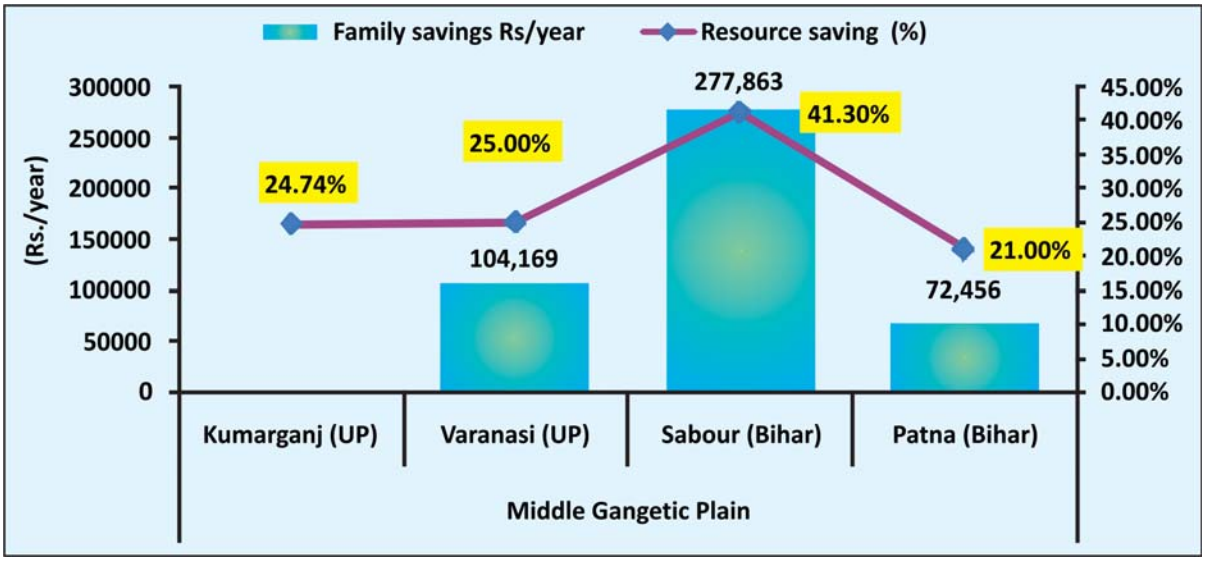


Fig. 5. Saving in farm resources along with family saving (GR-CC-FC)

6. Lower Gangetic Plains Region

AICRP-IFS Center at Kalyani (WB) representing Lower Gangetic Plains Region have dominate system of farming with i) Crop + dairy (70 %) followed by ii) Crop + Vegetable (20%). Integration of fishery in to existing farming system alongwith on farm processing & value addition of farm produces and proper land distribution among the farm enterprises could realized total farm production (RYE) of 21.5 t /ha/year with net returns of Rs. 1,08,832/ha/year in fourth year of the study much higher than Rs.67,370 in prevailing farmer practices. Further recycling of farm wastes, crop residues, G.M and use of bio fertilisers etc. could curtail 28.5% in cost of market inputs thus reducing cost of production (Rs.1,45,454/ha/year) to a great extent and promoting organic farming simultaneously.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year	Saving in market inputs
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean	14-15
Kalyani (W.B.)	21.5	26.25	108832	80128	67370	145454	112566	289	28.5%

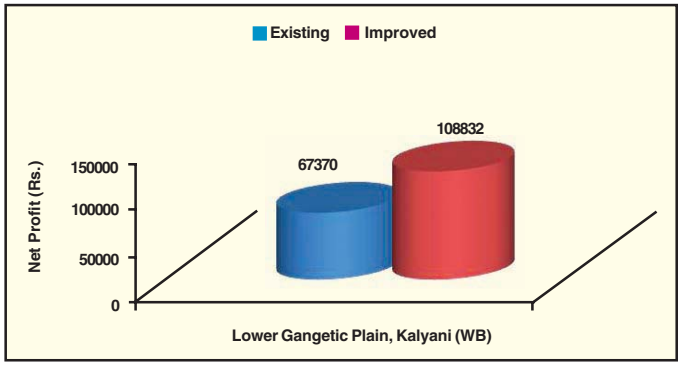


Fig. 6. Net profits in IFS approach V/S Prevailing system of farming

7. Eastern Plateau and Hills

IGKV, Raipur (Chhatisgarh) and BAU, Kanke Ranchi (Jharkhand), the two AICRP-IFS centers representing Eastern Plateau and Hills Region are given responsibilities to develop IFS models for livelihood improvement of small and marginal farmers of the region. Crop + dairy (cow and buffaloes) is the most dominate farming system of Chhatisgarh state with 90% farm families adopting it. Similarly major farming systems prevailing in Jharkhand state is Crops + Goat/ Poultry (60%) and or Crops +Dairy + Poultry (20%) with an average land holding of less than 1.45ha. The farming is mostly of subsistent nature with low profit margins of less than Rs.33,250/ha/annum at Raipur and Rs.62,500 at Ranchi. Composition of IFS model at Raipur and Ranchi centers is given in table-1&2. The results of IFS studies made at both the centers during last four years revealed that total farm production and net returns in reported year were 17.4 t & Rs.1,44,126 at Raipur and 12.5 t & Rs.90,073 at Ranchi. Net returns were considerably higher than farmer level of farming. As far as saving in market inputs through recycling is concerned it was 39.30% at Ranchi but low (8.00%) at Raipur need attention towards this. Family savings ranged from Rs.12,944 at Raipur to Rs.27,000 at Ranchi.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Raipur, Chhatisgarh	17.4	16.55	144126	130200	33250	131959	143293	276
Ranchi (Jharkhand)	12.5	14.25	90073	107909	62500	156676	92272	239

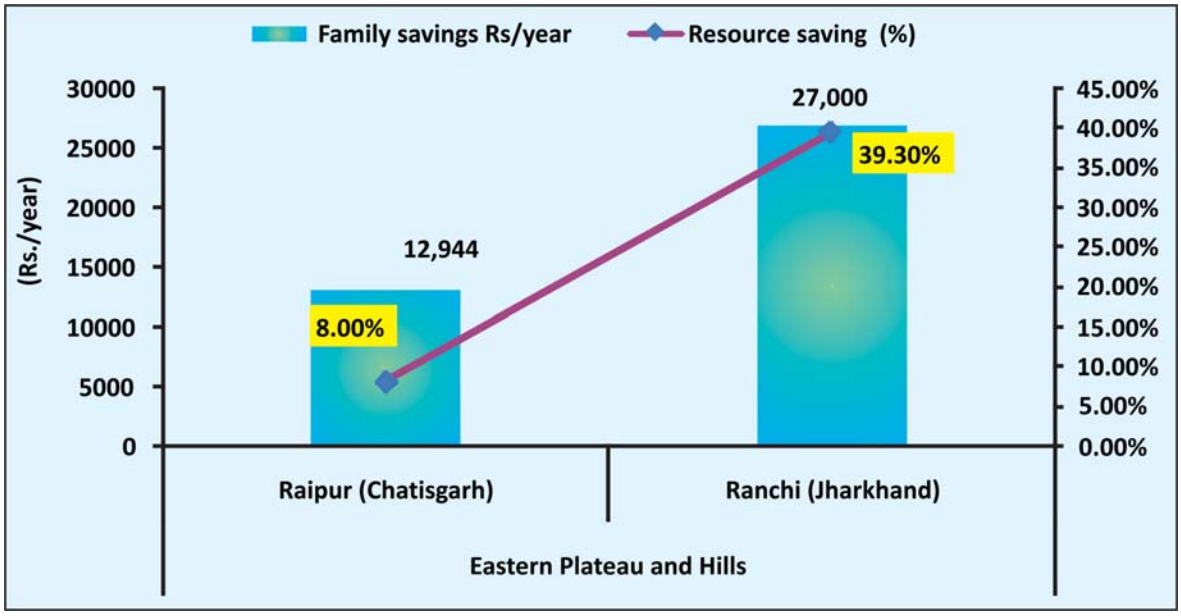


Fig. 7. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

8. Central Plateau and Hills

AICRP-IFS Centre at Jabalpur(MP), represents Central Plateau and hill Region of the country. Major farming system of the region is Crop+Dairy with adoption by 80% farmers followed by Crop+Dairy+Horticuture/Fishery. Family size of 6 members having average holding of less than 1.45ha. For livelihood improvement of small land holders of the region an IFS model (1.0 ha) established at the center comprises crops (0.90ha), Dairy animals (3cows), nutritional garden (24 m2), fishery (0.06ha) and other supplementary/ complementary farm components viz; mushroom, K.G. and boundary plantations. IFS model developed and related studies conducted during last four years revealed that scientific management of resources and integration of cost effective enterprises brought about a radical change in farm production and profitability with 23.6t/ha/year of total farm production and Rs.1,02,096 as net profit much more than existing system of farming (Rs.60,141). Further, a saving of 19.34% of total cost on market inputs could also be made possible through recycling of farm wastes, crop residues, GM and use of other organic means available at farm making farming more economic (reduced cost Rs.1,76,251 as against average cost of last four years Rs.1,82,839) and profitable.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year	Saving in market inputs
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean	14-15
Jabalpur (M.P.)	23.6	16.05	102096	113219	60141	176251	182839	576	19.34

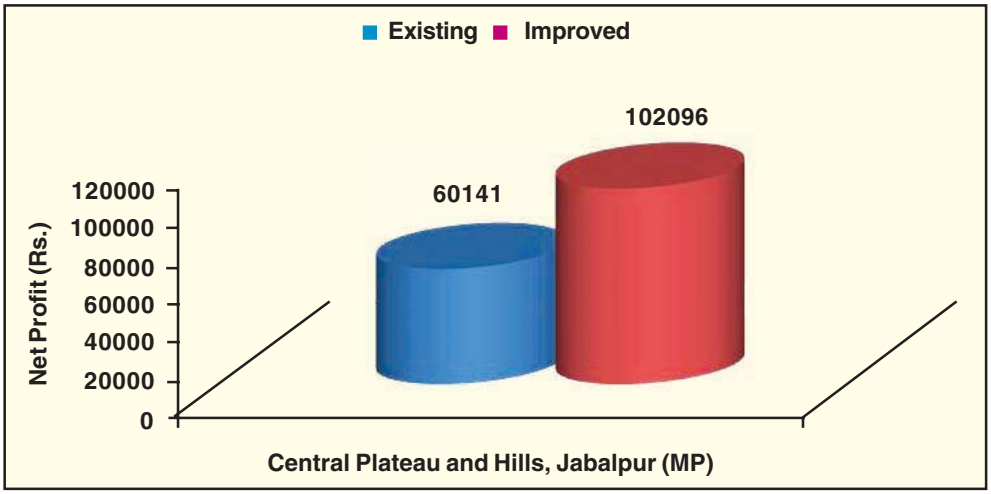


Fig. 8. Net returns in Ifs approach and prevailing system of farming

9. Western Plateau and Hills

Three AICRP-IFS centers including i) Parbhani, ii) Akola and iii) Rahuri, all in state of Maharashtra falling under Western Plateau and Hill Region initiated IFS studies during 2011-12 . Region specific on station IFS models have been established at all the three respective centers. Composition of IFS models and production & economic trends under scientific management and prevailing farming practices are given in table-1 and described below;

After four years of start of the study the total farm production (RYE) reached to the level of 25.00t,30.00t,29.80t/ha/year with net returns of Rs.104855,Rs.241462,Rs.84065/ha/year at Akola, Rahuri and Parbhani, respectively. The net returns in prevailing farming system (F.P.) were, however far behind of IFS approach ranging from Rs.34,000 at Akola, Rs.65,248 and Rs.1,05,000 at Rahuri showing the economic viability of the approach. In way of reducing the cost of cultivation (variable costs), efforts were made to maximize recycling of all farm wastes, residues and adopting G.M & organic farming practices including biofertilizers. Saving in market inputs to the level of 23.43%,30.00% and 21.00% at Akola, Rahuri and Parbhani centers could achieved resulting in reduced variable cost and bringing sustainability in production through reduced chemical load in agriculture. Besides meeting all household food, fuel , feed and fodder commodities and cost on production, a net saving ranging from Rs.37,973 at Akola to as high as Rs.1,76,074/annum at Rahuri is reported. This saving will further help in meeting family expenditures other than household food, fuel , feed and fodder requirements. Further, the diversified nature of the approach could create more on farm employment opportunities ranging from 320 Man Days at Rahuri to as much as 493 at Akola.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Akola (Maharashtra)	25	25.15	104858	97800	34000	106586	109894	493
Rahuri (Maharashtra)	30	28.63	241462	184417	105000	148316	201706	320
Parbhani (Maharashtra)	29.8	20.83	84065	86236	65248	150053	141955	357

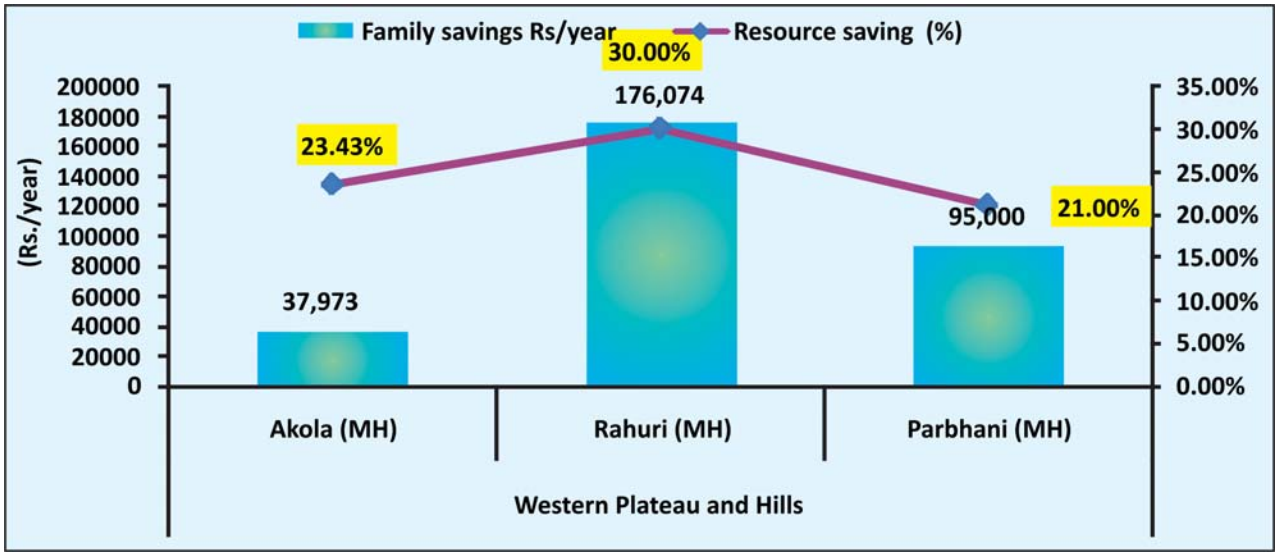


Fig. 9. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

10. Southern Plateau and Hills

Four AICRP-IFS centers namely, ANGRAU, Rajendra Nagar, Hyderabad (A.P.), TNAU, Coimbatore (Tamilnadu), ARS, Kathalgare (Karnataka) and ARS, Sirriguppa (Karnataka) are located in different NARP zones of Southern Plateau and Hill Agro Climatic Zone of the country. All the centers are engaged in developing region specific IFS models at their respective centers since 2010-11 and now have reached to its maximum production stage at most of the centers. The results of 2015-16 and overall performance during last 4 years is given below;

In fourth year of establishment of the IFS models at respective centers the results revealed that this IFS model could meet out the household food demand for a five to seven member families and could also provide year round green fodder for milch animals. The system could produce considerably higher total farm production (RYE) (26.67t, 32.31t, 12.64, 17.00t/ha/year) and net returns (Rs.1,06,805, Rs.2,67,444, Rs.1,70,058, Rs.1,60,578/ha/year) at Rajendra Nagar, Coimbatore, Kathalgare and Sirriguppa, respectively. Net returns were 50.5% higher at Rajendernagar to as much as 206 % at Siruguppa when compared to prevailing farming system of the regions. Conservation and scientific management practices including recycling of farm wastes and residues, cowdung in to vermicompost and adopting towards organic could curtailed expenditure on market inputs to the level of 15.17

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Rajendernagar, A.P.	26.67	26.58	106805	97341	67484	333236	272406	714
Coimbatore (T.N.)	32.31	27.22	267447	241728	109350	361599	276897	720
Kathalgere,Karnatak	12.64	60.23	170058	188608	134076	160500	125759	663
Sirugappa,Karnatak	17.00	14.39	160578	148091	52354	217322	145909	439

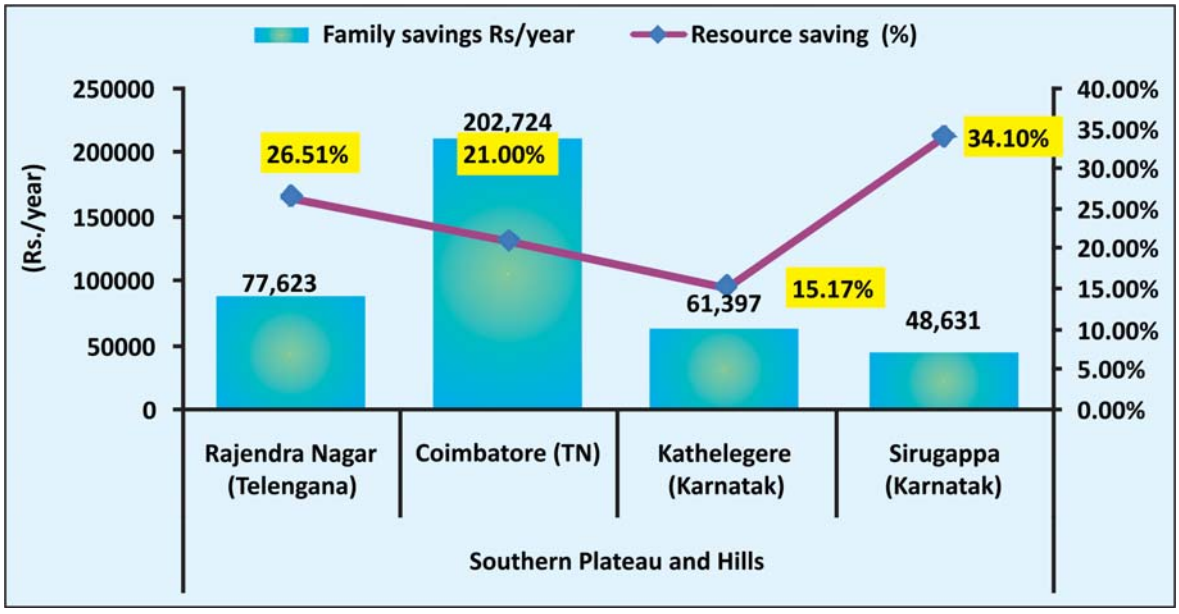


Fig. 10. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

% at Kathalgere to as high as 34.10% at Siruguppa. The direct or indirect benefit of the IFS approach is visualized in creating more and more employment opportunities ranging from 439 at Siruguppa to as high as 720 Man days at Coimbatore. Family savings after meeting household consumption of farm produces and variable costs were as high as Rs.2,02,724 at Coimabatore followed by Rs.77,623 at Rajendernagar,Rs.61,397 at Kathelgere and Rs.48,631 at Siruguppa.

11. East Coast Plain & Hills

In East Coast Plain & Hill region one AICRP-IFS center at Bhubneshwar (Odisha) has developed IFS model at 1.25ha area consisting crops(0.38ha), dairy animal(2cows), Poultry(80 birds), Duckery(20 ducks), Hort.(0.09ha), Fishery(0.33 ha) and other supplementary enterprises like mushroom, K.G.,B.P. Average holding size in the region ranges between 0.5ha to 1.39 ha of land with average family size of 7 members. Crop +Dairy (80%) and Crop + Dairy + Fishery (20%) with average annual profits of Rs.43138/ha are the major farming system . The results of current year 2014-15 and first four years averaged upon revealed that the total farm production in term of rice equivalent yield (REY) was 29.05 t/ha/year with an average of 22.84 t/ha/year. Net returns of Rs. 1,14,686 was much more than farmer level of farming (Rs.56,327). Besides fulfilling household food, fodder and feed consumption, the IFS approach improved the nutritional status of family members by way of producing sufficient amount of milk , fruits & vegetables, mushroom, meet in form of fish/poultry/duckry birds and also through K.G./B.P. and thereby reduced market dependency for household domestic needs. The total variable cost of different farm components/enterprises was Rs. 160369, of which more than 18.83 % was met out on the farm itself through recycling of farm wastes, residues and proper composting/vermicomposting of available cowdung & urine. Man days per hectare of land was 440 and family saving Rs.76,526/annum.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Bhubneswar	29.05	22.84	114686	75129	56327	181513	160369	440
Thanjavur	18.38	16.89	166564	138325	68490	143788	147982	294

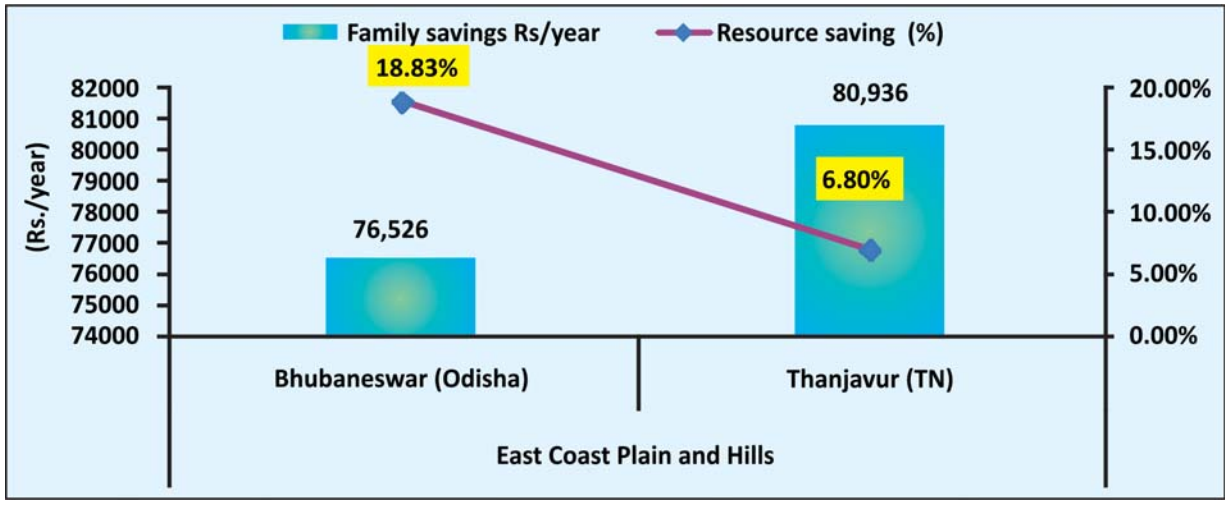


Fig. 11. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

During 2013-14, one more center at Thanjavur (Tamilnadu) also initiated IFS studies. The results of the study given in table below and predicted in fig. show encouraging and linear growth in production and profitability alongwith reduction in variable costs. Saving in market inputs though was at lower side (6.80%) but family savings (GR-CC-FC) was considerably high (Rs.80,936/ha/year).

12. Western Coast Plains & Hills

In this particular Agro Climatic Region three AICRP-IFS centers one each in the states of Maharashtra (Karjat), Kerala (Karmana) and Goa (ICAR Research Complex, Goa), are given the responsibilities of developing region specific IFS Models for respective states . The composition of IFS models at respective centers and related data have been given in table. The data on total farm production in term of rice yield equivalent (RYE), net returns (Rs./ha/year) given in table below and reduction in market input cost (%) through recycling of farm wastes, crop residues and proper management of cow dung and urine etc . predicted in fig. revealed that besides meeting all household food, feed and fodder farm commodities, the IFS approach is an viable approach for improving nutritional status not only family members but farm animals too (Table- 3). Further, by reducing cost on variable expenditures to the level of 12.76% at Karjat to 24% at Goa through on far recycling (Fig.12) of farm wastes, crop residues, cow dung & urine, use of G.M. and other organic sources, the farming can be made more economic and sustainable.

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Karjat	20.91	23.66	102636	99000	76965	188982	230979	824
Karmana	22.1	26.78	60555	69070	53442	122157	183817	214
Goa	36.7	22.07	101228	89411	50000	108236	106207	328

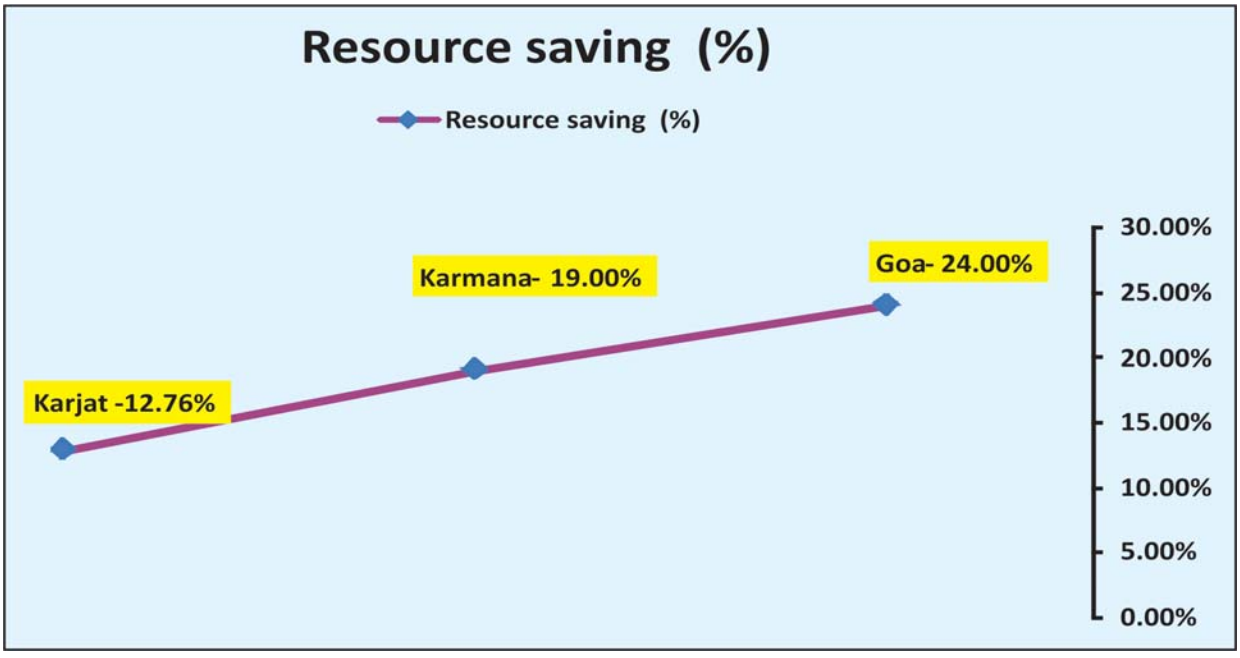


Fig. 12. Percent saving in market inputs through on farm recycling

13. Gujarat Plains & Hills

AICRP-IFS Center at S. K. Nagar (Gujarat) is conducting IFS studies for the ACR Gujarat Plains & Hills. The economy of the region is based on animals and mainly dairy based farming system with crops as necessary components representing more than 95% farm families with an annual net returns of Rs.68758/ha/year. Average holding size of the region ranges from 0.53 ha (marginal farmers) to 1.46 ha (Small farmers) with 6 member family. The composition of the IFS model constitute crops(0.70 ha), dairy animal (2B), Horticultural crops (0.25 ha). Based on the data of reporting period 2014-15 and the data averaged upon last four years revealed that the total farm production and net returns at the center during reporting period was 31.07t/ha/year with net returns of Rs.3,61,416 much more (four times higher) than prevailing farming system (Rs.87,743) of the district. Similarly, reduction in cost through scientific management of farm resources and proper recycling of farm wastes, crop residues and cow dung etc. could save in market inputs to the extent of 65% and resulted in family savings of Rs.1,37,096/ha/year. This all shows the viability of IFS approach above and over prevailing farming system of the region.

14. Western Dry Region

The dominate farming system of district Durgapura (Rajasthan) representing ACR Western Dry Region is Crop+ Dairy (90% farm families adopting the system) with annual net returns of Rs.72,904/ha/annum. Average land holding of the region ranges in between 0.48 ha (MF) to 1.44 ha (SF) with a family size of 7 members. To improve the livelihood of small land holders of the region an IFS model (1.45ha) with diversified nature of farm components including crops(1.0 ha), dairy animals (2 cows), goatary (11 goats), Hort.(0.25ha) and other supporting activities including vermicomposting, kitchen gardening and boundary plantations etc. were initiated at SKRAU, Durgapura -Jaipur (Rajasthan) during 2011-12. During reported year 2014-15 and based on last four years results, the total production of the farm converted in to rice yield equivalent (REY) was 25.7 t and 19.38 t/ha/year, respectively. The net returns

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
S.K.Nagar (Gujarat)	31.07	36.93	361416	237607	87743	223984	181403	286

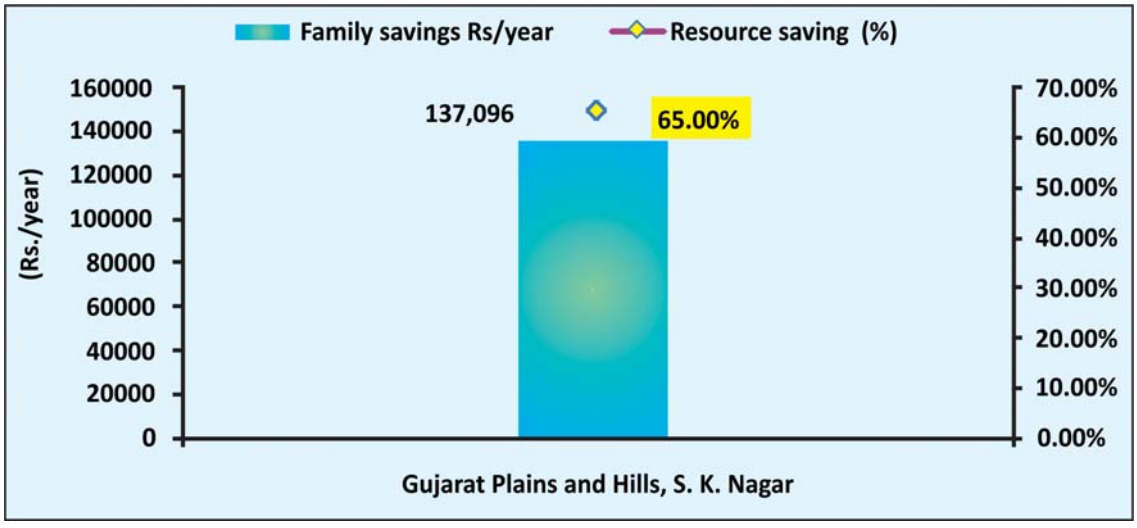


Fig. 13. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Durgapura (Rajasthan)	25.7	19.38	292238	177839	72904	227420	224626	455

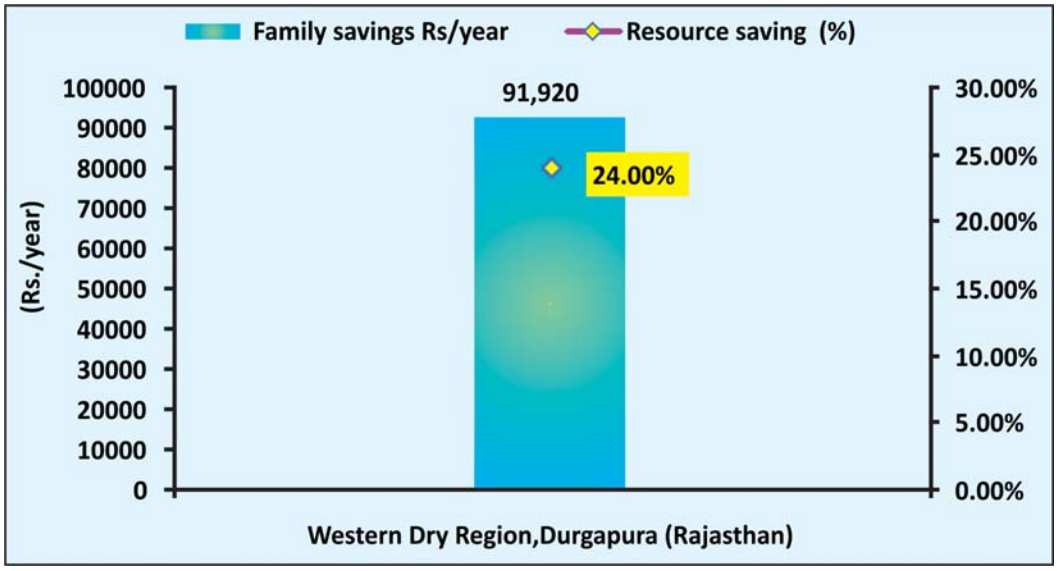


Fig. 14. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

in IFS model in current year was Rs.2,92,238 more than 300% than prevailing system of farming. Out of total variable cost (Rs.2,27,420) more than 24% of market inputs were met out at farm itself through recycling of farm wastes, crop residues, scientific composting of cowdung & urine mixed with other farm products and by products and using other means of organic farming. Besides, meeting all essential food and fodder/feed requirement of the family, the approach could improve the nutritional status of family members as well as livestock of the family. In addition to this after deducting variable cost of production and family needs, the total family saving was reported Rs.91,920/annum to meet other miscellaneous liabilities.

15. Island

AICRP-IFS Center at Port Blair (AN) is a representative center for Island Agro-Climatic Region. Plantation crops + Pig (50 %) followed by Crop + Dairy animal cows + Fish (45 %) are two equally important and prevalent farming systems of the region. Pigs are important animal of the region and symbol of social status too. The holding size ranged in between 0.39ha (MF) to 1.38 (S.F.) with an average of 7 members in a family. IFS model of 1.0 ha area developed at the centre comprise of crops (0.61ha), Dairy (2 cows), horticulture (0.20 ha) and piggery. The results on production and profitability along with other associated benefits during reporting period and last four years compiled data revealed that IFS approach is a viable approach because of its diversified nature and a mix of all the essential farm commodities required to meet not only household food and fodder need but upgrade the nutritional status of meal of family members and feed of livestock. Total farm production during 14-15 was significantly higher (48.78t/ha/year) than average production of last four years which show the stability and sustainability of the system. The same trend was observed for net profits. Net profit during current year and also averaged upon last four years (Rs.1,64,522 and Rs.1,26,085,respectively) was 3 to 4 times more than prevailing system of farming in the region. Further, conservation agricultural and organic farming practices adopted

Location	Total Farm Production (REY) t/ha		Net Returns (Rs/ha)			Cost of Cultivation (Rs/ha)		Man Days/ Year
	14-15	Mean	14-15	Mean	FP	14-15	Mean	Mean
Port Blair (A&N)	48.78	27.07	164522	126085	41431	206029	88050	174

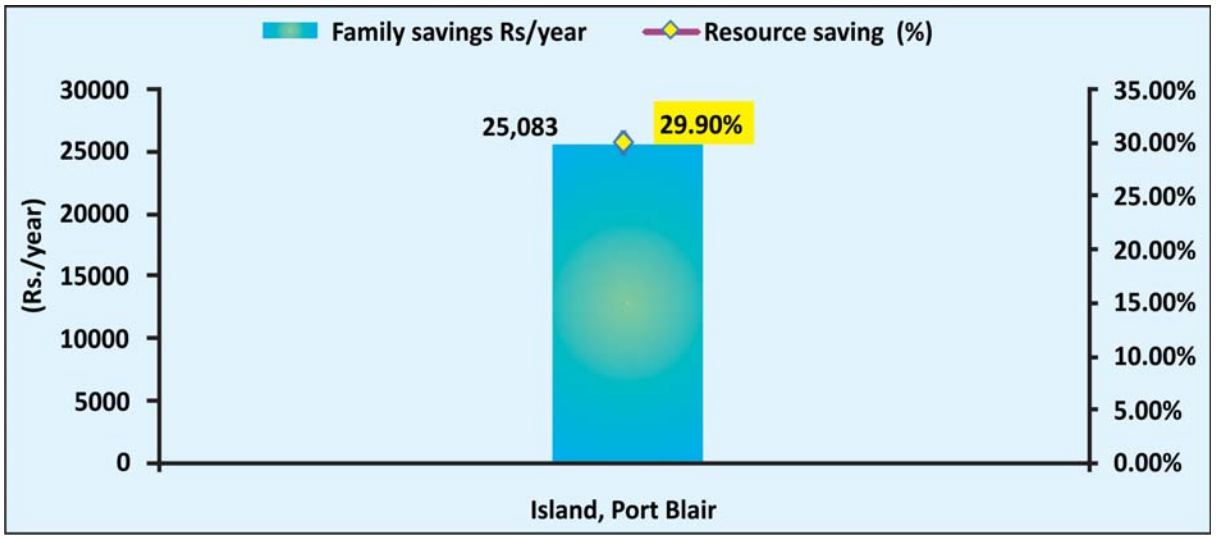


Fig. 15. Family savings (Rs./ha/year) and percent saving in market inputs through on farm recycling

and recycling of all the farm wastes and crop residues resulted in saving on market inputs to the extent of 29.9% and ultimate family saving (GR-CC-FC) Rs.25,083 (Fig.15).

IFS model at S.K. Nagar (Gujarat)

Visit of board members of SDAU, S.K. Nagar (Gujarat) to IFS model

Table 7.1.1. Composition of IFS models at different AICRP-IFS centers - Lead enterprises

Centers	Size of model (m^2)	Crop (m^2)	Dairy Animal	Hort. (m^2)	Fish Pond (m^2)	Centers	Size of model (m^2)	Crop (m^2)	Dairy Animal	Hort. (m^2)	Fish Pond (m^2)
Akola	10000	7000	-	2500	400	Palampur	10000	7500	2C	1750	-
Bhubneshwar	12500	3787	2 C	895	3300	Pantnagar	10000	5200	1C	1900	-
Chhata	15000	4500	1C+1B	3050	1000	Parbhani	10000	7100	1C+1B	2000	-
Coimbatore	12000	10200	2 C	1600	-	Patna M1	4000	2000	NA	900	-
Durgapura	14500	10000	2C	2500	-	Patna M2	8000	5000	2C	1000	1000
Hisar	10000	9000	2 B	600	-	Portblair	10000	6100	2C	2000	-
Jabalpur	10000	9000	3C	240	600	Rahuri	10000	7200	2 C	2000	-
Jorhat	10000	6643	2C	950	920	Raipur	10000	5980	2C	2220	725
Kalyani	6600	4100	2 C	1100	900	Rajendrnagar	10000	7000	2 B	2000	-
Kanpur	10000	7200	1C+1B	1920	-	Ranchi	10000	8000	2C	NA	1000
Karjat	10000	5000	3C	4000	-	Sabour	10000	7014	2 C	1412	800
Karmana	10000	8000	1C+1B	-	700	S.K. Nagar	10000	7000	2B	2500	-
Kathalgere	10000	9000	2C+1B	1000	100	Siruguppa	10000	7200	2C+2B	2000	300
Kumarganj	10000	7000	2 C	2000	1000	Umaim	10000	7000	Nil	2000	500
Ludhiana	10000	6400	2C	2000	1000	Varanasi	10000	8100	6C	600	1000
Modipuram	7000	3800	2C+1B	3000	-						

Table 7.1.2. Additional (supplementary/complementary) farm enterprises integrated at different centers

Goatary	Akola (12), Coimbatore (10+1), Durgapura (5+1), Karjat (6), Parbhani (5+1), Patna (20+1), Rajendernagar (5+1), Sabour (10+1), Siruguppa (10)
Poultry	Chhata (50), Karjat (90), Karmana (50), Kathelgere, Palampur (25), Parbhani 300), Patna (100), Rahuri (400), Varanasi (200x6batch), Rajendernagar (30), Bhubneshwar (80), Umaim (600Broiler+50 Layer), Raipur
Duckery	Patna (30+5), Sabour (25), Bhubneshwar (20), Karmana (50)
Piggery	Umaim (3) and Port Blair
Agro-forestry	Pantnagar (2300m^2), Ludhiana (300m^2), Bhubaneswar
Apiary	Modipuram, Jorhat, Kanpur and Ranchi (5 Bee boxes each center)
Mushroom	Modipuram (120 bags), Patna (90 bags), Karmana (100m^2), Ranchi (145m^2), Varanasi (20m^2), Raipur (30m^2)
B.P. and KG	Most of the centers

Table 7.1.3. Impact of Integrated Farming System Approach on the production, profitability, economizing production cost, family savings and employment generation.

S.N	Centre Name	Impact of Integrated Farming System Approach on the production, profitability, economizing of production cost, family savings and employment generation									
		Total Production (REY) t/ha		Net Returns (Rs./ha)			Variable cost (VC) (Rs./ha/year)		Saving through recycling (%)	Saving after meeting family demand and VC	Man Days
		14-15	Mean	14-15	Mean	F.P.	14-15	Mean	15.00	14-15	Mean
1	Chhata (J&K)	9.50	12.42	306202	189502	83148	297365	243576	14.82	109614	527
2	Palampur, (H.P.)	15.15	16.57	70274	78738	70752	230324	212505	7.50	7189	579
3	Pantnagar (U.K.)	33.17	24.25	237777	147989	100000	217486	177563	33.20	115826	586
4	Jorhat (Assam)	27.30	22.05	160262	180306	59656	124364	154408	7.30	27875	414
5	Umiam (Mgh.)	25.30	20.65	139334	155820	42000	305235	240969	3.15	77576	274
6	Ludhiana (Pb.)	52.40	35.54	380308	268106	104575	368103	235024	16.00	247523	328
7	Hissar (Haryana)	40.44	30.07	215905	152555	91855	87306	86315	21.00	19815	224
8	Modipuram (UP)	36.26	31.93	267447	192839	64300	291161	256470	32.82	97376	439
9	Kanpur (UP)	8.680	16.09	67307	97833	67754	156619	135126	39.00	66654	379
10	Kumarganj (UP)	26.60	18.07	158916	128493	59240	186979	145246	24.74	NA	450
11	Varanasi (UP)	49.90	47.05	250465	218500	44450	460166	457978	25.00	104169	NA
12	Sabour (Bihar)	62.60	46.45	352243	242383	74350	335852	264268	41.30	2,77,863	659
13	Patna (Bihar)	17.60	33.44	86521	217697	65270	153201	271185	21.00	72456	848
14	Kalyani (WB)	21.50	26.25	108832	80128	67370	145454	112566	28.50	NA	289
15	Raipur (Chatisgarh)	17.40	16.55	144126	130200	33250	131959	143293	8.00	12944	276
16	Ranchi (Jh)	12.50	14.25	90073	107909	62500	156676	92272	39.30	27000	239
17	Jabalpur (MP)	23.60	16.05	102096	113219	60141	176251	182839	19.34	NA	576
18	Akola (MH)	25.00	25.15	104858	97800	34000	106586	109894	23.43	37973	493
19	Rahuri (MH)	30.00	28.63	241462	184417	105000	148316	201706	30.00	176074	320
20	Parbhani (MH)	29.80	20.83	84065	86236	65248	150053	141955	21.00	43603	357
21	Rajendra Nagar(AP)	26.67	26.58	106805	97341	67484	333236	272406	26.51	77623	714
22	Coimbatore (TN)	32.31	27.22	267447	241728	109350	361599	276897	21.00	202724	720
23	Kathelegere (KT)	11.80	60.23	170058	188608	134076	160500	125759	15.17	61397	663

S.N	Centre Name	Impact of Integrated Farming System Approach on the production, profitability, economizing of production cost, family savings and employment generation									
		Total Production (REY) t/ha		Net Returns (Rs./ha)			Variable cost (VC) (Rs./ha/year)		Saving through recycling (%)	Saving after meeting family demand and VC	Man Days
		14-15	Mean	14-15	Mean	F.P.	14-15	Mean	15.00	14-15	Mean
24	Sirugappa (Kt)	17.00	14.39	160578	148091	52354	217322	145909	34.10	48631	439
25	Bhubaneswar(OD)	29.05	22.84	114686	75129	56327	181513	160369	18.83	76526	440
26	Thanjavur (TN)	18.38	16.89	166564	138325	68490	143788	147982	6.80	80936	294
27	Karjat (MH)	20.91	23.66	102636	99000	76965	188982	230979	12.76	9180	824
28	Karmana (Kerala)	22.10	26.78	60555	69070	53442	122157	183817	19.00	2696	214
29	Goa	36.70	22.07	101228	89411	50000	108236	106207	24.00	NA	328
30	Durgapura (Raj.)	25.70	19.38	292238	177839	72904	227420	224626	24.00	91920	455
31	S. K. Nagar(Gj.)	31.07	36.93	361416	237607	87743	223984	181403	65.00	137096	286
32	Port Blair(Island)	48.78	27.07	164522	126085	41431	206029	88050	29.90	25083	174

REY: Rice equivalent yield; VC: Variable cost; Mean (11-12 to 14-15); FC: Family savings after deducting variable cost and family consumption of farm produces from total farm value (gross returns)

Table 7.1.4. Livelihood Analysis – Household Demand and Farm Production of essential farm commodities.

Centres	IFS Model	Demand and Production of Different Farm Commodities (Kg / Litre/ No. etc.)											
	Area (ha)	Cereals (Kg)	Pulses (Kg)	Oil-seeds (Kg)	Milk (Litre)	Fruits (Kg)	Vegt. (Kg)	Eggs (nos.)	G.F. (Kg)	D.F. (kg)	Mushroom (Kg)	Fuel Wood (Kg)	Others
		Annual Demand of essential food and fodder commodities for a farm family with 6 family members											
		1550	**200**	**130**	**1120**	**200**	**900**	**-**	**27000**	**5500**	**-**	**-**	**-**
		Actual annual production of different farm commodities at farm											
Chhata	1.00	1332	175	95	3391.5	566	2014	36	10500	2091	235	400	5203.5
Palampur	1.00	2790	-	130	3086	-	415	-	21377	4620	46	-	-
Pantnagar	1.00	3740	225	480	5452	2200	1934	-	31700	5196	-	500	547
Jorhat	1.00	2368	100	363	3600	270	1758	450	12180	3000	60	220	VC = 1088 Kg LM = 4800 lt.
Umiam	1.00	1532.6	160.2	526.7	-	730	5103	1829	-	-	1597	-	-
Ludhiana	1.00	3513	127	138	12635	487	5516	2500	19780	4966	38	—-	Compost 18000 kg
Hissar	1.00	3392	140	510	1380	-	1064	—	16886	5594		2266	VC=350Kg
Modipuram	0.70	3245	228	190	2196.5	7790	8100	—	20770	2990	550	1100	VC=21000kg
Kanpur	1.00	2420	30	24	1765	381	309	—	6210	2108	—	-	-
Kumarganj	1.00	3642	488	192	3854		4150		30030	5143	205		
Varanasi	1.00												
Sabour	1.00	5220	135	140	3472	475	2065	1125	27800	7140	148	6.75	VC+ Manure 3150kg +1400 kg
Patna	1.20	1050	100	90	-	150	625		7200	400	10	800	PM-2120,GM-1830, VC- 2500 P&G meat 100kg
Kalyani	0.66	784	69	79	3955	1209	5173		20000	593	—	—	—
Raipur	1.00	1920	620	270	2432	-	1600		300	-	-	-	13 kg fish, 173.45 kg meat
Ranchi	1.00	3314	321	448	2597.5	45	345	-	19550	5573	93	1176	Fish- 20 kg, VC-2424Kg.
Jabalpur	1.00	3341	80	40	1300	3808	808	—	8069	3202	20	-	VC 3200 kg
Akola	1.00	503.33	780	932	-	-	201.25	25	130	333	-	391	—
Rahuri	1.00	2228	260	732	5470	1100	3114	—	15450	2995	—	—	VC=4000 kg

Centres	IFS Model Area (ha)	Demand and Production of Different Farm Commodities (Kg / Litre/ No. etc.)											
		Cereals (Kg)	Pulses (Kg)	Oil-seeds (Kg)	Milk (Litre)	Fruits (Kg)	Vegt. (Kg)	Eggs (nos.)	G.F. (Kg)	D.F. (kg)	Mushroom (Kg)	Fuel Wood (Kg)	Others
		Annual Demand of essential food and fodder commodities for a farm family with 6 family members											
		1550	**200**	**130**	**1120**	**200**	**900**	**-**	**27000**	**5500**	**-**	**-**	**-**
		Actual annual production of different farm commodities at farm											
Parbhani	1.00	800	300	1000	1025	-	5450	—	12805	6267	-	-	VC=12000 kg & Apiary-28 kg
RajendraNagar	1.00	2542	213.5	360	2580	40	1254	-	25525	4266	-	-	FYM=12512 kg VC= 1572 kg
Coimbatore	1.20	3270	225	257	3080	112	7620	-	24800	7850	-	-	VC=14530 kg
Kathalagere	1.00	7100	-	-	1851.4	950	2682	-	2555	14220	-	-	-
Siruguppa	0.74	5736	109.5	0	1515	245	2505	0	5000	7456	-	-	Vermicompost 4670 kg
Bhubaneswar	1.25	1300	37		3720	163kg	558		20000	1520	36	400	VC=400 kg. Coconut-2344No.
Thanjavur	0.80	6143	247	475	-	897	1909	248	11650	8196	420	-	VC=2205 kg
Karjat	1.00	1075	100	350 (Dry pods)	435 lt.. started March, 2013	460	3500 S. corn-G. cobs 1250	-	4600	1860		—	VC=400 Kg Dairy Started from January, 2013
Karmana	0.80 ha	784	-	863 Nuts 90 kg oil	4150	1284	2278 Yet to lay		60	1258	17	5150	VC. 2667 Green Man. 6000
Goa	0.50	1710	210	150	608		1100	-	15000	8336	-	-	3500 kg – manure
Durgapur	1.45	1738	239	283	5902	162	1581	675	26560	3761	-	810	compost 23306 kg
S.K.Nagar	1.00	1520	266	623	1362	45	2576	-	15526	4328	-	1515	VC= 6500Kg.
Port Blair	0.75	1587	20	316	2288.5	-	2904	-	17460	4092	-	-	7625

Note: VC = Vermicompost, LM = Liquid Manure, PM = Poultry Manure, GM=Goat Manure P=Poultry G=Goat GF=Green fodder DF=Dry fodder

7.2 CROPPING SYSTEMS MANAGEMENT

7.2.1 CROPPING SYSTEMS DIVERSIFICATION/INTENSIFICATION

***Title of the Experiment*:** Identification of need based cropping systems for different agro-ecosystems (**Expt**. No. 1a).

***Objectives*:** To identify suitable cropping systems with high productivity and profitability for different agro- ecosystems.

***Year of start*:** 1990-91

***Treatments*:** No common treatments are for all the centers; they vary from location to location. The number of cropping systems tested at each location also varies from 6 to 15. The treatments are modified after every 3-4 year. The details of treatments are given in table-7.2.1 along with experimental results.

Locations:

Ecosystem	Centre(State)
Arid	Hissar (Haryana) S.K.Nagar (Gujarat) and Siruguppa (Karnataka),
Semi-arid	Bichpuri (U.P.), Junagadh (Gujarat), Durgapura (Rajasthan), Rajendranagar (A.P.), Indore (M.P.), Rudrur (A.P.), Parbhani (Maharashtra), Coimbatore (T.N.), Kanpur (U.P.), Kota (Rajasthan), Akola (Maharashtra) and Ludhiana (Punjab).
Sub-humid	Faizabad (U.P.), Pantnagar (Uttarakhand), Sabour (Bihar), Ranchi (Jharkhand), Jabalpur (M.P.), Rewa (M.P.),Powarkheda (M.P.), Raipur (M.P.), Kathalgere (Karnataka), Chiplima (Orissa) and Varanasi (U.P.)
Humid	R.S. Pura (J & K), Jorhat(Assam),Kalyani(W.B.) and Palampur (HP)
Coastal	Bhubaneshwar (Odisha), Maruteru (A.P.), Thanjavur (T.N.), Karamana (Kerala), Navsari (Gujarat) andKarjat (Maharashtra)

***Results*:**

Data were recorded on yields, annual gross returns and annual energy output at each of the centers which have been presented in table 7.2/1. A brief description of Centre-wise results is given below.

Arid Ecosystem

Hisar: Seven cropping systems were evaluated at Hisar. Out of those, cotton-wheat-fallow system was found better than others and recorded the highest gross return of Rs. 1,77,871/ha/year followed by pearl millet+greengram-wheat+mustard-fallow system with gross returns of Rs.1,16,303 /ha/year. In terms of energy production, existing pearl millet-wheat-fallow

Table 7.2.1. Evaluation of alternate efficient cropping systems in various ecosystems.

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
A. ARID ECOSYSTEM							
HISAR (HARYANA)							
Pearl millet HHB-197 :74 125-62.5-0	Wheat WH-711 :147 150-60-60	Fallow	2758	5487	-	111301	28.9
Cotton H-1226 :173 175-60-0	Wheat WH-711 :147 150-60-60	Fallow	2484	5606	-	177871	27.6
Pearl millet HHB-197 :74 125-62.5-0	Barley BG-393 :130 60-30-0	Green gram Satya :80 20-40-0	3138	3068	320	87384	22.7
Cluster bean HG-365 :79 20-40-0	Broccoli CBH-1 :66 100-50-0	Onion Hisar-1:97 20-40-0	947	1654	4310	93021	32.3
Green gram Satya :80 20-40-0	Mustard RH-30:132 80-30-0 + Kasni NA:164 60-30-0	Fallow	885	2180 + 145	-	109606	14.8
Pearl millet HHB-197 :74 125-62.5-0	Wheat C-306 :129 150-60-0	Cowpea Pusa komal:7 120-40-0	3273	3002	362	86936	22.3
Pearl millet HHB-197 :74 125-62.5-0	Wheat WH-711 :149 150-60-0	Fallow	2554	5004	-	116303	28.2
Green gram Satya :80 20-40-0	Mustard RH-30:132 80-30-0		190	188			
SE±						3972	1.1
CD at 5%						8655	2.2
SK NAGAR(GUJARAT)							
Pearl millet GHB-558 :87 NR	Mustard GM-2 :126 NR	Fallow	1782	1932	-	81229	16.8
Green gram GM-4 :78 NR	Castor GCH-7 :203 NR	Green gram GM-4 :78 NR	438	3426	738	143883	20.2
Sunhemp Fodder null:0 NR			+ 7510				

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Green gram GM-4 :78 NR	Castor GCH-7 :203 NR	Fallow	389	3053	-	81494	14.7
Green gram GM-4 :78 NR	Castor GCH-7 :203 NR	Bottle gourd Pusa :133 NR	405	2955	3004	99239	14.7
Bt Cotton Hy-8 :225 NR	Castor GCH-7 :203 NR	Bottle gourd Pusa :123 NR	2527	2889	2637	173580	21.4
Green gram GM-4 :78 NR	Cauliflower Snowball_1 :116 NR	Fannel GF-11 :179 NR	656	19547	1461	262455	15.5
Green gram GM-4 :78 NR	Mustard GM-2 :126 NR	Lucerne Anand-2:193 NR	600	1724	512	80918	11.4
Bt Cotton Hy-8 :225 NR	Green gram GM-4 :78 NR	Castor GCH-7 :203 NR	773	2467	2571	194335	22.2
SE±						16443	1.7
CD at 5%						35271	3.7
		SIRUGUPPA (KARNATAKA)					
Rice null:NA 150-75-75	Rice BPT-5204 :NA NR	Fallow	7338	-	-	98696	25.3
Rice SIRI-1253 :NA 150-75-75	Fallow	Fallow	8096	-	-	108900	28.1
Rice SIRI-1253 :NA 150-75-75	Fallow	Fallow	7983	-	-	107375	27.6
Rice Fallow SIRI-1253 :NA 150-75-75	Fallow	8528	-	-	114710	29.5	
Rice SIRI-1253 :NA 150-75-75	Fallow	Fallow	7304	-	-	98243	25.2
Rice SIRI-1253 :NA 150-75-75	Fallow	Fallow	7280	-	-	97916	25.2
Rice RASI :NA 150-75-75	Spinach null:NA NR	Fallow	7255	-	-	97588	25.1
Rice RASI :NA 150-75-75	Fallow	Fallow	7242	-	-	97413	25.1

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice RASI :NA 150-75-75	Fallow	Fallow	6934	-	-	93266	23.9
Rice RASI :NA 150-75-75	Sesbania null:NA NR	Fallow	6538	-	-	87936	22.6
SE±						4513	1.2
CD at 5%						9483	2.5
B. SEMIARID ECOSYSTEM							
BICHPURI (UTTAR PRADESH)							
Pearl millet Shakti-7173 :0 80-40-40	Wheat HD-2687 :146 120-60-40	Fallow	2740	4412	-	96032	25.2
Pearl millet Shakti-7173 :0 80-40-40	Wheat HD-2733 :146 120-60-40	Green gram K-851 :0 25-50-0	2630	4508	1570	166679	30.3
Pearl millet Shakti-7173 :0 80-40-40	Lentil DPL-15 :120 25-50-0	Fallow	2710	1590	-	80804	15240
Soyabean PK-1092 :0 20-80-40	Wheat HD-2687 :146 120-60-40 + Mustard Rohini :155 120-60-40	Fallow	1220	3809 + 500	-	99817	21.1
Pigeon Pea UPAS-120 :0 30-60-30	Wheat HD-2687 :146 80-40-40	Fallow	1910	4117	-	139786	20.6
Green gram K-851 :0 25-50-0	Mustard Rohini :155 150-80-60	Fallow	1620	2490	-	148882	18.9
Daincha Local :0 NA	Potato E-3797 :130 150-80-60	Ladys finger Arca Anamica :0 120-60-60	-	31902	6597	209528	33.2
Pearl millet Shakti-7173 :0 80-40-40	Potato E-3797 :130 150-80-60	Cluster bean Amul-51 :0 20-40-0	2640	28409	6100	216992	39.3
Sesamum Guj-1 :0 30-15-15	Barley PL-172 :140 60-30-20	Green gram K-851 :0 25-50-0	950	3905	1390	148305	23.1
Jowar fodder Samrat :0 30-30-0	Oat fodder Local :138 60-30-20	Cowpea fodder Local :0 20-40-0	16296	24125	14702	119382	88.2

Cropping system (variety; duration in days)/ Fertilizer ($N:P_2O_5:K_2O$, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield ($x10^6$, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
SE±						4490	0.6
CD at 5%						9213	1.3
		DURGAPUR (RAJASTHAN)					
Pearl millet Raj-171 :96 90-30-0	Wheat Raj-4037 :125 120-40-0	—	1281	3113	—	59604	15.3
Cluster bean RGC-1003 :106 20-40-0	Barley RD-2715 :121 60-30-0	—	1279	3900	—	56462	13.5
Green gram RMG-492 :67 15-40-0	Pea veg Local :122 30-40-0	—	621	1863	—	46884	38.1
Pearl millet Raj-171 :96 90-30-0	Lentil Sahbaghi :121 20-40-0	—	1319	1464	—	59678	9.7
Cluster bean RGC-1003 :106 20-40-0	Onion Rohini :138 100-50-100	—	1348	1435	—	27924	11.9
Green gram RMG-492 :67 15-40-0	Isabgol Local :141 45-45-0	—	583	358	—	53356	2.4
Cluster bean RGC-1003 :106 20-40-0	Barley null:121 60-30-0	—	1209	3935	—	56108	1.4
Pearl millet Raj-171 :96 90-30-0	Garlic NA:161 120-40-100	—	1296	3171	—	128953	9.3
Pearl millet Raj-171 :96 90-30-0	Lentil NA:120 20-40-0	—	1175	1539	—	60102	9.5
SE±						3430	0.34
CD at 5%						7080	0.78
		JUNAGADH (GUJARAT)					
Groundnut GG-20 :118 12.5-25-0	Wheat GW-366 :109 120-60-0	Fallow	6458	4070	-	315326	50.7
Groundnut GG-20 :118 12.5-25-0	Onion Pili patti:122 75-60-50	Sorghum(F) Gundari :53 80-40-0	1416	23713	24407	312455	23.8
Groundnut GG-20 :118 12.5-25-0	Potato K.Badshah :102 220-110-120	Sesamum GT-2 :82 50-25-0	1433	8004	1022	136943	21.6

Cropping system (variety; duration in days)/ Fertilizer ($N:P_2O_5:K_2O$, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield ($x10^6$, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Sorghum Gundari :113 80-40-0	Cumin GC-4 :99 30-15-0	Green gram GG-2 :64 20-40-0	1654	850.00	796.33	93370.90	11.6
Sorghum(F) Gundari :55 80-40-0	Castor GCH-7 :133 75-50-0	Castor continue	26728.33	2950	-	95219	17.3
Onion Pusa bold :71 75-60-50	Wheat GW-366 :109 120-60-0	Green gram GG-2 :64 20-40-0	12057	3658	722	198274	21.1
Onion null:71 75-60-50	Chick Pea GF-11 :104 25-50-0	Maize fodder Elephant tall:57 80-40-0	12798	1874	28189	214939	17.7
Sesamum GT-2 :108 50-25-0	Potato K.Badshah :102 220-110-220	Maize fodder Elephant tall:57 80-40-0	786	7280	27304	100076	15.8
Bt Cotton Bt. cotton 6:198 160-0-0	Bt Cotton Bt. cotton 6:0 0-null-null	Groundnut G-40 :104 25-50-0	-	2227	1342	138554	15.1
Pigeon Pea BDN-2 :201 25-50-0	Pigeon Pea BDN-2 :0 0-0-0	Pearl millet GF-11 :95 80-40-0	-	1945	2456	114335	15.4
SE±						90087	12.7
CD at 5%						189273	26.6
		RAJENDRANAGAR (TELANGANA)					
Maize DHM-117 :95 180-60-40	Groundnut K-6 :105 30-40-50	—	4496	1178	—	106053	22.1
Maize DHM-117 :95 180-60-40	Sunflower Agsun :95 90-60-30	—	4167	1061	—	93869	20.8
Maize DHM-117 :95 180-60-40	Castor PCH-111 :135 90-40-30	—	4340	2025	—	99286	23.7
Maize DHM-117 :95 180-60-40	Wheat Local :105 120-60-40	—	4514	1496	—	80091	20.6
Soyabean JS-335 :95 180-60-40	Maize DHM-117 :105 180-60-40	—	1747	4335	—	101520	22.4
Soyabean JS-335 :95 180-60-40	Wheat Local :105 120-60-40	—	1683	1566	—	65013	12.7
Soyabean JS-335 :95 180-60-40	Castor PCH-111 :135 90-40-30	—	1818	1952	—	87449	16.5

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Soyabean JS-335 :95 180-60-40	Sunflower Agsun :95 90-60-30	—	1587	1105	—	81536	13.7
SE±						4983	1.1
CD at 5%						10689	2.5
		RUDRUR (TELANGANA)					
Rice MTU-1010 :135 120-60-40	Rice MTU-1010 :135 120-60-40	—	5610	6180	—	158575	40.7
Rice MTU-1010 :135 100-50-40	Maize fodder DHM-117 :120 200-80-40	—	5570	6217	—	82687	20.3
Rice MTU-1010 :135 100-50-40	Sunflower DRSH-2 :110 80-60-30	—	5880	2008	—	153382	32.8
Rice MTU-1010 :135 100-50-40	Mustard Kranthi :95 80-50-30	—	5520	993	—	104530	24.4
Soyabean JS-335 :95 60-60-40	Sunflower DRSH-2 :110 80-60-30	—	2350	1920	—	131200	22.1
Soyabean JS-335 :95 20-60-40	Sesamum SwethaTil :90 40-20-20	—	2500	910	—	115270	16.7
Pigeonpea ICPL 87-119 :155 20-60-40			+ 240				
Maize(Cob) DHM-117 :120 180-60-50	Sunflower DRSH-2 :110 80-60-30	—	3490	1958	—	82148	16.5
Soyabean JS-335 :120 60-60-40	Maize fodder DHM-117 :120 200-80-30	—	2480	6078	—	71085	11.7
Maize(Cob) DHM-117 :95 180-60-50	Bengal gram Annegiri :110 20-50-30	—	3560	1910	—	69106	11.3
Sunflower DRSH-2 :120 80-60-30	Maize(Cob) DHM-117 :120 200-80-80	—	1600	6083	—	76110	17.4
SE±						341	0.54
CD at 5%						716	0.21
		INDORE (MADHYPRADESH)					
Soyabean NA:0 NA	Wheat NA:0 NA	Fallow	177	4629	-	69346	16.7

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Soyabean NA:0 NA	Chick Pea NA:0 NA	Fallow	161	584	-	22254	2.8
Soyabean NA:0 NA + Maize NA:0 NA	Wheat NA:0 NA	Fallow	59 2519	3963	-	90017	22.5
Soyabean NA:0 NA	Chick Pea NA:0 NA + Wheat NA:0 NA	Green gram NA:0 NA	30 + 449	787 + 8235	29	147677	33.1
Soyabean NA:0 NA	Chick Pea NA:0 NA	Cowpea NA:0 NA	48	471	33	31084	4.6
Sorghum NA:0 NA	+ Mustard NA:0 NA	+ Ladys finger NA:0 NA	+ 417	+ 217	+ 166		
Soyabean NA:0 NA	Wheat NA:0 NA	Cowpea NA:0 NA	38	5185	27	193581	28.5
Amaranthus NA:0 NA	+ Cauliflower NA:0 NA	+ Maize(Green cob) NA:0 NA	+ 417	+ 15090	+ 186		
Soyabean NA:0 NA + Maize NA:0 NA	Pea veg NA:0 NA	Green gram NA:0 NA	43 + 1127.00	694	27	24160	4.8
Soyabean null:0 NA Maize(Green cob) null:0 NA	Wheat null:0 NA + Chick Pea null:0 NA	Green gram null:0 NA	43 + 2041	5257 + 1374	26	124180	25.9
Soyabean null:0 NA Maize null:0 NA	Wheat null:0 NA + French bean null:0 NA	Green gram null:0 NA	44 + 1030	7735 + 815	15	140459	30.7

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
SE±						11324	24.2
CD at 5%						24007	5.1
		PARBHANI (MAHARASHTRA)					
Soyabean MAUS-71 :0 NA	Sorghum NA :0 NA	Fallow	2586	3055	-	112665	21.8
Cotton NCS-207 :0 NA	Fallow	Groundnut TAG-24 :0 NA	2667	-	2048	188650	20.5
Soyabean MAUS-71 :0 NA	Wheat NA :0 NA	Cowpea NA :0 NA	2679	3404	6378	186433	26.5
Cotton NCS-207 :0 NA	Cotton continue	Amaranthus BPMR-145 :0 NA	2804	-	443	183955	17.5
		+	+		+		
Soyabean MAUS-71 :0 NA		Green gram Pusa :0 NA	1250		777		
Pigeon Pea NA:0 NA	Pigeon Pea continue	Cluster bean null:0 NA	1931	-	2238	169295	13.8
		+	+		+		
Soyabean MAUS-71 :0 NA		Green gram Pusa :0 NA	859		652		
			+				
Sesbania Local :0 NA			4378				
Maize NA :0 NA	Wheat NA :0 NA	Ladys finger Parbhani Kranti :0 NA	4306	1488	3019	267612	34.2
	+	+	+	+	+		
Soyabean MAUS-71 :0 NA	Chick Pea BDNG-797:0 NA	Cowpea NA :0 NA	896	1476	6882		
			+				
Sesbania Local :0 NA			4453				
Pearl millet NA :0 NA	Mustard NA :0 NA	Cowpea NA :0 NA	1537	900	4599	181493	24461
	+		+	+			
Soyabean MAUS-71 :0 NA	Chick Pea BDNG-797:0 NA		1524	1458			

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Maize NA :0 NA	Sorghum Local :0 NA	Ladys finger Parbhani Kranti :0 NA	4431	1891	3250	197654	32.9
	+		+	+			
Soyabean MAUS-71 :0 NA	Chick Pea BDNG-797:0 NA		1071	1490			
SE±						5017	0.66
CD at 5%						10761	1.43
		COIMBATURE (TAMILNAIDU)					
Green gram Vamban-2 :80 25-50-25	Cotton Bunny Bt. hybrid :152 150-75-75	Sunflower Sunbreed :90 60-90-60	1005	2883	1985	228537	25.2
Sorghum(F) CO-26 :55 60-40-20 + Onion Local:NA 150-75-75	Cotton Bunny Bt. hybrid :152 150-75-75	Lublub NA:NA NA	28984 + 912	2872	7752	295661	18.1
OnionCotton Local :80 30-60-30	Bunny Bt. hybrid :152 150-75-75	Maize NK-6240 :110 150-62.5-50	5000	2666	6907	239556	34.9
Maize NK-6240 :110 150-62.5-50	Cowpea(S) CO(CP)-7 :85 25-50-25	Tomato NA:NA NA	6648	894	9786	193542	27.8
Maize NK-6240 :110 150-62.5-50 + Cowpea Co-2 :90 150-62.5-50	Sunflower Sunbreed :90 60-90-60	Cowpea Co-2 :90 25-50-25	6484 + 795	1900	1050	175547	34.8
Beet root Ruby queen :120 60-160-100	Green gram Vamban-2 :75 25-50-25 + Cowpea fodder Co-2 :60 150-62.5-50	Maize NK-6240 :110 150-62.5-50	9142	817 + 1912	6933	271908	30.7
Cowpea Co-2 :90 25-50-25	Maize NK-6240 :110 150-62.5-50 + Cowpea fodder Co-2 :60 150-62.5-50	Sunflower Sunbreed :90 60-90-60	2801	6774 + 1815	1843	192369	36.2

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Sunflower Sunbreed :100 60-90-60	Pigeonpea VBN(Rg)-3 :110 25-50-25	Snake gourd NA :0 25-50-25	2010	1077	10302	251528	17.8
Green chillies K-2 :135 120-60-30	Maize NK-6240 :110 150-62.5-50	Sunhemp Fodder NA:NA 150-62.5-50	9921	6989	8463	302131	28.2
SE±						4473	0.94
CD at 5%						9484	1.9
		LUDHIANA (PUNJAB)					
Rice PR-121:119 NR	Wheat HD 2967:157 NR	Fallow	6170	5035	-	153476	38.7
Basmati Rice PB Basmati-2:110 NR	Hayola PAC-401 :130 NR	Summer squash null:0 NR	3944	1760	1125	144162	23.3
Basmati Rice PB Basmati-2:110 NR	Radish JG-315 :96 NR	Maize null:0 NR	3880	21650	6460	250405	39.2
Maize PMH-1 :92 NR	Potato KufriJyoti :106 NR	Maize null:0 NR	4975	22730	6489	245657	61.3
Maize PMH-1 :92 NR	Barley Early composite :140 NR	Fallow	3870	3470	-	543410	87.7
	+		+	+			
Turmeric Pb haldi1:103 NR	Linseed Mahamaya :140 NR		17480	328			
Maize PMH-1 :92 NR	Wheat HD 2967:157 NR	Fallow	3925	3750	-	576318	91.7
	+		+	+			
Turmeric Pb haldi1:103 NR	Linseed null:140 NR		18155	350			
Maize PMH-1 :92 NR	Wheat HD 2967:157 NR	Green gram null:0 NR	3825	3685	1060	188679	32.7
	+		+	+			
Radish PusaChetki :92 NR	Linseed null:140 NR		8745	365			
Groundnut SG-99 :155 NR	Wheat HD 2967:157 NR	Fallow	1575	4890	-	154151	28.6
	+		+	+			
Arhar AL-15:165 NR	Gobi sarson null:140 NR		460	224			

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Cotton LH-2076:181 NR + Hayola null:148 NR	Radish null:0 NR	Fallow	1260 + 15058	1675	-	342535	85.9
Cotton LH-2076:181 NR + Linseed null:140 NR	Wheat HD 2967:157 NR	Fallow	1315 + 357	3770	-	116857	19.3
Maize(Green cob) PMH-1 :92 NR Cowpea CO-4 :46 NR	Chick Pea Guj-1 :0 NR + Mustard null:157 NR	Green gram null:0 NR	21080 + 2865	328 + 1525	1044	193811	40.6
Sorghum(F) SL-44:96 NR + Mustard null:157 NR	Wheat HD 2967:0 NR	Fallow	57760 + 240	4924	4060	148466	27.5
SE± CDat 5%						7257	1.3
		KANPUR (UTTARPRADESH)					
Rice Pantdhan-12 :97 120-60-60	Wheat PBW-343 :0 120-60-60	Fallow	4904	4284	-	125948	31.7
Rice PHB-71 :97 120-75-120	Wheat PBW-343 :0 120-60-60	Fallow	8024	4550	-	171622	43.5
Rice PHB-71 :97 120-75-60	Wheat PBW-343 :0 120-60-60	Green gram null:0 NR	8214	4670	765	210309	47.2
Maize Azad Uttam :80 120-60-60	Wheat PBW-343 :0 120-60-60	Fallow	2857	4695	-	103156	26.1
Maize Azad Uttam :80 120-60-60	Mustard Kanti :0 120-60-60	Onion null:0 NR	2880	1740	12320	207875	25.4
Maize Azad Uttam :80 120-60-60	Mustard Kanti :0 120-60-60	Green gram null:0 NR	3050	2080	859	142087	24.5

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Maize Azad Uttam :80 120-60-60 + Green gram K-851 :85 120-60-60	Potato NA :0 200-100-200 + Wheat K-7903 :0 200-100-200	Fallow	2928 + 357	21280 + 3304	-	190082	43.3
Maize Azad Uttam :80 120-60-60 + Black gram NA :82 120-60-60	Potato null:0 200-100-200	Onion null:0 NR	3452 + 1131	22650	12729	309920	44.1
Maize Azad Uttam :80 120-60-60	Garlic Local :0 120-60-60	Green gram null:0 NR	3097	7684	980	357852	25.1
Rice Sugandha :80 120-60-60	Wheat null:0 120-60-60	Ladys finger null:0 NR	4714	4415	4034	171418	33.2
SE±						14818	15.2
CD at 5%						30406	3.1
		KOTA (RAJASTHAN)					
Soyabean RKS-24 :0 NR	Wheat Raj-171 :124 120-40-0	Fallow	-	4546	-	63653	15.7
Maize PEHM-2 :0 NR + Wheat Raj-171 :124 120-40-100	Garlic Local :137 120-40-100	Fallow	-	5301 + 978	-	202170	11.1
Maize PEHM-2 :0 NR	Mustard Pusa bold :118 80-40-0	Green gram AKM-8802 :75 20-40-0	-	1998	556	85999	12.7
Maize PEHM-2 :0 NR + Mustard Pusa bold :118 20-40-0	Chick Pea Samrat :118 20-40-0	Green gram AKM-8802 :75 20-20-0	-	933 + 606	545	71961	8.5
Maize PEHM-2 :0 NR	Chick Pea Samrat :118 20-40-0	Cowpea Local :70 20-20-0	-	1449	5520	118412	9.9

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
+ Linseed Meera :137 20-40-0				+ 396			
Maize PEHM-2 :0 NR	Garlic Local :137 120-40-100	Fallow	-	6136	-	218158	8.9
Cotton H-8 :0 NR	Fallow	Green gram AKM-8802 :75 20-20-0	-	-	820	36900	2.7
Cotton H-8 :0 NR	Fallow	Green gram AKM-8802 :75 20-20-0	-	-	931	41925	3.2
SE±						55325	2.3
CD at 5%						118674	5.1
		AKOLA(MAHARASHTRA)					
Groundnut TAG-24 :101 25-50-30	Linseed Local :110 60-30-0	Green gram AKM-4:66 20-40-0	1270	939	165	104888	14.3
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 60-30-0		+ 126	+ 1894			
Groundnut TAG-24 :101 25-50-30	Lentil Local :140 20-40-0	Fallow	1175	-	-	51890	7.4
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 20-40-0		+ 139	-			
Groundnut TAG-24 :101 25-50-30	Pea Local :90 20-40-0	Green gram AKM-4:66 20-40-0	1198	615	170	83991	10.8
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 20-40-0		+ 175	+ 1287			
Groundnut TAG-24 :101 25-50-30	Frenchbean Local :90 90-60-0	Green gram AKM-4:66 20-40-0	1233	1394	121	105470	14.3
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 90-60-0		+ 143	+ 2651			
Groundnut TAG-24 :101 25-50-30	Frenchbean Local :90 20-40-0	Green gram AKM-4:66 20-40-0	1145	68	189	63231	8.4
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 20-40-0		+ 179	+ 191			

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Groundnut TAG-24 :101 25-50-30	Green gram TAMS-38 :98 20-40-0	Green gram AKM-4:66 20-40-0	1389	704	136	107291	12.1
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 20-40-0		+ 155	+ 1328			
Groundnut TAG-24 :101 25-50-30	Black gram TAG-24 :98 20-40-0	Green gram AKM-4:66 20-40-0	1291	505	254	93876	10.9
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 20-40-0		+ 139	+ 661			
Groundnut TAG-24 :101 25-50-30	Wheat null:66 120-60-60	Green gram AKM-4:66 20-40-0	1287	3621	212	139399	22.9
Niger NPS-6:118 25-50-30	+ Carrot Kesar:90 120-60-60		+ 132	+ 3621			
SE±						8831	1.3
CD at 5%						18942	2.7
		C. SUBHUMID ECOSYSTEM					
		FAIZABAD (UTTAR PRADESH)					
Rice NDR-359 :141 NA	Wheat HUW-468 :143 NA	Fallow	4701	4072	-	120245	30.3
Rice NDR-359 :141 NA	Potato K.Ashoka :101 NA	Green gram NDM-1 :79 NA	4983	19060	1038	193814	39.2
Rice NDR-359 :141 NA	French bean Meera :129 NA	Ladys finger NA :76 NA	4785	2376	7373	197861	19.7
Rice NDR-359 :141 NA	Mustard NDR-8501 :108 NA	Black gram NDU-1 :82 NA	4925	1680	911	156682	29.3
Rice NDR-359 :141 NA	Berseem Vardan :156 NA	Berseem seed Vardan :180 NA	4816	0.0	151	80158	17.3
Rice NDR-359 :141 NA	Chick Pea Awarodhi :151 NA	Maize fodder NA :53 NA	4830	1930	-	124802	23.7
Rice NDR-359 :141 NA	Lentil NDL-1 :134 NA	Green Fodder Sudanchari :68 NA	4718	1725	-	114344	22.2

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice NDR-359 :141 NA	Cauliflower Hybrid :90 NA	Cowpea fodder NDL-1 :93 NA	4865	9608	7235	156906	24.3
SE±						4622	0.75
CD at 5%						9915	1.6
		PANTNAGAR (UTTARAKHAND)					
Rice HKR-47:105 120-60-40	Wheat PBW-343 :155 120-60-40	Fallow	4233	3900	-	111538	28.1
Rice HKR-47:105 120-60-40	Pea veg Arkel :80 20-60-40	Rice 4266 HKR-47:109 150-60-40	10933	7116	264079	49.5	
Rice HKR-47:126 120-60-40	Pea veg Arkel :77 20-60-40	Fallow	4266	9666	-	155503	23.7
Rice HKR-47:126 120-60-40	Potato KufriJyoti :107 150-60-80	Cowpea Pusa Komal :92 20-60-40	4233	28533	8123	266135	46.3
Rice HKR-47:126 120-60-40	Pea veg Arkel :90 20-60-40	Maize Suvarna:90 80-60-40	4466	10266	9350	286768	56.9
Rice HKR-47:126 120-60-40	Mustard PBW-343 :116 90-60-40	Cowpea Pusa Komal :90 20-60-40	4200	1500	8050	190790	26.5
Rice HKR-47:126 120-60-40	Pea veg null:90 20-60-40 + Toria Utkala Manika :95 20-60-40	Maize Suvarna:101 80-60-40 + Mentha NA:116 80-60-40	3400	9066 + 583	5123 + 21033	285589	55.9
Soyabean PS-1024:135 20-60-40	Wheat PBW-343 :151 120-60-40	Fallow	2066	4400	-	193688	43.4
Rice HKR-47:126 20-60-40	+ Mentha NA :121 120-60-40		+ 2366	+ 15783			
Maize Suvarna:100 80-60-40	Pea veg Arka :91 20-60-40	Green gram PM-2 :77 20-60-40	8533	8250	996	315307	53.2
Cowpea PusaKomal :100 80-60-40	+ Toria Utkala Manika :96 20-60-40	+ Mentha NA:121 20-60-40	+ 1766	+ 500	+ 13466		
SE±						8621	2.2
CD at 5%						18277	4.5

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
			SABOUR (BIHAR)				
Rice Sita :138 NA	Wheat HD-2733 :113 NA	Fallow	5392	4678	-	138023	34.9
Rice Sita :132 NA	Maize Shaktiman-3 :153 NA + Potato K.Ashoka :69 NA	Maize fodder Suwan :39 NA	5299	6405 + 14821	-	217426	54.6
Rice Rajendra suwasini :135 NA	Wheat HD-2733 :113 NA + Febugreek Leaves NA :113 NA	Green gram SML-668 :76 NA	4481	4491 + 300	566	152100	33.1
Rice Rajendra suwasini :135 NA	Potato K.Ashoka :76 NA + Radish Pusa Chetki :56 NA	Onion Nasik Red :68 NA + Maize(Cob) Suwan :81 NA	4212	18098 + 5078	8386 + 5893	233351	44.4
Rice Rajendra suwasini :135 NA	Cabbage Pusa Mukta :101 NA + Radish Pusa Chetki :56 NA	Ladys finger null:0 NA + Green gram null:0 NA	4347	37035 + 6544	12911 + 254	473522	31.5
Rice JKRH-401 :128 NA	Maize Shaktiman-3 :148 NA + Potato K.Ashoka :69 NA	Sorghum(F) Local :0 NA	6541	6352 + 14318	-	231329	58.3
Rice Maize JKRH-401 :128 NA	Maize Shaktiman-3 :148 NA + Frenchbean PDR-14 :108 NA	Fodder Local :0 NA	6665	7874 + 529	-	203728	51.8

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice JKRH-401 :128 NA	Garlic Yamuna Safed :128 NA + Coriander Pant Haritima :64 NA	Maize null:0 NA	6520	4522 + 5058	2924	344678	53.7
Rice Rajendra mahsuri :156 NA	Wheat HD-2733 :133 NA	Green gram null:0 NA	6293	4554	623	176446	39.6
Rice Rajendra mahsuri :156 NA	Maize Shaktiman-3 :158 NA	Clusterbean fodder null:0 NA	6231	7569	-	182969	47.5
Rice Rajendra mahsuri :156 NA	Oat fodder JHO-822 :110 NA	Fodder null:0 NA	6055	-	-	81439	20.9
Rice Rajendra mahsuri :156 NA	Chick Pea Baibhav :121 NA + Coriander Rajendra Swati :109 NA	Maize null:0 NA	6168	1667 + 436	2810	176475	38.2
SE±						9981	2.1
CD at 5%						20702	4.2
		RANCHI (JHARKHAND)					
Rice Shahbhagi:121 80-40-20	Wheat K-9107 :140 100-50-25	Fallow	2946	3471	-	88227	22.2
Rice Shahbhagi:121 80-40-20	Mustard Pusa bold :127 80-null-20	Green gram Pusa Vishal :71 20-40-20	3426	1088	7	79584	17.7
Rice Shahbhagi:121 80-40-20	Linseed Sweta:134 30-20-20	Green gram Pusa Vishal :71 20-40-20	3733	761	9	75110	16.9
Rice Shahbhagi:121 80-40-20	Potato K.Ashoka :93 120-80-100	Green gram Pusa Vishal :71 20-40-20	3830	21231	13	141287	33.9
Rice Shahbhagi:121 80-40-20	Wheat K-9107 :140 100-50-25	Green gram Pusa Vishal :71 20-40-20	3254	2458	7	85110	20.9

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
	+ Mustard Pusa bold :127 100-50-25			+ 216			
Rice Shahbhagi:121 80-40-20	Wheat K-9107 :140 100-50-25 + Linseed Sweta:134 100-50-25	Green gram Pusa Vishal :71 20-40-20	3542	2565 + 137	7	88335	21.9
Rice Shahbhagi:121 80-40-20	Potato K.Ashoka :93 120-80-100 + Wheat K-9107 :130 120-80-100	Green gram Pusa Vishal :71 20-40-20	4254	20117 + 1626	11	165014	39.9
SE±						3507	0.80
CD at 5%						7642	1.7
		JABALPUR (MADHYA PRADESH)					
Rice MR-219 :143 120-60-40	Wheat GW-273 :130 120-60-40	Fallow	3432	3669	-	97536	24.5
Rice MR-219 :143 120-60-40	Chick Pea JG-322 :125 20-60-20	Fallow	3581	-	-	48174	12.4
Rice Danteshwari :112 120-60-40	Onion Pusa red :120 120-60-40	Fallow	3637	5881	-	104798	15.5
Rice Pusa Bahar :124 120-60-40	Berseem seed JB-5 :169 20-60-40	Fallow	3030	4	-	41260	10.5
Rice JRH-5 :119 150-75-50	Potato Kufri Jyoti :115 120-100-100	Sorghum (F) MP-chari :70 75-50-30	3244	2664	48863	115909	21.7
Rice JRH-5 :119 150-75-50	Gobi sarson Terriuttam :113 75-50-30	Black gram CU-19 :77 20-60-20	3189	947	677	90057	18.5
Rice JRH-5 :119 150-75-50	Pea veg Arkel :105 20-60-20	Sorghum(F) MP-chari :70 75-50-30	3237	3540	47771	139197	22.3
Rice JRH-5 :119 150-75-50	Potato Kufri Jyoti :115 120-100-100	Groundnut Jyoti :70 20-60-20	3111	7675	1762	144601	28.2

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice JRH-5 :119 150-75-50	Gobi sarson Terriuttam :113 75-50-30	Sorghum(F) MP-chari :70 75-50-30	3124	884	46632	117156	23.1
Rice JRH-5 :119 150-75-50	Gobi sarson Terriuttam :113 75-50-30	Ladys finger ParbhaniKranti :70 120-60-40	3140	901	3698	101747	17.1
Rice JRH-5 :119 150-75-50	French bean Arkakomal :100 120-50-40	Sorghum(F) MP-chari :70 75-50-30 + Cowpea fodder Ankur :70 75-50-30	3596	-	27008 + 3411	90829	17.3
Rice Danteshwari :112 120-60-40	Merigold African Giant :115 120-60-40	Sorghum(F) MP-chari :70 75-50-30	3197	4337	47228	184668	18.8
SE±						9593	2.3
CD at 5%						19531	7.3
		REWA (MADHYA PRADESH)					
Rice Danteshwari :98 120-60-40	Wheat GW-273 :120 120-60-40	Fallow	3848	4900	-	120369	30.2
Rice Danteshwari :98 120-60-40	Chick Pea JG-322 :133 20-60-20	Fallow	4017	514	-	69983	15.7
Rice Danteshwari :98 120-60-40	Berseem NA :150 20-60-20	Berseem seed NA :95 NA	4826	65203	229	254465	27.9
Rice Danteshwari :98 120-60-40	Potato Kufri Sinduri :95 120-60-40	Wheat HD-2864 :110 100-60-40	4290	9675	3533	147806	36.5
Rice Danteshwari :98 120-60-40	Garlic NA :165 10-75-50	Fallow NA :0 NA	4170	7613	-	326756	25.5
Rice Danteshwari :98 120-60-40	Toria T9 :85 60-30-20	Onion AFLR :135 120-60-40	4355	1440	5236	151825	25.6
Rice Danteshwari :98 120-60-40	Lentil NA :150 20-60-20	Sunhemp Fodder GM-2 :65 20-60-20	4996	466	9465	105093	20.4
Rice Danteshwari :98 120-60-40	Pea veg Arkel :90 20-60-20	Wheat HD-2864 :110 120-60-40	4777	3648	3722	153401	32.8
Rice Danteshwari :98 120-60-40	Chick Pea JG-322 :130 20-60-20	Fallow	4027	189	-	88415	19294

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
	+ Linseed JM-12 :133 20-60-20			+ 883			
Rice Danteshwari :98 120-60-40	Mustard Pusa bold :155 120-60-40	Sunhemp Fodder GM-2 :65 20-60-20	4668	1777	8657	139067	27.2
SE±						8985	1.3
CD at 5%						18877	2.6
		POWERKHEDA (MADHYA PRADESH)					
Soyabean JS 95-60 :95 20-60-20	Wheat GW-273 :120 120-60-40	Fallow	0.0	4978	-	69701	17.2
Soyabean JS 95-60 :95 20-60-20	Pigeon Pea JG-130 :110 20-60-20	Fallow	0.0	1527	-	65687	5.2
Soyabean JS 95-60 :95 20-60-20	Sugarcane Co 86032 :0 300-80-60	Fallow	0.0	0.0	-	-	-
Soyabean JS 95-60 :95 20-60-20	Sugarcane Co 86032 :0 300-80-60	Fallow	0.0	105545	-	221644	35.9
Rice Pusa sugandha-5 :120 100-40-25	Wheat GW-273 :120 120-60-40	Green gram PDM-54 :68 20-60-20	0.0	5318	687	105399	20.7
Soyabean JS 95-60 :95 20-60-20	Potato Chip Sona :95 120-100-75	Ladys finger Parbhani Kranti :150 80-60-20	0.0	33052	12221	278749	36.4
Soyabean JS 95-60 :95 20-60-20	Maize fodder African Tall :95 120-60-40	Fallow	0.0	40968	-	51210	65.5
Rice Pusa sugandha-5 :120 100-40-25	Linseed Kiran :120 50-30-20	Green gram PDM-54 :68 20-60-20	0.0	1291	729	74332	9280
Rice Pusa sugandha-5 :120 100-40-25	Linseed Kiran :120 50-30-20	Sesamum TKG-55 :80 50-30-20	0.0	1458	604	74065	11129
Soyabean JS 95-60 :95 20-60-20	Potato Chip Sona :95 120-100-75	Sesamum TKG-55 :80 50-30-20	0.0	33468	624	168691	35.9
SE±						7684	1.5
CD at 5%						15768	3.1

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
CHIPLIMA (ODISHA)							
Rice Naveen :135 80-40-40	Groundnut Smruti :120 null-40-40	Fallow	3500	1915	-	123706	22973
Rice Naveen :135 80-40-40	Groundnut Smruti :120 null-40-40 + Sunflower Mahamaya :0 null-40-40	Bottle gourd US-15 :65 50-30-50 + Amaranthus White Vienna :50 50-30-50	3663	1410 + 313	12797 + 742	206564	24.5
Rice ARISE-6444:135 80-40-40	Groundnut Smruti :120 null-40-40 + Kosala R-059 :0 null-40-40	Cowpea NA :60 25-50-50 + Amaranthus White Vienna :50 25-50-50	4153	1864 + 1909	3109 + 888	183759	27.7
Rice Naveen :135 80-40-40	Maize(Cob) Kamal :90 80-40-40 + Radish NA :0 80-40-40	Ladys finger NA :65 80-40-40 + Amaranthus White Vienna :50 80-40-40	3692	35691 + 11606	3146 + 760	160789	60.8
Rice ARISE-6444:135 80-40-40	Maize(Cob) Kamal :90 80-40-40 + Coriander NA :0 80-40-40	Cowpea NA :60 25-50-50 + Amaranthus White Vienna :50 25-50-50	4257	41909 + 377	3309 + 805	142301	70.2
Rice Naveen :135 80-40-40	Tomato BT-10 :100 80-40-40 + Kosala NA :0 80-40-40	Water melon Sugar-75 :75 100-50-50 + Amaranthus White Vienna :50 100-50-50	3570	9090 + 1475	8982 + 758	234314	19.6
Rice ARISE-6444:135 80-40-40	Tomato BT-10 :100 80-40-40 + Febugreek Leaves NA :0 80-40-40	Cowpea null:60 25-50-50 + Amaranthus White Vienna :50 25-50-50	4067	9689 + 2543	2992 + 874	212418	19.4
Rice Naveen :135 80-40-40	Kufri Potato chandermukhi:100 100-200-100	Pumpkin null:75 100-50-50	3672	7468	10027	197527	24.5

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
	+ Radish NA :0 100-200-100	+ Amaranthus White Vienna :50 100-50-50		+ 9705	+ 924		
Rice ARISE-6444:135 80-40-40	Potato Kufri chandermukhi:100 100-200-100	Green gram K-851 :66 20-40-40	4280	8481	744	143118	26.5
	+ Kosala NA :0 100-200-100	+ Amaranthus White Vienna :50 20-40-40		+ 1099	+ 1012		
Rice Naveen :135 80-40-40	KnolKhol Virat :85 80-40-40	Ridge gourd Salem :95 80-40-40	3624	6002	2853	142243	16.5
	+ Spinach NA :0 80-40-40	+ Amaranthus White Vienna :50 80-40-40		+ 843	+ 879		
SE±						12114	14.8
CD at 5%						25453	3.1
		KATHALGERA (KARNATAKA)					
Rice MTU-1010 :135 100-60-50	-	Rice MTU-1010 :125 120-60-60	5762	-	5175	147107	37.8
Maize Hybrid :110 150-75-40	-	Rice MTU-1010 :125 120-60-60	3991	-	5049	131090	31.9
Green gram KKM-3 :0 150-75-40			+ 242				
Rice MTU-1010 :135 100-50-50	-	Rice MTU-1010 :125 120-60-60	5392	-	5554	147228	37.8
Rice MTU-1010 :135 100-50-50	-	Rice MTU-1010 :125 120-60-60	5774	-	5479	151361	38.9
Rice MTU-1010 :135 100-50-50	-	Tomato NA :90 120-50-30	6023	-	19901	258134	25.4
Rice MTU-1010 :135 100-50-50	-	Ladys finger Arca Anamica :85 120-75-60	5109	-	13608	224531	22.4
Rice MTU-1010 :135 100-50-50	-	Rice MTU-1010 :125 120-75-60	3963	-	5903	132706	34.2

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice MTU-1010 :135 100-50-50	-	Rice MTU-1010 :125 120-75-60	6145	-	5850	161350	41.5
Maize Hybrid :110 100-75-50	-	Rice MTU-1010 :125 120-60-60	4023	-	5163	122152	31.6
Rice MTU-1010 :135 100-50-50	-	Maize Hybrid :100 150-75-60	5162	-	4227	124811	32.4
Rice MTU-1010 :135 100-50-50	-	Groundnut NA :125 25-50-60	5294	-	2502	171311	32.5
Maize Hybrid :110 150-75-40	-	Green gram KKM-3 :65 25-50-0	4462	-	1282	116172	19.5
SE±						14737	3.5
CD at 5%						30566	7.3
		RAIPUR (CHHATTISGARH)					
Rice MTU-1010 :115 NR	Wheat GW-273 :NA NR	Cowpea(S) Gomti:NA NR	4927	2748	986	126094	29.7
Rice MTU-1010 :115 NR	Castor DCH-9 :NA NR + Lentil K-75:NA NR	Cowpea Gomti:NA NR	5281	94 + 867	5704	161354	24.4
Rice MTU-1010 :115 NR	Mustard Pusa bold :NA NR + Lentil K-75:NA NR	Cowpea fodder Gomti:NA NR	4937	1175 + 762	27844	195730	30.5
Rice MTU-1010 :115 NR	Wheat GW-273 :NA NR	Green gram null:NA	5187 NR	2931	1063	158652	31.6
Rice Mahamaya :128 NR	Sunflower K-7903 :NA NR + Lentil K-75:NA NR	Cowpea Gomti:NA NR	5802	1066 + 812	4602	192099	31.7

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice Mahamaya :128 NR	Wheat GW-273 :NA NR + Fenugreek(S) Hy-8 :NA NR	Cowpea fodder Gomti:NA NR	6083	2139 + 808	32475	225380	36.4
Rice Mahamaya :128 NR	Wheat GW-273 :NA NR + Lentil K-75:NA NR	Cowpea Gomti:NA NR	6323	2039 + 582	5258	188619	33.5
Rice Mahamaya :128 NR	Onion Nasik Red :NA NR + Coriander null:NA NR	Cowpea(S) Gomti:NA NR	6385	10685 + 745	878	214950	32.4
SE±						9121	17.1
CD at 5%						19564	36.5
		VARANASI (UTTAR PRADESH)					
Rice Pusa sugandha-4 :135 150-75-75	Wheat HUW-468 :120 120-60-60	Fallow	3178	3831	-	96378	24.2
Rice Pusa sugandha-4 :135 150-75-75	Wheat HUW-468 :120 120-60-60	Green gram ICPL 87-119 :68 0-50-30	3551	3935	1169	155469	29.9
Rice Pusa sugandha-4 :135 150-75-75	Wheat HUW-468 :120 120-60-60	Sesbania Local :68 NA	3811	4375	-	112516	28.3
Rice Pusa sugandha-4 :135 150-75-75	Wheat HUW-468 :120 120-60-60 + Mustard PRO-4001 :85 120-60-60	Black gram Pant Urd -1:68 0-50-30	3266	3178 + 337	1030	143027	27.7
Rice Pusa sugandha-4 :135 150-75-75	Wheat HUW-468 :120 120-60-60 + Mustard PRO-4001 :85 120-60-60	Cowpea CP-4 :68 0-50-30	3623	3235 + 385	3240	141419	27.4

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice Pusa sugandha-4 :135 150-75-75	Mustard PRO-4001 :85 75-50-50	Green gram HUM-16:68 0-50-30	3615	1325	1308	147919	24.5
Rice Pusa sugandha-4 :135 150-75-75	Rapeseed Sanjucta Asesh :68 75-50-50	Ladys finger Mahyco-10:68 120-100-60	3583	960	10763	200744	21.3
Rice Pusa sugandha-4 :135 150-75-75	Pea veg AP-3:68 0-50-30	Ladys finger Mahyco-10:68 120-100-60	3488	3738	11435	215796	19.5
Rice Pusa sugandha-4 :135 150-75-75	Maize(Green cob) Bio-9681 :90 150-75-75 + Pea veg AP-3:68 150-75-75	Cowpea fodder CP-4 :68 0-50-30	3582	11012 + 3432	18321	160346	32.2
Rice Pusa sugandha-4 :135 150-75-75	Potato Kufri Sinduri :90 120-60-60	Green gram HUM-16:68 0-50-30	3627	13812	1447	171914	30.7
SE±						5868	0.90
CD at 5%						12328	1.85
		D. HUMID ECOSYSTEM					
		R S PURA (JAMMU & KASHMIR)					
Rice Jaya :113 120-60-30	Wheat DBW-17 :148 100-50-25	Fallow	4979	3270	-	112758	28.5
Rice IET-1410 :93 50-30-20	Berseem Muscavi :186 50-50-0	Fallow	3645	58229	-	197519	21.9
Rice IET-1410 :93 50-30-20	Potato K.Badshah :90 120-60-120	Onion N-53 :112 100-50-50	3833	15208	14062	249030	35.1
Rice PC-19 :102 120-60-25	KnolKhol G-40 :64 NA	Tomato Sonia :118 NA	4270	12875	9083	220038	22.4
Rice IET-1410 :93 50-30-20	Garlic Local :197 100-50-50	Cowpea Pusa Komal :51 50-60-0	3479	5708	0.00	249720	20.3
Rice PC-19 :103 120-60-25	Marigold Pusa Narangi :104 120-100-100	French bean Contender :100 50-100-100	3904	5083	7020	294326	15.5
Rice PC-19 :102 120-30-20	Spinach Local :106 NA	Ladys finger NA :137 60-30-30	4000	13958	8416	309993	23.6

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice IET-1410 :93 50-30-20	Broccoli Evergreen :91 NA	Green gram NA :80 NA	3583	8291	1041	305677	19.7
Rice IET-1410 :93 50-30-20	Cabbage Golden Acre :85 120-60-60	Onion N-53 :112 100-50-50	3541	14062	13666	266765	22.9
Rice PC-19 :102 120-60-25	Potato K.Badshah :93 120-60-60	Maize(Cob) ICPL 87-119 :91 90-60-30	4083	19916	41957	174233	85894
SE±						11814	7.1
CD at 5%						24244	14.6
		JORHAT(ASSOM)					
Rice Suwasini :129 80-40-40	Fallow	Rice Disang :96 40-20-20	3300	-	2840	82583	21.2
Rice Suwasini :129 80-40-40	Toria TS-67:82 60-40-40	Fallow	3633	663	-	68901	16.2
Rice Suwasini :129 80-40-40	Cabbage Golden Acre :129 120-60-60	Green gram Pratap :89 10-35-10	3466	9900	390	127041	15.9
Rice Suwasini :129 80-40-40	Cauliflower Snowball_1 :110 80-60-60	Black gram PU-31 :91 10-35-10	2800	3250	560	86440	13.7
Rice Suwasini :129 80-40-40	Knol Khol White Vienna :90 80-60-60	Cowpea fodder EC-4216 :55 15-35-10	3566	2586	4733	76467	14.2
Rice Suwasini :129 80-40-40	Capsicum California Wonder :129 120-60-60	Cowpea fodder EC-4216 :53 20-40-20	3166	906	5833	74738	12.1
Rice Suwasini :129 80-40-40	Green chillies Tejaswini:121 120-60-60	Black gram PU-31 :91 10-35-10	3133	1203	513	87140	12.9
Rice Suwasini :129 80-40-40	Radish Pusa Chetki :62 50-100-100	Green gram Pratap :89 10-35-10	3133	3346	350	68435	12.6
SE±						7838	1.4
CD at 5%						16813	3.1
		KALYANI (WEST BENGAL)					
Rice IET-4786 :116 60-30-60	Rice IET-4786 :150 NA	Fallow	3027	3561	-	88617	22.7
Rice BCKV-1 :90 60-30-60	Rice BCKV-1 :150 70-35-35	Fallow	1513	3847	-	72101	18.5

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice BCKV-1 :109 60-30-60	Potato Kufri Jyoti :99 200-150-150	Jute JRO-524 :122 80-40-40	3541	15861	2185	164503	35.3
Rice BCKV-1 :109 60-30-60	Wheat UP-262 :122 100-50-50	Maize Datta:95 80-40-40 + Groundnut TAG-24 :95 80-40-40	3499	2562	1630 + 1099	148265	32.8
Rice IET-4786 :116 60-30-60	Mustard B-9 :90 80-40-40	Green gram Bajaura Makka :92 20-60-40	3027	1414	721	116340	20.5
Rice BCKV-1 :116 60-30-60	Lentil B-67 :88 80-40-40 + Mustard B-9 :98 80-40-40	Sesamum B-76 :96 80-40-40	3694	550 + 294	939	117166	21.6
Amaranthus Jabakusam :72 80-40-40	Brinjal Muktakeshi :176 150-75-75 + Cluster bean Hybrid :60 150-75-75	Bitter gourd Meghna-2 :90 80-40-40	6500	8775 + 858	2139	209011	61.3
Cauliflower Radha :80 120-60-60	Radish Kalpin :48 100-50-50 + Amaranthus Jabakusam :60 100-50-50	Ladys finger Mahyco-10 :102 150-75-75	10058	20652 + 349	5094	203602	12.1
EFY Bidhankusam :170 150-120-150	Dolichos bean Hytech :157 60-80-40	Ginger Bidhankusam :170 150-120-150 + Turmeric Suranjana :322 150-120-150	24322	2383	520 + 6659	605276	43.9
Rice BCKV-1 :116 60-30-60	Wheat HP-1731:122 100-50-50	Green gram BDN-2 :75 20-60-40	3749	2604	330	101743	23.1
SE±						19758	2.2
CD at 5%						41512	4.7

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
PALAMPUR (HIMANCHALPRADESH)							
Maize Early composite :112 120-30-40	Wheat HPW-155 :178 120-45-30	Fallow	2462	3680	-	83782	21.2
Maize(Green cob) Early composite :112 120-30-40	Pea Palampriya :152 25-45-60	Summer squash Australian Green :69 100-37.5-35	4782	947	16637	209670	11.7
French bean Pole type :94 120-30-40			+ 284				
Maize Early composite :112 120-30-40	Garlic GHC-1 :210 125-56.25-60	Fallow	2462	2376	-	120363	12.5
Soyabean Harit Soya :112 120-30-40			+ 142				
Maize(Green cob) Early composite :112 120-30-40	Broccoli PalamSamridhi :132 150-75-55	Potato Kufri Jyoti :89 120-60-60	4876	4640	12045	182004	19.8
Maize Early composite :112 120-30-40	Radish Early menu long white :99 100-37.5-35	Onion Patna Red :133 125-56.25-60	2462	19081	19697	281794	21.5
Asparagus beans DP ASB-1 :112 120-30-40			+ 151				
Maize(Green cob) Early composite :112 120-30-40	Cauliflower Palam Uphar :132 125-56.25-70	French bean Pole type :112 50-75-50	4877	4734	2220	98147	10.2
Frenchbean BRS-II :120 120-30-40			+ 133				
Maize(Green cob) Early composite :112 120-30-40	Cauliflower Palam Uphar :132 125-56.25-70	Buck wheat Sangla B1 :67 40-30-20	4829	4734	5066	217258	27.3
Green gram BRS-II :120 120-30-40			+ 161				
Maize(Green cob) Early composite :112 120-30-40	Broccoli Palam Samridhi :132 150-56.25-50	Radish Early menu Long white :95 100-37.5-35	4924	4735	1515	140759	8.6
Asparagus beans DP ASB-1 :112 120-30-40			+ 133				
SE±						29172	1.2
CD at 5%						60678	2.4

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
E. COASTAL ECOSYSTEM							
BHUBANESWAR (ODISHA)							
Rice Hiranmayee:128 80-40-40	Groundnut Smruti :125 20-40-40	Fallow	3467	1764	-	117226	22.1
Rice Hiranmayee:128 80-40-40	Groundnut Smruti :125 20-40-40 + Toria Parbati :60 20-40-40	Bottle gourd GT-2 :0 50-30-50 + Amaranthus NA :0 50-30-50	3385	1348 + 349	6560 + 742	159713	22.4
Rice ARISE-6444:118 120-60-60	Groundnut Smruti :125 20-40-40 + Kosala Local :30 20-40-40	Cowpea Utkala Manika :89 25-50-50 + Amaranthus NA :0 25-50-50	3785	1476 + 1354	3463 + 888	164421	24.1
Rice Hiranmayee:128 80-40-40	Maize(Cob) Navjyot :88 120-60-60 + Radish Chetki long :60 120-60-60	Ladys finger NA :0 80-40-40 + Amaranthus NA :0 80-40-40	3234	38961 + 6493	4770 + 760	159913	63.9
Rice ARISE-6444:118 120-60-60	Maize(Cob) Navjyot :88 120-60-60 + Kosala Local :30 120-60-60	Cowpea Utkala Manika :89 25-50-50 + Amaranthus NA :0 25-50-50	3563	42291 + 1676	2930 + 805	133183	67.7
Rice Hiranmayee:128 80-40-40	Tomato BT-10 :98 120-75-100 + Radish Chetki long :60 120-75-100	Bitter gourd Nakhara local :84 75-25-50 + Amaranthus NA :0 75-25-50	3408	8979 + 6228.00	3448 + 758.00	219079	16.2
Rice ARISE-6444:118 120-60-60	Tomato BT-10 :98 120-75-100 + Kosala Local :30 120-75-100	Cowpea Utkala Manika :89 25-50-50 + Amaranthus NA :0 25-50-50	4232	12421 + 1410	3510 + 874	222571	20.3

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice Hiranmayee:128 80-40-40	Broccoli NA :112 120-60-60 + Radish Chetki long :60 120-60-60	Pumpkin NA :72 65-30-75 + Amaranthus NA :0 65-30-75	3098	3907 + 4995	6604 + 817	215676	15.4
Rice ARISE-6444:118 120-60-60	Broccoli NA :112 120-60-60 + Kosala Local :30 120-60-60	Cowpea Utkala Manika :89 25-50-50 + Amaranthus NA :0 25-50-50	3977	4773 + 1354	3618 + 903	231062	18.7
Rice Hiranmayee:128 80-40-40	Knol Khol Samrat :101 80-40-40 + Spinach NA :30 80-40-40	Cowpea Utkala Manika :89 25-50-50 + Amaranthus NA :0 25-50-50	3419	6027 + 788	3762 + 879	144180	17.1
SE±						10701	1.9
CD at 5%						22483	4.1
		MARUTERU (ANDHRA PRADESH)					
Rice MTU-1075 :150 90-60-60	Maize(Cob) DHM-117 :93 120-50-60	—	6100	6048	—	98859	28666
Rice MTU-1075 :150 90-60-60	Sorghum Local :117 120-40-40	—	6281	4220	—	148642	36.5
Rice MTU-1075 :150 90-60-60	Soyabean JS-335 :89 50-50-40	—	6172	927	—	106770	25.4
Rice MTU-1075 :150 90-60-60	Black gram PU-31 :90 20-50-40	—	5991	967	—	122188	24.1
Rice MTU-1075 :150 90-60-60	Maize(Cob) DHM-117 :93 120-60-50	—	5592	5511	—	90533	26.3
Rice MTU-1075 :150 90-60-60	Sorghum Local :117 120-40-40	—	5954	932	—	94266	23.9
Rice MTU-1075 :150 90-60-60	Soyabean JS-335 :89 50-50-40	—	5773	981	—	102760	24.2

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice MTU-1075 :150 90-60-60	Black gram PU-31 :90 20-50-40	—	6100	968	—	123669	24.5
Rice MTU-1075 :150 90-60-60	Rice MTU-1010 :117 180-90-60	—	5991	1425	—	99745	25.6
SE±						22074	5.1
CD at 5%						46798	10.7
		NAVSARI (GUJARAT)					
Rice Jaya :98 100-30-0	Chick Pea GG-2 :90 20-40-0	Fallow	2640	460	-	49797	10.7
Rice Gurjari :92 100-30-0	Sorghum G-40 :130 80-40-0	Sorghum G-40 :95 80-40-0	2309	1783	1829	85963	20.5
Rice Gurjari :92 100-30-0	Maize Sweet corn Madhur :80 120-40-0 + Green gram Meghna-2 :0 120-40-0	Green gram Meghna-2 :75 20-40-0	2800	3200 + 308	794	127952	17.3
Rice Gurjari :92 100-30-0	Febugreek Leaves Guj-1 :45 40-40-0	Cluster bean Pusa Bahar :115 25-40-0	2926	6035	6287	175105	15.3
Rice Gurjari :92 100-30-0	Castor GCH-7 :150 120-30-0	Castor continue	2652	2183	-	81417	18.7
Rice Gurjari :92 100-30-0	Brinjal Suranjana :160 100-50-50 + Radish Jaipur long :58 100-50-50	Brinjal continue	2629	9775 + 6287	-	154380	12.5
Rice Jaya :98 100-30-0	Sunhemp Fodder Local :50 20-40-0	Groundnut GG-2 :115 25-50-0	3052	-	1297	92947	17.9
Rice Jaya :98 100-30-0	Cabbage Golden Acre :72 220-110-220	Green gram Meghna-2 :75 20-40-0	2869	14975	1017	179463	17.4
Rice Jaya :98 100-30-0	Maize Sweet corn Madhur :80 120-40-0	Groundnut GG-2 :115 25-50-0	2937	6310	1086	163092	24209

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice Jaya :98 100-30-0	Lucerne Anand-2:100 20-40-0	Lucerne seed null:80 0-0-0	3063	33550	210	163200	16.1
SE±						4239	0.65
CD at 5%						8907	1.4
		KARAMANA (KERALA)					
Rice Aiswaria :120 90-45-45	Rice Aiswaria :120 90-45-45	Fallow	1804	2314	-	55403	14.2
Rice Aiswaria :120 90-45-45	Rice Aiswaria :120 90-45-45	Amaranthus Arun :60 100-50-50	6517	4540	8850	244306	42.6
Rice Aiswaria :120 90-45-45	Rice Aiswaria :120 90-45-45	Amaranthus Arun :60 10-50-50	3466	2849	4500	133540	24.1
Rice Aiswaria :120 90-45-45	Rice Aiswaria :120 90-45-45	Cucumber Vellayani culture :85 70-25-25	7371	5341	11713	289894	45.5
Rice Aiswaria :0 90-45-45	Rice Aiswaria :120 90-45-45	Cucumber Vellayani culture :85 70-25-25	3846	3086	4838	142357	24.6
Rice Aiswaria :120 90-45-45	Rice Aiswaria :120 90-45-45	Cowpea fodder KBC-2:55 40-30-30	5769	4273	19166	183949	37.8
Rice Aiswaria :120 90-45-45	Rice Aiswaria :120 90-45-45	Cowpea fodder KBC-2:55 50-30-40	3371	2849	18564	131003	24.5
SE±						30191	3.8
CD at 5%						65786	8.4
		THANJAVOUR (TAMILNAIDU)					
Rice ADT-43 :110 150-50-50	Rice ADT-49:125 150-50-50	Brinjal Local :152 100-50-30	5516	5772	5969	212417	40.5
Rice ADT-43 :110 150-50-50	Rice ADT-49:125 150-50-50 + Black gram ADT-5 :62 135-62.5-50	Maize NK-6240 :105 135-62.5-50	4866	5634 + 165	5634	222148	56.2
Rice ADT-43 :110 150-50-50	Rice ADT-49:125 150-50-50 +	Groundnut VRI-3 :100 17-34-54	5614	5693 +	1211	209875	46.7

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
	Pigeonpea VBN(Rg)-3 :105 17-34-54			216			
Maize NK-6240 :170 135-62.5-50 + Black gram ADT-5 :70 135-62.5-50	Rice ADT-49:125 150-50-50	Black gram ADT-5 :72 25-50-25 + Pigeonpea VBN(Rg)-3 :105 25-50-25	5418 + 185	5733	965 + 216	206851	43082
Sunflower Sungold :95 60-90-60	Rice ADT-49:125 150-50-50	Green gram KM-2 :95 25-50-25 + Pigeonpea VBN(Rg)-3 :105 25-50-25	1586	5989	761 + 214	182739	33.8
Black gram ADT-5 :70 25-50-25 + Pigeonpea VBN(Rg)-3 :105 25-50-25	Rice ADT-49:125 150-50-50	Pigeonpea VBN(Rg)-3 :105 25-50-25	811 + 266	6166	1221	181808	29.1
Green gram KM-2 :70 25-50-25 + Pigeonpea VBN(Rg)-3 :105 25-50-25	Rice ADT-49:125 150-50-50	Sesamum TMV-4 :91 35-23-23	817 + 244.33	6225	808	167392	29.6
Pigeonpea VBN(Rg)-3 :105 25-50-25	Rice ADT-49:125 150-50-50	Onion Local :90 60-60-30	1125	6186	3113	161150	26.7
Green Manure Local :45 0-0-0	Rice ADT-49:125 150-50-50	Sunflower Sungold :92 60-90-60	8470	6619	1714	174048	34.8
SE±						10918	2.1
CD at 5%						23147	4.2
		KARJAT (MAHARASHTRA)					
Rice Palghar-1 :107 100-50-50	Groundnut SB-XI :109 25-50-0	—	5833	2467	—	177138	34.1
Rice Palghar-1 :107 100-50-50	Mustard Varuna :87 90-50-0	—	5902	953	—	108467	25.6

Cropping system (variety; duration in days)/ Fertilizer (N:P_2O_5:K_2O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10^6, K Cal)
Kharif	*Rabi*	Summer	*Kharif*	*Rabi*	Summer		
Rice Palghar-1 :107 100-50-50	Sunflower NA :104 60-30-30	—	5595	1002	—	112355	25.6
Rice Palghar-1 :107 100-50-50	Brinjal NA :138 150-50-50	—	5565	28805	—	367227	26.2
Rice Palghar-1 :107 100-50-50	Cabbage G-1 :84 120-60-60	—	5595	14825	—	169396	23.4
Rice Palghar-1 :107 100-50-50	Maize fodder African Tall :75 120-50-50	—	5178	62409	—	147659	27.9
Rice Palghar-1 :107 100-50-50	Cowpea Konkan Bhushan :73 25-50-0	—	6309	867	—	94409	22.3
Rice Palghar-1 :107 100-50-50	Dolichos bean KonkanBhushan :99 90-60-30	—	5992	6336	—	201297	23.8
Rice Palghar-1 :107 100-50-50	Ladys finger Hybrid :81 100-50-50	—	5674	5586	—	140287	21.5
Rice Palghar-1 :107 100-50-50	Green chillies Sita :117 150-50-50	—	5277	4771	—	161878	19644
Rice Palghar-1 :107 100-50-50	Rice JRH-5 :93 120-50-50	—	5258	4566	—	132137	33992
SE±						2798	0.57
CD at 5%						5837	1.2

system was better which gave highest energy production of 28.9 K*10^6/ha/year followed by pearl millet+greengram-wheat+mustard-fallow(28.2 K*10^6/ha/year)cropping system.

S.K. Nagar: Out of eight cropping systems evaluated, the cropping system involving green gram-cauliflower–fennel recorded the highest gross returns of Rs.2, 62,455/ha/year followed by Bt-cotton-green gram–castor (Rs 1, 94,336/ha/year). In terms of energy production, Bt-cotton-green gram–castor sequence was better with highest energy production of 22.1 K*10^6/ha/year.

Siruguppa: Ten cropping systems were evaluated at Siruguppa. Among those, rice-fallow-fallow was identified to be the most profitable with gross returns of Rs. 1,14,711/ha/year, Energy production was also recorded highest (29.5 K*10^6/ha/year) in the same cropping sequence.

Semi-Arid Ecosystem

Bichpuri: Ten cropping systems were evaluated at Bichpuricentre, out of which pearlmillet-potato-clusterbean recorded the highest gross return of Rs. 2,16,992/ha/year closely followed by daincha-potato-Ladys finger(Rs 2,09,528/ha/year). The

highest energy value of 88.2K*106/ha/year was also recorded under sorghum (fodder)-oat (fodder)-cowpea (fodder) cropping system followed by pearlmillet-potato-clusterbean.

Junagarh: Among ten cropping systems evaluated at Junagarh, groundnut-wheat system found to be the best with gross return of Rs. 3,15,326/ha/year as well as energy output (50.7 K*10^6/ha/year) followed by groundnut-onion-sorghum (F).

Durgapura: Among nine cropping systems evaluated pearlmillet-garlic cropping system recorded the highest gross return of Rs. 1, 28,953/ ha/year followed by pearlmillet-wheat cropping system(Rs. 59,604/ha/year. The highest energy value of Rs. 15.3 K 10^6/ha/Year was also recorded from pearlmillet-wheat system.

Rajendranagar: Out of eight cropping systems evaluated at Rajendranagar, maize-groundnut cropping system recorded the highest gross return of Rs. 1,06,053/ha/year closely followed by soybean-maize (Rs.1,01,520/ha/year). As regard the energy production, maize-castor was found to be the best (23.7 K 10^6/ha/year).

Rudrur: Among ten cropping systems evaluated at Rudrur, rice-rice cropping system was found better in terms of gross return (Rs. 1,58,575/ha/ year) and energy production of 40.8 K*10^6/ha/year) closely followed by rice-sunflower in terms of gross returns (Rs.1,53,382/ha/year) and energy production (32.8 K*10^6/ha/year).

Indore: Out of nine cropping systems evaluated at Rahuri (Indore), soybean+amaranthus-wheat+cauliflower-cowpea+maize (cob) recorded the highest gross return of Rs. 1,93,581/ha/year closely followed by soybean+maize-chickpea+wheat-green gram (Rs. 1,47,677/ha/ year). However in terms of energy production soybean+maize-chickpea+wheat-green gram and soybean+maize-wheat+french bean-green gram proved better and produced 33.0K*10^6 and 30.7 K*10^6 energy/ha/year, respectively.

Parbhani: Among eight cropping systems evaluated maize+soybean+sesbania-wheat+ chickpea-Ladys finger+cow pea found to be the best both in term of gross return (Rs. 2, 67, 612/ ha/year) and energy production (34.1 K*10^6/ha/ year). Maize+soybean-sorghum+chick pea-Ladys finger found to be the next best in terms of gross return (Rs. 1, 97,654/ha/year) and energy production (32.9 K*10^6/ha/year).

Coimbatore: Nine cropping systems were evaluated at Coimbatore, out of which green chillies-maize-sunhemp(fodder) recorded highest gross return of Rs. 3,02,131/ha/year followed by sorghum (F)-cotton+onion-lablab (Rs. 2,95,661/ ha/year). With regard to energy production cowpea-maize+cowpea (fodder)-sunflower found the best (36.2 K*10^6/ha/year) closely followed by onion-cotton-maize (34.9 K*10^6/ha/year) and maize + cowpea-sunflower-cowpea (34.8K*10^6/ha/year).

Ludhiana: Among the twelve cropping sequences evaluated at Ludhiana, maize + turmeric – wheat + linseed -fallow sequence was identified most suitable with highest gross returns of Rs. 5,76,318/ ha/year with highest energy production of 91.6 K*10^6/ha/year. Maize + turmeric – barley + linseed - fallow sequence was, however, statistically proved at par with respect to both gross return and energy production.

Kanpur: Out of ten cropping systems, maize-garlic-green gram system recordedhighest gross returns of Rs.3, 57,852/ha/year followed bymaize+black gram–potato–onion (Rs. 3,09,920/ ha/year). However, in terms of energy production, maize+black gram–potato–onion(44.1 K*10^6/ha/ year) system proved better than others.

Kota: Eighth cropping systems were evaluated at Kota out of which maize-garlic-fallow recorded the highest gross return of Rs. 2, 18,159/ha/year followed by Maize-garlic+wheat-fallow(Rs. 2, 02,171/ha/year). From energy production point of view soybean-wheat-fallow (15.7 K*10^6/ha/ year) followed by maize-mustard-green gram (12.7K*10^6/ha/ year) cropping systems were found better than others.

Akola: Out of eight cropping systemsevaluated at Akola, groundnut+niger-wheat+carrot-green gram

recorded highest both gross return (Rs. 1,39,399/ha/year) as well as energy value (23.0K10^6/ha/year) followed by groundnut+niger-greengram+carrot-green gram(Rs. 1,07,291/ha/year).

Sub-Humid Ecosystem

Faizabad: Eight cropping systems were evaluated at Kumarganj; out of which rice-french bean-Ladys finger recorded highest gross return of Rs. 1,97,861/ha/year followed by rice-potato-green gram(Rs. 1,93,814/ha/year), which also recorded the highest energy value (39.2 K*10^6/ha/year).

Pantnagar: Among eight cropping systems evaluated at pantnagar, maize-pea (veg)-green gram recorded the highest gross return of Rs. 3,15,307/ha/year closely followed by rice-pea(veg)-maize (2,86,768/ha/year). However from energy production point of view, rice-pea (veg)-maize found to be the best (56.9K*10^6/ha/year) closely followed by rice-pea (veg.) +toria-maize+mentha (55.6 K*10^6/ha/year).

Sabour: Twelve cropping systems were evaluated at Sabour. Out of those rice-cabbage-Ladys finger found the best in terms of gross return (4, 73,522/ha/year) followed by rice-garlic-maize (Rs.3, 44,678/ha/year). Whereas with regard energy value, rice-maize-sorghum (fodder) proved to be the best (58.2 K*10^6/ha/year) closely followed by rice-maize-maize for fodder (54.6K*10^6/ha/year).

Ranchi: Out of seven cropping systems evaluated at Ranchi, rice-potato+wheat-green gram found the best in terms of both, gross return (Rs. 1,65,015/ha/year) and energy production (39.9K*10^6/ha/year) followed by rice-potato-green gram both in terms of gross returns (Rs. 1,41,287/ha/year) and energy production(33.8K*10^6/ha/year).

Jabalpur: Out of twelve cropping system evaluated, rice (basmati)-merigold-sorghum (fodder) recorded the highest gross return of Rs. 1, 84,668/ha/year followed by rice-potato-ground nut (Rs. 1, 44,601/ha/year). Regarding energy production rice-potato-ground nut recorded the highest calorific value (28.3 K*10^6/ha/year).

Rewa: Out of ten cropping systems evaluated at Rewa, rice-garlic-fallow recorded the highest gross return of Rs. 3,26,756/ha/year followed by rice-berseem-berseem seed (Rs. 2,54,465/ha/year). Rice-potato-wheat followed by rice-pea (veg)-wheat recorded the highest respective calorific values (36.4 and 32.8 K*10^6/ha/year).

Powerkheda: Out of ten cropping systems evaluated at Powerkheda, soybean-potato-Ladys finger provided the highest gross return of Rs. 2,78,749/ha/year followed by soybean-sugarcane(Rs. 2,21,644/ha/year). Whereas, energy production was maximum with soybean-pigeon pea cropping system (51.1K*10^6/ha/year) followed by soybean-potato-Ladys finger (36.31K*10^6/ha/year).

Chiplima: Among ten cropping system evaluated at Chiplima,paddy-tomato+kosala-watermelon+amarantusrecorded the maximum gross return (Rs. 2,34,314/ha/year) followed by rice-tomato+fenugreek-cowpea+amaranthus (Rs. 2,12,418/ha/year).Rice-maize(cob)+coriander-cowpea+amaranthus recorded the highest energy value of 70.2 K*10^6/ha/year.

Kathalgere: Out oftwelve cropping system evaluated at Kathalgere,rice-tomato found the best with gross return of Rs.2, 58,134/ha/year followed by rice-Ladys finger (Rs. 2, 24,532/ha/year). With regard to energy production rice-rice(41.5 K*10^6/ha/year) proved better than others.

Raipur: Eight cropping systems were evaluated at Raipur. Among them rice-wheat+fenugreek-cowpea (F) recorded the highest gross return of Rs. 2, 25,380/ha/year as well as the higest energy value (36.4 K*10^6/ha/year) followed by rice-onion+coriander-cowpea for seed (Rs 2, 14,950/ha/year).

Varanasi: Out of ten cropping systems evaluated, paddy-pea (veg)-Ladys finger was found best in terms of gross return(Rs2, 15,797/ha/year)

followed by paddy-rape seed-Ladys finger (Rs2,005,745/ha/year). Paddy-maize (cob) +Pea (veg)-cow pea (F) recorded the highest energy value of 33.3 K*10^6/ha/year.

Humid Ecosystem

R.S.Pura: Out of ten cropping systems evaluated rice-spinach-Ladys finger recorded the highest gross return of Rs. 3, 09,993/ha/year closely followed by rice-broccoli-green gram (Rs. 3,05,677/ha/year).From energy view point, rice-potato-maize (Cob) recorded the highest calories of 85.8K*10^6/ha/year followed by rice-potato-onion (35.1K*10^6/ha/year).

Jorhat: Eight cropping system were evaluated at Jorhat. Out of those, rice-cabbage-green gram recorded the highest gross return of Rs. 1, 27,041/ha/year followed by rice-green chillies-black gram (Rs. 87,140/ha/year). Rice-fallow rice, however recorded the highest energy value 21.2K*10^6/ha/year.

Kalyani: Out of ten cropping systems evaluated at Kalyani, elephant foot yam-dolichos bean-ginger+ turmeric recorded the highest gross return of Rs. 6,05,276/ha/year followed by amaranthus-brinjal+cluster bean-bitter gourd (Rs 2,09,011/ha/year). Highest energy value (43.9 K*10^6/ha/year) was recorded from elephant foot yam-dolichos bean-ginger+ turmeric followed by rice-potato-jute (35.3 K*10^6/ha/year) cropping system.

Palampur: Among eight cropping systems evaluated at Palampur, maize(cob)+asparagus beans-radish-onion recorded the highest gross return of Rs. 2, 81,795/ha/year followed by maize (cob)+green gram-cauliflower- buck wheat (Rs. 2,17,259/ha/year) with highest energy production of 27.2 K*10^6/ha/year.

Coastal Ecosystem

Bhubaneshwar: Ten cropping system were evaluated at Bhubaneshwar. Out of those rice-broccoli+kosala-cowpea+amaranthus recorded the highest gross return of Rs. 2, 31,062/ha/year closely followed by rice-tomato+kosala-cowpea+amaranthus (Rs.2, 22,571/ha/year). With regard to energy production, rice-maize (cob)+kosala-cowpea+amaranthus found the best with calorific value of 67.7 K*10^6/ha/year.

Maruteru: Out of nine cropping system evaluated, rice-sorghum recorded the highest gross return of Rs. 1, 48,642/ha/year followed by rice- black gram (Rs 1, 23,669/ha/year). Rice-sorghum followed by rice-maize produced maximum energy values of 36.5 and 28.7K*10^6/ha/year, respectively.

Navsari: Ten cropping systems were evaluated at Navsari. Rice-cabbage-green gram provided the maximum gross returns of Rs. 1, 79,463/ha/year closely followed by rice-fenugreek-clusterbean (Rs. 1, 75,105/ha/year). Rice-maize (sweet corn)-groundnut recorded the highest calorific value of 24.2 K*10^6/ha/year.

Karamana: Among seven cropping systems evaluated, rice-rice-cucumber recorded the maximum gross returns (Rs 2, 89,894/ha/year) as well as calorific value (45.5 K*10^6/ha/year) closely followed by rice-rice-amaranthus in terms of gross return (Rs 2, 44,306/ha/year) and energy (42.6 K*10^6/ha/year).

Thanjavur: Out of nine cropping system evaluated, rice-rice-maize+black gram recorded the highest gross return (Rs. 2, 22,148/ha/year) as well as energy production (56.2 K*10^6/ha/year). Rice-rice-brinjal and rice-rice-groundnut+ Pigeonpearecorded the second best cropping system from gross return (Rs 2, 12,417/ha/year) and energy production (46.7 K*10^6/ha/year) point of view.

Karjat: Among the eleven cropping systems evaluated at Karjat, rice-brinjalrecorded the highest gross return of Rs. 3, 67,228/ha/year followed by Rice-dolichos bean (Rs.2,01,298/ha/year). With regard to energy production rice-groundnut (34.2 K*10^6/ha/year)followed by rice-rice (34.0 K*10^6/ha/year)proved better than other cropping systems.

7.2.2 CONSERVATION AGRICULTURE AND CLIMATE CHANGE

Title of the experiment : Development of innovative farming practices to mitigate the effects of climate change

Objective:

1. To design and identify economically viable and efficient farming practices for resource conservation and counteracting adverse effects of climate change.

2. To study the effects of resource conservation technologies on photosynthetic efficiency, biomass production, economic yield, soil thermal regimes and soil health.

Year of start : 2011-12

Treatments

A. Main plots (Crop establishment methods x Cropping Systems) - 8

I. Crop establishment method - 2

T_1 = No tillage/minimum tillage/bed planting/and other suitable seed drill/planter

T_2 = Conventional tillage

II. Cropping systems (location specific) - 4

CS_1 = Predominant cropping system of the region

CS_2 = Best identified cropping system from expt. 1(a)

CS_3 and CS_4 = New cropping systems designed by involving C_4 plants (as they are known to perform better under enhanced CO_2 and higher ambient temperatures), low water requiring and physiologically more efficient crops.

B. Sub-Plots (Mulch x Fertilizer) - 4

I. Mulch - 2

M_1 = No mulch

M_2 = Crop residue mulch (crop residue - straw or stover - to be recycled *in situ*, especially in *rabi* season crops, and to be applied uniformly on inter - row space after crop seeding establishment

II. Fertilizer rates - 2

F_1 = Recommended dose of fertilizer (RDF)

F_2 = 75% RDF + 25 % N through organic manure

Experimental Design : Split Plot with three replications

Results: Centre-wise results are given in tables 7.2/2 (a-g) and discussed below:

Jabalpur

An experiment has been initiated on climate change through tillage, cropping systems, mulches and fertility levels. There were 2 tillage levels (minimum, conventional), 4 cropping systems (rice-wheat, rice-berseem, maize-wheat and sorghum-wheat) were kept in main-plot and two mulches (without mulch and with mulch) and two fertility levels (recommended dose of fertilizer and 25% higher to RDF) in sub-plot. The experiment was laid out in split plot design with three replications. Treatments comprises of 32 combinations which include rice cvkranti, maize cv JM-12 and sorghum cv. JJ-2020 in kharif and wheat cv GW-273 and berseem cv JB-5 in rabi. Recommended dose of fertilizers for rice, wheat, maize and sorghum was 120:60:40 and berseem 20:60:20 kg N, P_2O_5, K_2O/ha, respectively.

In *kharif* season, rice yield varied from 56.92 to 60.56 q/ha. The maximum yield of rice (60.56 q/ha) was recorded under conventional tillage, rice-berseem cropping system without mulch and 25% higher RDF. The maximum yield of maize (29.42 q/ha) and sorghum (29.89q/ha) was recorded under conventional tillage with mulch and 125% of recommended dose of fertilizer The minimum yield of maize and sorghum was recorded under minimum tillage, maize – wheat cropping system + without mulching + recommended dose of fertilizers and minimum tillage, sorghum – wheat, cropping system without mulch and recommended dose of fertilizer 26.89 and 24.08 q/ha respectively. During *rabi*, the wheat yield varies from 23.33 to 35.56 q/ha under all the cropping systems. The maximum yield was recorded 30.00 q/ha in rice-wheat, 34.08 q/ha in maize-wheat and 35.56 q/ha in sorghum-wheat under conventional tillage with mulch and 125% recommended dose of fertilizer. The maximum berseem fodder (3 53.42q/ha) and seed yield (2.36 q/ha) was recorded under conventional tillage with mulch and 125% recommended dose of fertilizer. The minimum yield of wheat under rice-wheat, maize-wheat and sorghum-wheat systems was obtained from minimum tillage without mulch with recommended dose of fertilizer and similar trend of minimum yield was observed in rice-berseem cropping system also.

Under different tillage practices, conventional tillage recorded maximum REY, NMR and B: C ratio of 95.35 q/ha/year, 65744 Rs/ha/year and2.66 followed by minimum tillage. Under different cropping system rice-berseem (F+S) cropping system gave the maximum REY, NMR and B:C ratio of 124.96 q/ha/yr, 91890 Rs/ha/yr and 3.02 followed by rice-wheat and sorghum-wheat cropping system. The minimum REY, NMR and B: C ratio obtained from the maize-wheat cropping system. As regard the mulches, maximum REY, NMR and B:C ratio was recorded with mulch as compare to without mulch whereas under fertility levels 125% RDF gave maximum REY, NMR and B:C ratio followed by 100% RDF.

Navsari

An experiment on Management of cropping systems for Resource Conservation and Climate Change to design agronomical efficient and economically viable new cropping systems for resource conservation and counteracting adverse effects of climate change and to study the effect of resource conservation technologies, such as zero tillage, bed planting, crop residue mulches on photosynthetic efficiency, biomass production, economics yield, soil thermal regimes and soil health was conducted in 2013-14 keeping the tillage and cropping systems in main plots and fertility level as well as mulch load in sub plot with 3 replications. Three cropping systems viz., Rice –Green manuring -Summer Groundnut, Rice – *Rabi* Castor – Green manuring and Rice - Sorghum – Summer Green gram were taken.

Results indicated that the conventional tillage recorded significantly the highest rice equivalent yield (64.46 q/ha) along with gross return of Rs. 1, 95,816/ ha and net return of Rs. 1, 03,532/ ha over minimum tillage treatment. Significantly the highest rice equivalent yield was recorded from Rice - Sorghum – Summer Green gram croppingsystem (72.00 q/ha) over others. The highest gross return of Rs. 2, 18,735/ha were also observedin the same cropping system with net return of Rs. 1, 27,221/ ha. Significantly the highest rice equivalent yield (64.56 q/ha), grass return (Rs. 1, 96,141/ha) and net return (Rs. 1, 07,487/ha) were recorded under treatment M_2 (mulch incorporation). 25% higher dose of recommended fertilizer recorded significantly the highest rice equivalent yield (64.02 q/ha) and gross return (Rs. 1, 94,488/ha) among different fertilizer treatments. The same trend was

observed in net return (Rs. 1, 06,267/ha). Nitrogen, phosphorus and potash uptake were higher in conventional tillage (153.85 kg ha^{-1}, 22.17 kg ha^{-1} and 112.80 kg ha^{-1}, respectively) as compared to conventional tillage. Among the cropping systems nitrogen uptake was higher in Rice – Green manuring -Summer Groundnut (175.38 kg ha^{-1}), while phosphorus and potash were higher in the cropping system Rice - Sorghum – Summer Green gram(26.03 kg ha^{-1} and130.68 kg ha^{-1}, respectively). N, P and K uptake were higher in the treatment of M_2 (158.76kg ha^{-1}, 21.67 kg ha^{-1} and 112.62 kg ha^{-1}), respectively than no mulch. N, P and K uptake were higher in the treatment of 25% higher of RDF (157.21 kg ha^{-1}, 21.78 kg $ha^{-1}$and 112.41kg ha^{-1}), respectively as compared to RDF. Available nitrogen and potash status were higher in the treatment having mulch(271.92 kg $ha^{-1}$and 229.00 kg ha^{-1}, respectively), whereas available phosphorus was higher in the treatment having no mulch(34.32 kg ha^{-1}) as compared to conventional tillage. Available nitrogen and Phosphorus status were higher in the treatment Rice –green manuring -summer groundnut (273.75, 34.02 kg ha^{-1}), while available potash was higher under treatment Rice - Sorghum – Summer Green gram(218.88 kg ha^{-1}). N and K status were higher in the treatment having mulch load(271.08 kg ha^{-1} and 218.08 kg ha^{-1}, respectively) as compared to no mulch, whereas available phosphorus was higher under without mulch (32.36 kg ha^{-1}). N, P and K status were higher in the treatment of 25% higher RDF(271.50 kg ha^{-1}, 33.90 kg $ha^{-1}$and 218.67 kg ha^{-1}, respectively) as compared to RDF. Organic carbon content was higher in the treatment of conventional method(0.70 %), Rice – *Rabi* Castor – Green manuring (0.73 %), with mulch load(0.71 %) and25% higher RDF(0.70 %) as compared to others. Slight decrease in pH was recorded due to conventional tillage, under Rice – *Rabi* Castor – Green manuring cropping system, no mulch and fewer than 100 per cent RDF over no tillage, Rice - Sorghum – Summer Green gram and Rice –Green manuring -Summer Groundnut cropping system with mulch and 25 per cent higher dose of RDF, respectively.

Bhubaneswar and Chiplima

An experiment was initiated on climate change through tillage, cropping systems, mulches and fertility levels at two locations viz.,, Bhubaneswar [East Coast Plains] and Chiplima [Eastern Plateau and Hills] (Odisha) having different set of soil and climate. There were 2 tillage levels (minimum and conventional) and 4 rice based cropping systems were kept in main-plot with two mulches (zero mulch and with mulch) and two fertility levels (recommended dose of fertilizer and 25% higher to RDF) in sub-plot. The experiment was laid out in split plot design with three replications.

Higher net return of Rs 82180/ha and B: C ratio was recorded under minimum tillage at Bhubaneswar. At Chiplima, higher net return and higher BC ratio was recorded from conventional method of crop establishment (table 1).

At Bhubaneswar, among the cropping systems, higher net return of Rs 63983/ha/ year was recorded from Rice-maize-okra with 0.52 BC ratio. At Chiplima, maximum net return of Rs. 98555/ha/year was also recorded from the similar cropping system i.e. Rice-maize-okra. Higher BC ratio (1.04) was recorded from the same cropping system and lowest BC ratio (065) was recorded from Rice-toria-greengram (table 2). Organic carbon and available nitrogen status of soil were improved due to cropping systems involving a legume component with mulching and INM practices as compared to other systems with no mulching and RDF practices at both the centers.

Table: 7.2/2(a). Effect of crop establishment methods on net return (Rs/ha/year) and BC ratio at different location

Locations	Tillage			
	Minimum tillage		Conventional tillage	
	Net Return	BC Ratio	Net Return	BC Ratio
Bhubaneswar	82180	0.52	59182	0.52
Chiplima	60654	0.71	70277	0.77

Table: 7.2./2(b). Net return (Rs/ha/year) and BC ratio from various cropping systems at two different locations

Locations	CS1		CS2		CS3		CS4	
	Net Return	BC Ratio	Net Return	BC Ratio	Net Return	BC Ratio	Net Return	BC Ratio
Bhubhneswar	61817	0.52	46921	0.52	63983	0.52	59182	0.52
Chiplima	56239	0.71	74880	0.67	98555	1.04	51432	0.65

Bhubaneswar: CS1: Rice-groundnut-fallow; CS2: Rice-tomato-cowpea; CS3: Rice-maize-okra, CS4: Rice-toria-greengram
Chiplima: CS1: Rice-groundnut-fallow; CS2: Rice-groundnut-cowpea; CS3: Rice-maize-okra, CS4: Rice-toria-greengram

Pantnagar

An experiment on management of cropping systems for resource conservation and climate change with twin objective to design agronomically efficient and economically viable new cropping systems for resource conservation and counteracting adverse effect of climate change and to study the effect of conservation tillage such as zero tillage, reduced tillage and direct seeding and crop residue mulches on biomass production, economic yield, soil thermal regimes and its health was conducted during 2013-14. To achieve the objective total 24 treatments with two tillage practices (RCT and conventional) with three cropping systems i.e. Rice-wheat, Rice-vegetable pea-maize and Rice- potato-moon and two mulch load and fertility level were laid out in 3 replication.

Average grain/tuber/seed/pod yield of crops was found maximum in reduced tillage as compared to conventional tillage during *kharif, rabi* and *summer* season except potato tuber yield. Among the mulching treatments, significantly higher yields were obtained in paddy straw mulched plot than without mulch plots. Between fertility levels, application of 75% RDF through inorganic and 25% through organic source recorded higher yield of crops over 100% through inorganic sources.

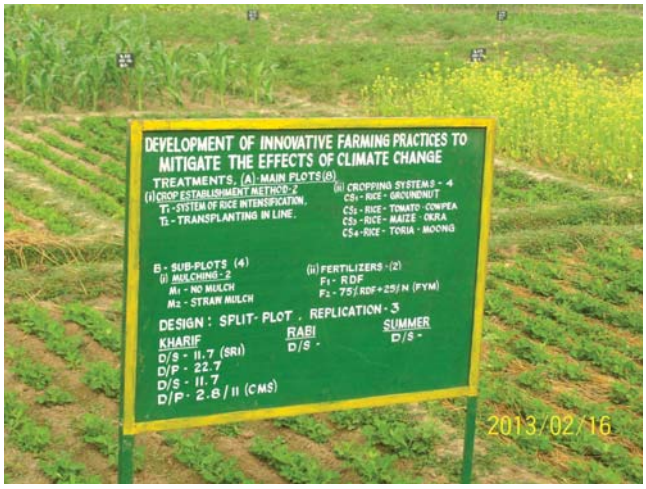
System yield (REY) was found significantly higher in in reduced tillage over conventional tillage methods. Similarly higher REY was recorded with mulching over the without mulch. Among cropping systems, rice-potato-moong gave the highest yield over other cropping systems. Effect of fertilizer dose over system productivity was found higher in INM provided 75% RDF through inorganic and 25% through organic source. Net return per year was also recorded higher with the same treatment.

Soils of plots under reduced tillage showed higher organic carbon over plots under conventional tillage. Higher organic carbon was also associated with the treatments having rice-

potato-moong grown under reduced tillage with mulch and INM (75% RDF and 25% through organic).

Parbhani

An experiment on "Development of Innovative Farming Practices to Mitigate the Effects of Climate change" with two objective to design and identify economically viable farming practices for resource conservation and counteracting adverse effects of climate change and to study the effect of resource conservation technologies on photosynthetic efficiency, biomass production, economic yield, soil hydro-thermal regimes and soil health with 4 cropping systems (Soybean-rabi sorghum, soybean-wheat, maize-gram and maize-wheat) and two tillage practices with two mulch load and fertility level was laid out in split plot design. The conventional tillage recorded significantly higherSoybean equivalent yield (39.30 q/ha) with net return of Rs.110560/ha year than the minimum tillage(35.04 q/ha SEY and net return of Rs.88713/ ha/year). Among the cropping systems, Soybean equivalent yield (39.96 q/ha) and higher net return of Rs.115322.8/ha/year over all other cropping system.Significantly higher net return of Rs.107913.7/ha/year was recorded in 100 % RDF treatment than 75 % RDF .The treatment of mulch with 5 t/ha recorded significantly higher net return of Rs.97472.6/ha/year over no mulch treatment.



Lay out of climate change experiment at Bhubaneswar (Odisha)

Monitoring and discussion with scientists on climate change experiment at Bhubneswar (Odisha)

7.3 SUSTAINABLE RESOURCE MANAGEMENT

7.3.1. INTEGRATED NUTRIENT MANAGEMENT (INM)

Title of the Experiment: permanent plot experiment on integrated nutrient management in cereal based cropping systems (Expt. No.2a).

Objectives: 1. To develop suitable integrated nutrient supply and management system.

2. To study the long –term effect of conjunctive use of fertilizers and organic manures on the productivity of cereal based crop sequences and on soil health.

Treatments:

	Kharif	*Rabi*
T_1	No fertilizer, no organic manure(control)	No, fertilizer, no organic manure(control)
T_2	50% rec. NPK dose through fertilizers	50% rec. NPK dose through fertilizers
T_3	50% rec. NPK dose through fertilizers	100% rec. NPK dose through fertilizers
T_4	75% rec. NPK dose through fertilizers	75% rec. NPK dose through fertilizers
T_5	100% rec. NPK dose through fertilizers	100% rec. NPK dose through fertilizers
T_6	50% rec. NPK dose through fertilizers+ 50% N through FYM	100% rec. NPK dose through fertilizers
T_7	75% rec. NPK dose through fertilizers+ 25% N through FYM	75% rec. NPK dose through fertilizers
T_8	50% rec. NPK dose through fertilizers+ 50% N through straw	100% rec. NPK dose through fertilizers
T_9	75% rec. NPK dose through fertilizers+ 25% N through straw	75% rec. NPK dose through fertilizers
T_{10}	50% rec. NPK dose through fertilizers+ 50 N through GM	100% rec. NPK dose through fertilizes
T_{11}	75% rec. NPK dose through fertilizers+ 25% N through GM	75% rec. NPK dose through fertilizers
T_{12}	Farmer's conservational practice	Farmer's conservational practice

(FYM=Farm Yard Manure and GM=Green manure)

Locations:

Cropping System	Ecosystem/ Centre (State)
Rice-Rice	Semi-arid: Rajendranagar (A.P.);Sub-humid: Chiplima(Odisha); Humid: Jorhat(Assam); Coastal : Maruteru (A.P.), Bhubaneswar(Odisha), Karjat(Maharashtra), Karamana(Kerala)
Rice-Wheat	Semi-arid:Ludhiana (Punjab), Kanpur(U.P.);Sub-humid:Jabalpur (M.P.), R.S.Pura (J&K), Varanasi (U.P.) , Pantnagar(Uttarakhand), Faizabad(U.P.), Sabour (Bihar), Raipur(Chhattisgarh) ,Humid: Kalyani (W.B.), Coastal:Navsari(Gujarat)
Rice- Maize	Semi-arid:Kathalgere (Karnataka)
Rice-Mustard	Semi-arid:Rudrur (A.P.)
Maize- wheat	Sub-humid:Ranchi (Jharkhand)
Pearl millet-wheat	Arid: S.K.Nagar (Gujarat), Hisar(Haryana), Junagadh (Gujarat)
Sorghum - wheat	Semi-arid: Akola (Maharashtra), Parbhani (Maharahstra), Rahuri (Maharashtra)

Year of start, crop varieties and fertilizers doses

Results:

Rice-Rice Cropping System

At Rajendranagar, the highest yield of rice was recorded under T5(4324 kg/ha) during kharif, and in rabi(4531kg/ha) respectvely. It was statistically at par with T11and T10. Whereas, during rabi T5 it was at par with T10 and T16.

At Chiplima, the highest grain yield of rice was achieved underT10 during kharif (4437 kg/ha) and

The centre-wise details in respect of year of start, crop varieties and fertilizer doses are given hereunder

Centre	Year of start	Crop variety		Recommended fertilizer dose ($N:P_2O_5:K_2O$, kg/ha)		Farmers' practice ($N:P_2O_5:K_2O$, kg/ha) + FYM, t/ha	
		Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
Rice-Rice Cropping System							
Rajendranagar	1988	MTU-1010	MTU-1010	120:60:60	120:60:60	80:50:20	120:60:40
Chiplima	1983	Swarna	Khandagiri	80:40:40	100:50:50	40:20:20+4.5	50:25:25
Jorhat	1987	Ranjit	Disang	46:16:60	46:16:60	NR	NR
Maruteru	1989	MTU-1075	MTU-1010	60:40:40	120:60:40	90:60:0	180:90:0
Bhubneswar	1983	Pratiksha	Naveen	80:40:40	100:50:50	20:0:0+2.0	20:0:0+2.0
Karjat	2007	Palghar	Karjat-3	100:50:50	120:50:50	45:45:45	90:45:45
Karamana	1985						
Rice-Wheat Cropping System							
Ludhiana	1983	PR-116	PBW-343	NR	120:60:30	NR	NR
Kanpur	1983	Pant-12	PBW-343	120:60:60	120:60:60	80:30:0	80:30:0
Jabalpur	1985	MR-219	GW-273	120:60:40	120:60:40	40:20:0	40:20:0
R.S.Pura	1985	Jaya	DBW-17	100:60:30	100:50:25	34:25:22	56:25:0
Palampur	1985	Arize-6129	HPW-155	90:40:40	120:60:30	36:16:16+ 5.0	48:36:12+ 5.0
Varansi	1985	HUR-105	HUW-2387	120:60:60	120:60:60	50:0:0	60:0:0
Pantnagar	1983						
Faizabad	1984	Sarju-52	PBW-343	120:60:60	120:60:60	90:40:0	90:40:0
Sabour	1984	Sita	PBW-343	80:40:20	80:40:20	60:30:15	68:33:0
Raipur	1988	Mahamaya	GW-273	80:60:40	100:50:30	60:40:20	90:40:20
Kalyani	1986	IET-4094	UP-262	80:40:40	100:60:40	50:30:20	60:20:20
Navsari	1987	Jaya	GW-496	100:50:0	120:60:0	50:25:0+2.5	60:30:0
Rice-Maize Cropping System							
Kathalegere	1988	JGL—1798	Kaveri	46:16:60	46:16:60	NR	NR
Rice-Mustard Cropping System							
Rudrur	1984	MTU-1010	GM-1	120:60:40	80:40:30	150:40:0	60:0:0
Maize-wheat Cropping System							
Ranchi		Suwan	K-9107	100:50:25	100:50:25	23:0:0	23:0:0
Pearl millet-Wheat Cropping System							
S.K.Nagar	1986	GHB-558	GW-496	80:40:0	120:60:0	40:0:0	80:0:0
Hisar	1985	HHB-223	WH-711	125:62.5:0	150:60:0	NR	NR
Junangarh	1987	GHB-538	GW-366	0:0:25	0:0:25	40:0:0	80:0:0
Bichpuri	1990	Bioseed-8510	UP-2338	80:40:40	120:60:40	40:0:0	40:0:0
Sorghum-Wheat Cropping System							
Akola	1984	CSH-14	AKW3722	120:60:60	120:60:60	50:25:0	40:25:12.5
Rahuri	1984	CSH-9	HD-2189	120:60:60	120:60:60	40:20:20	60:40:30
Parbhani	1983	CSH-9	Lok-1	80:40:40	120:60:60	40:20:20	60:40:30

Table7.3.1(a): Grain yield(kg/ha) of rice–rice crop sequence under different integrated nutrient management treatments

Treatment	Rajendranagar		Chiplima		Jorhat		Maruteru		Bhubneswar		Karjat		Karamana	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
T_1	1946	1730	2267	2315	2500	1000	3784	2613	2105	2148	3573	3657	2712	2216
T_2	3712	3497	3395	4204	3100	1250	4082	4530	2605	2855	5104	5165	3621	3443
T_3	3621	3343	3296	4290	3200	1450	4535	5110	2665	3710	5205	5755	3837	3652
T_4	3856	4200	3426	4540	3400	1850	4762	5546	2915	3500	5262	5255	3981	3777
T_5	4324	4531	3907	4321	3900	2438	5244	6417	3430	3913	6467	6470	4270	4265
T_6	3702	4307	4167	4407	3300	2000	4677	6504	3670	3960	6454	6606	4703	4488
T_7	3802	4077	4090	4299	3600	2175	5045	6243	3520	3743	5686	5631	4760	5046
T_8	3344	4237	3944	4407	3700	2013	4762	6272	3450	3915	5340	6498	4703	4530
T_9	3583	4073	4222	4750	4575	2638	4960	6224	3335	3833	5482	5347	4746	4293
T_{10}	4074	4343	4437	4660	3400	1950	4337	5952	3660	4043	6326	6574	4428	4753
T_{11}	4255	4087	4340	4113	3000	1788	4734	5459	3385	3965	5487	5453	4616	4697
T_{12}	3802	3937	3619	3744	2900	1175	4720	5575	2640	2708	5048	5412	4039	4014
SEm±	407	225			**291**	**134**	**330**	**188**	**235**	**249**	**148**	**144**	**272**	**617**
CD at 5%	844	466	465	519	**591**	**274**	**684**	**390**	**478**	**506**	302	**294**	**553**	**1256**

during rabi T 10 (4750kg/ha). The increase in crop yield under highest yielding treatment over 100 %RDF was 13.56 and 9.92 percent during kharif and rabi, respectively. It was statistically at par with T9 and , T11in kharif season and during rabi it was statistically at par with T10, and T8.

At Jorhat, the highest yield of rice was recorded under T9 (4575kg/ha) during kharif, and during rabi (2638 kg/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 17.20 and 8.20 percent, during kharif and summer, respectively. During kharif T9 statistically at par with T8 and during rabi The highest yielding treatment T5 was not found at par with all other treatments.

At Muruteru, the highest yield of rice was recorded under T5 (5244kg/ha) during kharif. The highest yielding treatment (i.e.T5) was at par with T12, T11, T10 and T9. During rabi T6 treatment gave the maximum yield (6504kg/ha).The increase in crop yield under highest yielding treatment over 100% RDF was 1.33 per cent. The highest yielding treatment T6 at par with T9, T10 and T11.

At Bhubaneswar, the highest yield of rice was recorded under T6 (3670 kg/ha) during kharif and T10 (4043 kg/ha). The corresponding highest yield increase in respective season was 6.99 and 3.32 percent higher than 100% RDF. The highest yielding treatment (T6) was being at par was with T7,T8,T9, and T11 during kharif whereas in rabi the highest yielding treatment T10 was at par with T6,T7,T8, and T9, respectively.

At Karjat, the highest yield of rice (6467 kg/ha) was recorded under T5 treatment during kharif whereas during rabi the highest yield of second crop of rice was recorded under T6 (6606 kg/ha). The highest yield treatment T5 was at par with T6and T8 during kharif whereas during rabi the highest yielding treatment (T6) was at par with T8, and T9.

At Karamana the highest yield of rice was recorded under T_7 (4760 kg/ha) during kharif and (5046 kg/ha) during rabi respectively. The corresponding highest yield increase in respective season was 11.47and 18.31 percent higher than 100% RDF. The highest yielding treatment (T7) was being at par was with T6,T8,T9,T10, and T11 during kharif .

Rice-Wheat Cropping System

At Ludhiana**, the highest yield of rice was recorded under T_{11} (7180 kg/ha) during kharif, and in wheat during rabi T_{12} gave the maximum yield (5417 kg/ha) which was 10.87 and 6.38 per cent higher over recommended dose of fertilizers (T_5). The yield under highest yielding treatment (T_{11}) during kharif was at par with T_6 T_7 and T_{12} T_{13} and T_{14} whereas during rabi T_{12} it was at par with T_6, T_{10}, T_{13} and T_{14}.

At Kanpur, the highest yield of rice and wheat was recorded under T_6 (4546 kg/ha) and (4650 kg/ha) during both the season respectively. Slightly higher yield in rice and wheat(7.23 and 1.97 percent) was recorded with T_6 treatment as compared to recommended dose of fertilizer (T_5).The yield under highest yielding treatment during kharif T_6 was at par with T_5, T_7 and T_{10} whereas during rabi T_6 it was at par with T_5. and T_7.

At Jabalpur, the highest yield of rice was recorded under T_{10} during both the seasons (3080kg/ha) (4482 kg/ha).The increase in crop yield under highest yielding treatment (T_{10}) over 100% RDF during kharif was 7.26. The yield under highest yielding treatment during kharif T_{10} was at par with T_5, T_6, T_7 and T_8 whereas during rabi T_{10} it was at par with T_5.

At Jammu, in rice-wheat system, the treatment T_6 gave the maximum yield of rice (5096 kg/ha) and wheat (3901kg/ha) which was 9.78 and 18.67per cent higher over recommended dose of fertilizer (T_5). The yield under highest yielding treatment (T6) during kharif was at par with T_7 but during rabi various IPNS packages had significant effect on crop yields.

At Varanasi, in rice –wheat cropping system, the treatment T_6 gave maximum yield of rice (4770

Table7.3.1(b): Grain yield (kg/ha) of rice–wheat crop sequence under different integrated nutrient management treatments

Treatment	Ludhiana		Kanpur		Jabalpur		Jammu		Varansi		Faizabad	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
T_1	1560	1695	925	605	744	1058	1923	1089	2260	1080	1440	574
T_2	3393	3885	3188	3335	1644	2408	3741	3066	3760	2540	3344	2044
T_3	3756	4795	3525	3510	1849	2411	3908	3192	3960	3250	3475	3380
T_4	4529	4258	3413	3300	2334	3296	4152	2859	4120	3050	3756	2860
T_5	6476	5092	4325	4560	3052	4441	4642	3287	4390	3390	4113	3431
T_6	6685	5375	4638	4650	2764	3991	5096	3901	4770	3710	4859	3951
T_7	6825	5221	4325	4415	2445	3539	5023	3141	4530	3450	4708	3810
T_8	5635	4665	4113	4290	2672	3779	4168	2844	4070	3350	4117	3718
T_9	5820	4570	4150	4215	2363	3503	4449	2949	4400	3180	4270	3651
T_{10}	6985	5188	4425	4490	3080	4482	4157	2910	4490	3490	4753	3890
T_{11}	7180	5110	4288	4370	2449	3564	4577	3094	4470	3160	4611	3883
T_{12}	7145	5417	2838	2835	1561	2222	3477	2670	3900	2840	3320	2133
T_{13}	6985	5395										
T_{14}	6525	5185										
SEm±			**117**	124	116	207	180	115	132	99	**144**	**175**
CD at 5%	370	487	**239**	252	237	421	367	234	380	286	**293**	**356**

Treatment	Sabour		Raipur		Kalyani		Navsari		Palampur		Pantnagar	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
T_1	942	2302	1354	537	2222	1222	1565	1546	4032	3822	2327	1864
T_2	2682	2008	4708	1417	3139	2194	2623	2119	4377	3856	2811	2602
T_3	2728	4169	5031	1743	3556	2972	2818	2350	4536	4410	3621	2758
T_4	3502	3373	5667	1599	3333	2694	2922	2533	4368	4116	3786	2913
T_5	4774	4321	5990	2106	3639	3056	3279	2618	5040	5460	4114	4032
T_6	5337	4795	5750	2015	3833	3361	3302	2798	5494	5612	3730	4406
T_7	4934	4417	5605	1815	3417	3250	3198	2677	5162	5087	5181	4451
T_8	5133	4578	5469	1877	3333	3139	3060	2279	4343	4477	5124	3406
T_9	4843	4337	5500	1797	3444	3167	3198	2314	4326	4536	4937	3570
T_{10}	5256	4747	6004	2134	3611	3056	3129	2426	4486	4335	5130	4134
T_{11}	4927	4401	5740	1894	3500	3083	3026	2405	4259	4141	5056	4181
T_{12}	3234	2964	3210	1501	3583	2833	2749	2192	5439	5271	4081	3866
SEm±	**199**	**628**	**196**	**120**	**152**	**233**	**304**	**192**				
CD at 5%	**405**	**1278**	**407**	**248**	**310**	**474**	**618**	**390**	**643**	**906**		

kg/ha) and wheat (3710 kg/ha) which was 8.65 and 9.43 per cent higher over recommended dose of fertilizers (T_5). The yield under highest yielding treatment during kharif T_6 was at par with T_7 and T_{10} whereas during rabi T_6 treatment was at par with T_{10}.

At Faizabad , maximum yield of rice and wheat (4859kg/ha) (3951kg/ha)was recorded under T_6 which was 18.13 and 15.15 per cent higher than recommended dose of fertilizer. During kharif T_6 was statistically at par with T_7, T_{10} and $T_{11.}$ Whereas, during rabi T_6 was statistically at par with T_7, T_{10} and $T_{11.}$

At Sabour, the rice yield was recorded maximum (5337kg/ha) under T_6 which was 15.98 percent higher over recommended dose of fertilizer and maximum yield of wheat(4795 kg/ha) was recorded under T_6 which was10.96 percent higher than recommended dose of fertilizer. The yield under highest yielding treatment during kharif was at par with T_8 and T_{10} whereas during rabi T_6 it was at par with T_{10}.

At Raipur, the highest yield of rice and wheat was recorded under T_{10} (6004 kg/ha) and (2134 kg/ha) during kharif and rabi. The increases in crop yield under highest yielding treatment over 100% RDF during both the seasons were meagre. The yield under highest yielding treatment during kharif T_{10} was at par with T_5,T_6, T_7, and T_{11} whereas during rabiT_{10} treatment was at par with T_5, and T_6.

At Kalyani, the rice yield recorded maximum (3833 kg/ha) under T_6 which was 5.33 per cent higher over recommended dose of fertilizer and maximum yield of wheat (3361 kg/ha) was also recorded under T_6 which was 9.98 per cent higher than recommended dose of fertilizer. The yield under highest yielding treatment during kharif T_6 was at par with T_5,and T_{10}.While in rabi season highest yielding treatment (T_6) was at par with T_7.

At Navsari, the highest yield of rice and wheat was recorded under T_6 (3302 kg/ha) and (2798 kg/ha) during kharif and rabi seasons, respectively. The increases in crop yield under highest yielding treatment over 100% RDF during both the seasons were meagre. The yield under highest yielding treatment during kharif T_6 was at par with T_5, T_7,T_9,T_{10} and T_{11} whereas during rabi T_6 it was at par with T_4,T_5,T_7 and T_{10}.

At Palampur, the rice yield was maximum (5494 kg/ha) under T_6 and 9.11 percent higher than recommended dose of fertilizer and the maximum yield of wheat (5612 kg/ha) was also under T_6 during rabi season which was 2.78 percent higher than recommended dose of fertilizer.

At Pant Nagar, the rice yield recorded maximum (5181 kg/ha) under T_7 which was 25.93 per cent higher over recommended dose of fertilizer and maximum yield of wheat (4451 kg/ha) was also recorded under T_7which was 10.39 per cent higher than recommended dose of fertilizer. The yield under highest yielding treatment during kharif T_7 was at par with T_8, While in rabi season highest yielding treatment (T_7) was at par with T_6.

Rice-Maize cropping system

At Kathalgere, in rice-maize cropping system the treatment T_9 yielded maximum(7149kg/ha) and

Table 7.3.1(c). Grain yield (kg/ha) of rice-maize crop sequence under different integrated nutrient management treatments

Treatment	Kathalgere	
	Kharif	*Rabi*
T1	3642	2234
T2	5811	4036
T3	6149	4490
T4	6419	4294
T5	6422	4679
T6	5942	4751
T7	6356	4627
T8	6642	4786
T9	6742	5198
T10	6523	4059
T11	6127	3921
T12	6070	3321
SEm±	**222**	**155**
CDat 5%	**451**	**316**

(5198 kg/ha)rice and maize yield respectively which was 4.98 and 11.12 per cent higher than recommended dose of fertilizer. . The yield under highest yielding treatment during kharif and rabi T_9 was at par with T_8 .

Rice-Mustard cropping system

At Rudrur, the rice-mustard system the treatment T_{11}(75% recommended NPK dose through fertilizer+ 25%N through GM) yielded maximum (5890 kg/ha) of rice during kharif, which was 10.92 per cent higher than RDF(T_5) while in rabi the same treatment gave highest (958 kg/ha) yield of mustard, which was 8.86 per cent higher than RDF.

Table 7.3.1(d). Grain yield (kg/ha) of rice-mustard crop sequence under different integrated nutrient management treatments

Treatment	Rudrur	
	Kharif	*Rabi*
T1	3010	504
T2	4000	556
T3	4020	662
T4	4820	630
T5	5310	880
T6	5120	834
T7	5870	902
T8	5100	933
T9	5780	857
T10	5120	893
T11	5890	958
T12	5020	703
SEm±	**1.92**	**7.79**
CDat 5%	**3.98**	**16.15**

Maize-wheat cropping system

At Kanke (Ranchi), the maize yield was maximum (4389 kg/ha) under T_6 and 29.12 percent higher than recommended dose of fertilizer and the maximum yield of wheat (4892 kg/ha) was also under T_6 during rabi season which was 15.75 percent higher than recommended dose of fertilizer.

Table 7.3.1(e). Grain yield (kg/ha) of maize-wheat crop sequence under different integrated nutrient management treatments

Treatment	Ranchi	
	Kharif	*Rabi*
T1	1109	933
T2	1963	2887
T3	2160	3867
T4	2541	3375
T5	3399	4225
T6	4389	4892
T7	2401	4667
T8	2980	4250
T9	2749	3883
T10	2842	4050
T11	2726	3517
T12	1224	1108
SEm±	**554**	**414**
CDat 5%	**1148**	**858**

Pearl millet-wheat cropping system

At S.K.Nagar, the highest grain yield of pearl millet was recorded under T_6 (1527 kg/ha) during kharif season and wheat yield was also recorded highest (3931 kg/ha) under the same treatment (T_6) during rabi. The increase in pearl millet yield under highest yielding treatment(50% recommended NPK dose through fertilizer+ 50% N through FYM) over 100% RDF(T_5) was 74.71 per cent higher . Whereas, in wheat the highest yielding treatment had produced 51.36 per cent higher grain yield than RDF treatment. The yield under highest yielding treatment during kharif T_6 was at par with T_7, and $T_{11,}$ .Whereas, during rabiT_6 was at par with T_7.

At Junagadh (with Potash), the highest yield of pearl millet and wheat crops were attended under T_6 treatment (2477 and 4101 kg/ha).The increase in crop yield under highest yielding treatment (50% recommended NPK dose through fertilizers+ 50% N through FYM) over 100% RDF was 17.84 and 18.12 per cent, during kharif and rabi seasons, respectively. The yield under highest yielding treatment during kharif was at par with T7 T10 and

Table7.3.1(f): Grain yield(kg/ha) of pearl millet –wheat crop sequence under different integrated nutrient management treatments

Treatment	S K Nagar		Junagadh (P)		Hisar		Bichpuri	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
T_1	48	110	886	1259	969	1090	1050	1280
T_2	513	994	1472	3017	2246	3716	1506	3010
T_3	538	1257	1528	3230	2412	5308	1620	4151
T_4	633	1569	1908	3114	2874	4636	2000	3906
T_5	874	2597	2102	3473	3342	5618	2575	4591
T_6	1527	3931	2477	4101	3580	5812	2831	5111
T_7	1509	3637	2227	3816	3218	4830	2490	4270
T_8	1369	3543	2248	3626	2760	5481	2200	4450
T_9	1282	3397	2131	3377	2928	4692	2101	4120
T_{10}	1419	3817	2471	3556	3276	5668	2731	4921
T_{11}	1382	3490	2075	3373	3312	4682	2460	4330
T_{12}	531	1547	1747	3063	2898	5196	1420	2810
SEm±	**71**	**147**	**236**	**284**	**170**	**141**	**79**	**73**
CD at 5%	**145**	**300**	**479**	**577**	346	286	**161**	**148**

T11, Whereas, during rabi T_6 it was at par with T_7 and T_8.

At Hisar, in pearl millet-wheat system, the treatment T_6 gave the maximum yield of pearl millet (3580 kg/ha) and wheat (5812 kg/ha).However, these yields were not increased significantly as compared to 100% recommended dose of NPK through fertilizers. The yield under higher yielding treatment (T_6) during kharif season was at par with T_{10}, and T_{11}. Whereas, in rabi T_6 treatment was at par with T_5,T_7 and T_{10}.

At Bichpuri, in pearl millet –wheat cropping system, the treatment T_6 gave the maximum yield of pearl millet (2831 kg/ha) and wheat (5111 kg/ha) which were 9.94 and 2.40 per cent higher over 100% recommended dose of NPK through fertilizers (T_5). The yield under highest yielding treatment during rabi was at par with T_{10}. But during kharif various IPNS packages had significant effect on crop yield.

Sorghum-wheat cropping system

At Akola, the maximum grain yield of sorghum(1760 kg/ha) was produced by T_5 treatment which was having 100% recommended dose of NPK fertilizer followed byT_7 treatment (1635 kg/ha) whereas during rabi the highest yield of wheat was recorded under T_6 (2837 kg/ha). The highest yield treatment T_5 was at par with T_7 during kharif whereas during rabi the highest yielding treatment (T_6) was at par with T_5 100% NPK.

At Rahuri, in sorghum-wheat system, the treatment T_6 gave the maximum yield of pearl millet (4684 kg/ha) and wheat (4010 kg/ha) which was 5.91 and 9.98 per cent higher than recommended dose of fertilizer respectively both the season.. The yield under higher yielding treatment (T_6) during kharif and rabi season was at par with T_7, and T_{10}.

At Parbhani, the grain yield of sorghum in sorghum –wheat cropping system was recorded

Table 7.3.1(g). Grain yield (kg/ha) of sorghum-wheat crop sequence under different integrated nutrient management treatments

Treatment	Akola		Rahuri		Parbhani	
	Kharif	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
T_1	158	258	171	529	290	375
T_2	721	1702	2281	2887	1771	1747
T_3	873	2388	3898	3378	1804	1918
T_4	1161	1832	3729	3060	2066	2061
T_5	1760	2672	4423	3646	2488	2521
T_6	1551	2837	4684	4010	2521	2583
T_7	1635	2106	4533	3459	2227	2255
T_8	1405	2442	3266	3280	2108	2132
T_9	1451	1965	4261	3246	1828	1914
T_{10}	1432	2229	4476	3552	2346	2436
T_{11}	1546	1972	4353	3479	1762	1762
T_{12}	637	1344	2438	2414	1572	1638
T_{13}					2013	2175
T_{14}					2369	2426
SEm±	**238**	**185**	**336**	**174**		
CD at 5%	**484**	**376**	**684**	**353**		

highest (2521 kg/ha) under T_6 treatment (50% recommended NPK dose through fertilizers+50%N through FYM) and closely followed by T_5 treatment (100% recommended NPK dose through fertilizer), i.e.(2488 kg/ha). Whereas, the maximum wheat grain yield was recorded under same treatment (T_6), i.e. (2583 kg/ha) and followed by T_5 treatment (2521 kg/ha). During kharif season, $T_2$and T_3,T_5andT_6, $T_7$and T_8 and T_{11} and T_{12} treatments were remained statistically at par with each otherowing to sorghum grain yield. Similar trend was also observed in case of wheat grain yield during rabi season.

Monitoring of rice crop at maturity stage in INM experiment at Kalyani (West Bengal)

Discussion of Director, ICAR-IIFSR with Chief Agronomist at Bhubaneswar (Odisha)

7.3.2 DEVELOPMENT OF ORGANIC FARMING PACKAGE

Title of the experiment: Development of organic farming packages in system based high value crops

Objectives

i. To develop organic nutrient management packages for system-based high value crops

ii. To recycle farm waste to value added compost

iii. To monitor soil health and crop quality and also to develop holistic approach for nutrient, pest and disease management as well as moisture conservation

Year of start: 2003-04

Treatments

T_1: 50% recommended NPK + Zn + S as per soil test + 50% N as FYM

T_2: 100% organic nutrient sources as FYM, vermicompost and neem oil cake each equivalent to 1/3 of recommended N dose of crops

T_3: T2 + intercropping/trap cropping

T_4: T2 + agronomic practices for weed and pest control

T_5: 50% N as FYM + seed treatment with Azotobacter and PSB + Rock phosphate

T_6: T2 + Azospirillum and phosphate solubilizing bacteria (PSB)

T_7: 100% NPK + Zn + S based on soil test

Results

The centre wise results are presented in table and their brief description is given below.

Rice-Based cropping system

Bhubaneswar

At Bhuvneshwar, highest yield of rice (4.5 t ha^{-1}) and potato (147.4 t ha^{-1}) was recorded under treatment T_6 which received 1/3 N each in the form of FYM, vermicompost (VC), neem oil cake (NOC) and bio-fertilizers containing N and P carriers. The present increase in crop yield under this treatment was 16.1% and 17.65%, respectively for rice and potato over RDF (T_7). During summer season, the highest yield of okra (7.49 t ha^{-1}) was achieved under T_6 treatment which was 21.9% higher than RDF (T_7) in rice-potato-okra cropping system.

Chata

At Chata centre, in rice-potato-onion/ frenchbean system, the highest yield of rice (2.65 t ha^{-1}) and potato (9.6 t ha^{-1}) was recorded under treatment T_6 during *kharif* and *rabi* seasons, respectively. The yield increase in these crops was 4.7% and 19.1%, respectively. During summer season, onion was replaced by frenchbean and among all the treatments highest yield of frenchbean was recorded under treatment T_2 which received 1/3 N each in the form of FYM, vermicompost (VC), neem oil cake (NOC).

Jabalpur

At Jabalpur centre, in rice-potato-fallow system, the highest grain yield of rice (3.8 t ha^{-1}) and potato (3.4 t ha^{-1}) was recorded under treatment T_7 (RDF) during *kharif* and *rabi* season, respectively. Among organic treatments, T4 which received FYM + VC + NOC each equivalent to 1/3 N requirement of crops and agronomic management packages for weed and pest control, recorded the highest crop yield (3.0 and 2.8 t ha^{-1}) with yield reduction of 25.5 and 19.7%, respectively, compared to crop yields under RDF.

Jorhat

At Jorhat centre, in rice-toria-blackgram system, highest grain yield of rice (4.05 t ha^{-1}) was recorded under treatment T_3. In rabi season wheat was sown as intercrop with toria and in summer season lady finger was sown as intercrop with blackgram. Both in rabi and summer season treatment T_3 recorded highest yield of toria (600 kg ha^{-1}) and blackgram (400 kg ha^{-1}) among all the treatments. Treatments T_1, T_2, and T_4 were at par with RDF.

Kalyani

At Kalyani Centre, in rice-potato-groundnut system, highest grain yield of rice (2.08 t ha^{-1}) and potato (13.93 t ha^{-1}) was recorded under treatment T_1, while in summer season higher yield of groundnut was recorded under treatment T_7. Under treatment T3 coriander in rabi season and lady finger in summer season were grown as an inter crop with potato and groundnut respectively.

Raipur

At Raipur centre, in rice-potato-onion system, highest grain yield of rice (6.3 t ha^{-1}) was recorded under treatment T_3 during *kharif* season. Rice yield under this treatment increased by .6% over RDF. During rabi season, the highest potato yield (12.99 T ha^{-1}) was recorded under treatment T_1, i.e. integrated nutrient management package (IPNS).

Sabour

At Sabour, in rice-potato-onion system, highest rice yield (4.8 t ha^{-1}) was recorded under treatment T_7 (RDF) whereas during rabi and summer seasons, highest tuber yield of potato (23.83 t ha^{-1}) and onion (12.6 t ha^{-1}) were recorded under treatment T_1 (IPNS). The increase under this treatment was 3.9 and .8% respectively, compared to crop yield under RDF.

Navsari

At Navsari, in rice-fallow-groundnut system, highest grain yield of rice (3.9 t ha^{-1}) was recorded under RDF during kharif season whereas during summer highest groundnut yield (1.82 t ha^{-1}) was recorded under treatment T_2. The organic nutrient management package receiving 1/3 N as FYM, VC and NOC each recorded highest yield among organic nutrient management packages.

Maize based cropping systems

Kanpur

At Kanpur, in maize (cob)–potato–onion system, highest maize cob yield (79.84 t ha^{-1}) was recorded under 100% organic nutrient sources as FYM, VC and NEOC and intercropping/trap cropping (T_3). Yield of maize under T_3 was increased to the tune of 17.85% over T_7 (100% NPK + Zn + S based on soil test). Whereas, potato yield (25.10 t ha^{-1}) was registered highest under 100% organic nutrient sources as FYM, VC and NEOC with Azospirillum and PSB (T_6). Data for onion was not available.

Kumarganj

At Kumarganj, in maize–potato–onion system, maize yield (2.95 t ha^{-1}) was recorded highest in treatment T_4 (100% organic nutrient sources as FYM, VC and NEOC + agronomic practices for weed control) followed by 100% NPK + Zn + S based on soil test (T_7). However, during rabi season, yield (7.44 t ha^{-1}) of potato was found highest under treatment T_2 (100% organic nutrient sources as FYM, VC and NEOC) which was 6.30% higher over T_7. Whereas yield of onion (3.90 t ha^{-1}) was recorded highest in treatment T_4 during summer season.

Thanjavur

At Thanjavur, in maize–rice–greengram system, highest yield of maize (5.28 t ha^{-1}), rice (5.38 t ha^{-1}) and greengram (1.0 t ha^{-1}) was registered under treatment T_1 (50% recommended NPK + Zn + S as per soil test + 50% N as FYM). Among different organic treatments, highest yield (4.75 t ha^{-1}) of maize was recorded under treatment T_3 (100% organic nutrient sources as FYM, VC and NEOC and intercropping/trap cropping)

Table 7.3.2(a). Effect of organic nutrient management packages on crop yield (kg ha^{-1}) in rice based cropping systems 2013-14

Treatment	Crop Season	Bhubaneshwar	Chatha	Jabalpur	Jorhat	Kalyani	Raipur	Sabour	Navsari
		Rice-Potato-Okra	Rice-Potato-Onion/ Frenchbean	Rice-Potato-Fallow	Rice-Toria-Blackgram	Rice + Potato - Groundnut	Rice-Potato/ Onion	Rice-Potato-Onion	Rice-Fallow-Groundnut
T1	*Kharif*	4544	2508	3534	2263	2079	6213	4826	3870
	Rabi	13116	7697	3135	374.5	13936	12981	23831	-
	Summer	6337	2828	-	331.83	1604	-	12624	1805
T2	*Kharif*	4323	2645	2900	2267	1667	5839	4594	3653
	Rabi	11986	8897	2431	357.5	11463	9393	22630	-
	Summer	6220	2925	-	371.83	1347	-	11570	1820
T3	*Kharif*	4646	2618	2996	4050	1856	6313	4461	3639
	Rabi	12479	8844	2576	600+1063*	3380+17191*	11115	19927+3847*	-
	Summer	6381	2672	-	400+719**	1380+2204**	-	8785+5816**	1661
T4	*Kharif*	4430	2602	3042	2252	1613	5984	4698	3419
	Rabi	11883	9220	2822	331.5	11032	9587	23297	-
	Summer	6269	2666	-	408	1635	-	11844	1575
T5	*Kharif*	4363	2551	2852	2014	1746	5546	4315	3230
	Rabi	12704	8124	2389	280.83	10401	5720	20151	-
	Summer	6566	2463	-	353	1458	-	10182	1469
T6	*Kharif*	4969	2651	2829	1999	1654	6037	4689	3779
	Rabi	14739	9590	2260	313	11275	9690	22534	-
	Summer	7486	2726	-	315.33	1582	-	11872	1562
T7	*Kharif*	4280	2531	3820	2078	1681	6276	4854	3958
	Rabi	12527	8050	3377	245.83	17050	12119	22940	-
	Summer	6141	2872	-	372	1682	-	12526	1511

whereas yield of rice (4.85 t ha^{-1}) and greengram (0.87 t ha^{-1}) was found highest under T_2 (100% organic nutrient sources as FYM, VC and NEOC).

Miscellaneous cropping systems

Hissar

At Hissar, in moongbean–wheat system, highest moongbean (0.27 t ha^{-1}) and wheat yield (0.63 t ha^{-1}) was recorded under T_7 (100% NPK + Zn + S based on soil test). Yield of moongbean was 28.3% and 24.83% lower under T_2 (100% organic nutrient sources as FYM, VC and NEOC) in comparison to T_7, respectively.

Kota

At Kota, in blackgram–coriander system, highest coriander yield (3.13t ha^{-1}) during rabi season was registered under treatment T_3 (100% organic nutrient sources as FYM, VC and NEOC and intercropping/trap cropping). Yield of coriander was increased 15.69% under T_3 over T_7 (RDF).

Palampur

At Palampur, in baby corn–Chinese cabbage–onion system, highest yield of baby corn (2.34 t ha^{-1}), Chinese cabbage (9.96 t ha^{-1}) and onion (28.44 t ha^{-1}) was recorded under 50% recommended NPK + Zn + S as per soil test + 50% N as FYM (T_1). As per yield performance of organic nutrient management package is concerned, the treatment T_6, which received organic sources of nutrients with Azospirillum and PSB produced highest baby corn yield (1.86 t ha^{-1}) whereas yield of Chinese cabbage and onion was found under T_5 (50% n as FYM + seed treatment with Azotobacter and PSB + rock phosphate).

Table 7.3.2(b). Effect of organic nutrient management packages on crop yield (kg ha^{-1}) in maize based cropping systems 2013-14

Treatment	Crop Season	Kanpur	Kumarganj	Thanjavur
		Maize (cob) -Potato –Onion	Maize-Potato-Onion	Maize –Rice –Greengram
T1	*Kharif*	76702	2863	5281
	Rabi	24048	7287	5376
	Summer	-	3533	999
T2	*Kharif*	74964	2726	4721
	Rabi	19700	7442	4850
	Summer	-	3778	874
T3	*Kharif*	79839+75156	2659	4754+164*
	Rabi	18666+18337	1241+320*	4795
	Summer	-	631+11200**	826
T4	*Kharif*	76015	2962	4612
	Rabi	20828	7333	4807
	Summer	-	3899	827
T5	*Kharif*	75632	2256	4017
	Rabi	20340	6370	4200
	Summer	-	3225	612
T6	*Kharif*	77744	2648	4457
	Rabi	25091	7215	4811
	Summer	-	3874	824
T7	*Kharif*	67691	2952	4055
	Rabi	17133	7001	4337
	Summer	-	3753	745

Rudrur

At Rudrur, in turmeric–sesamum–fallow system, highest turmeric (18.10 t ha^{-1}) and sesamum yield (0.67 t ha^{-1}) was recorded under treatment T_7 (100% recommended NPK + Zn + S as per soil test). Among the different organic nutrient management treatments highest yield of turmeric (15.70 t ha^{-1}) was registered under treatment T_6 (organic sources of nutrients with Azospirillum and PSB), whereas sesamum yield was highest in T_2 (100% organic nutrient sources as FYM, VC and NEOC).

Coimbatore

At Coimbatore, in chillies–Bengal gram–babycorn system, yieldc(8.56 t ha^{-1}) of chillywas recorded highest under treatment T_3 (100% organic nutrient sources as FYM, VC and NEOC with intercropping/trap cropping), whereas, yield of Bengal gram (1.30 t ha^{-1}) and baby corn (6.50 t ha^{-1}) was found highest under treatment T_4 (100% organic nutrient sources as FYM, VC and NEOC with agronomic practices for weed control).

Durgapura

At Durgapura, in groundnut–onion–fellow system, highest yield of groundnut (1.24 t ha^{-1}) and onion (16.21 t ha^{-1}) was recorded under treatment T_7 (100% NPK + Zn + S based on soil test). As per yield performance of organic nutrient management package is concerned,the treatment T_4, which received organic sources of nutrients with agronomic practices for weed control produced highest groundnut (1.17 t ha^{-1}) and onion yield (15.0 t ha^{-1}).

S.K. Nagar

At S.K. Nagar, in green manure–potato–groundnut system, yield of potato was recorded highest under treatment T_7 (100% NPK + Zn + S based on soil test). However yield of groundnut was registered highest under treatment T_1 (50% NPK + Zn + S as per soil test + 50% N as FYM). Yield of potato under different organic treatments reduced to the tune of 16.15% to 31.16% in comparison to T_7 (RDF).

Representation of IFS crop components in Rangoli at Kathelgere (Karnataka)

Green manure for organic farming

Table 7.3.2(c). Effect of organic farming packages on crop yield (kg ha^{-1}) in miscellaneous cropping systems 2013-14

Treatment	Crop Season	Hisar	Kota	Palampur	Rudrur	Coimbatore	Durgapura	S.K. Nagar
		Moongbean-Wheat	Blackgram-Corriander	Baby corn-Chinese Cabbage-Onion	Termaric-Sesamum-Fallow	Chillies-Bengal gram-Babycorn	Groundnut-Onion-Fallow	Green Manure-Potato-Groundnut
T1	*Kharif*	239.4	-	2341	16748	8478	1071	-
	Rabi	545.2	2688	9955	568.8	996.1	14057	25482
	Summer	-	-	28442	-	6246	-	2107
T2	*Kharif*	190.8	-	1768	15429	8481	1062	-
	Rabi	476.1	2690	7513	486.2	971.7	13141	22286
	Summer	-	-	23668	-	6333	-	2060
T3	*Kharif*	151.2	-	1750	2817+620*	8560	1171+137*	-
	Rabi	419.4	3127	8655	428.0	917.3	14017	22294
	Summer	-	-	22739	-	6182	-	2020
T4	*Kharif*	199.0	-	1450	14160	8061	1172	-
	Rabi	478.7	2750	8012	432	1304	14995	21502
	Summer	-	-	21514	-	6498	-	1992
T5	*Kharif*	110.0	-	1589	15261	7163	1046	-
	Rabi	327.3	2507	8728	446.5	870.9	13005	18302
	Summer	-	-	25291	-	5671	-	1628
T6	*Kharif*	168.0	-	1863	15698	7724	1145	-
	Rabi	483.5	2590	7901	441.9	907.2	14027	21689
	Summer	-	-	23671	-	5657	-	2101
T7	*Kharif*	266.1	-	1881	18101	7658	1237	-
	Rabi	633.4	2703	5074	670.6	992.9	16206	26587
	Summer	-	-	2339	-	6055	-	1753

7.4 ON-FARM RESEARCH

7.4.1 On-farm crop response to application of nutrients

Title of the experiment: On-farm crop response to application of major plant nutrients in predominant cropping system

Objective: To assess the response of major crops to application of N, P and K at recommended rates in predominate cropping systems in different agro-ecosystem under farmer's field condition.

Year of start: 1999-2000, Treatments are modified in 2010-2011.

Treatments: There are five common treatments at various locations. They are ($N_0P_0k_0$), N, N+P, N+K and N+P+K and all the nutrients are applied as per the recommended rates of crops/cropping systems evaluated at particular location. Two treatments namely, N+P+K+ Supplement of deficient micronutrient based on soil test and farmer's practice were added during 2010-2011.

Locations:

Results: The centre-wise details of varieties, nutrients used, crop yield and crop response to NPK application in terms yield difference, are presented in table 7.4.1. Brief descriptions of centre-wise result are given below.

Rice rice: A total 131 trial conducted at 6 locations compromising of five NARP zones and it covers Andhra Pradesh, Telangana, Tamil Nadu, Kerala

Cropping system	OFR district (State)	No. of trials
Rice-rice	Warangal (T.S.), Seethampeta (A.P.), Thiruvalla (Kerala), Chettinad & Paiyur (T.N.), Phalghar (Maharashtra)	131
Rice-wheat	Pakur (Jharkhand), Katni&Dindori(M.P.), Amritsar (P.B.), Ambedkarnagar & Kanpur Dehat (U.P.), Jeolikote (U.K.), Samba (J.K.)	176
Rice-gram	Kawardha (C.G.)	24
Rice-green gram	Kendrapara (Orissa), Kakdwip (W.B.)	41
Rice-groundnut	Angul (Orissa), Paiyur (T.N.)	36
Rice-maize	Purnea (Bihar), Anand (Gujarat)	36
Maize-wheat	Kangra (H.P.), Udaipur (R.J.), Samba (J.K.), Anand (Gujarat)	72
Maize-gram	Gadag (Karnatka), Aurangabad (M.H.)	36
Soybean-wheat	Amravati (Maharashtra)	12
Soybean-gram	Amravati (Maharashtra)	12
Soybean-onion	Pune (Maharashtra)	24
Cotton-wheat	Sirsa (Haryana), Jagudan (Gujarat)	46
Cabbage-tomato	Kolar (Karnatka)	11
Fingermillet-tomato	Kolar (Karnatka)	12
Cluster bean-wheat	Sikar (Rajasthan)	24
G'dnut-sorghum	Gadag (Karnatka)	12

Table7.4.1. Yield of different cropping systems under researcher designed farmer managed nutrient response experiment (2013-14)

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)													
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Rice-Rice																						
Kerala	Special Zone / Thiruvalla-KER/ 24	Coastal Alluvial	Uma/ 90- 45 -45 / ZnSO4(25) 100- 50-50	4.3	0.8	376	11	153	2155	2708	4343	4175	6020	6159	5825	119	84	165	9.18	3865	139	195
Kerala	Special Zone / Thiruvalla-KER/ 24	Coastal Alluvial	Uma/ 90- 45 -45 / ZnSO4(25) 100- 50-50	—	—	—	—	-	1902	2408	4059	3941	5499	5563	5228	89	63	123	7.54	3597	64	271
Telangana	CT Zone / Warangal-Telangana/ 24	Red Sandy	BPT-5204/ 120- 60-40/ ZnSO4(21%) 140- 80-40	8.1	0.8	196	58	299	3521	4896	5234	5696	5971	6542	5504	173	123	244	11.3	2450	571	467
Telangana	CT Zone / Warangal-Telangana/ 24	Red Sandy	MTU-1010/ 120- 60-40/ ZnSO4(21%) 160- 57.5-45	—	—	—	—	-	2475	3115	3785	4274	4972	5423	4731	184	130	257	15.5	2497	451	241
Andhra Pradesh	High Altitude and Tribal Zone - Rastakuntabai/ Chintapalli/ Seethampeta-AP/23	Sandy Clay Loam	MTU1001/ 80- 60-50/ ZnSO4(50) 130- 35 -25	6.4	0.7	157	26	217	2211	2415	2640	2613	3329	4402	6221	72	51	100	7.22	1118	1073	-2892
Andhra Pradesh	High Altitude and Tribal Zone - Rastakuntabai/ Chintapalli/ Seethampeta-AP/23	Sandy Clay Loam	MTU-1010/ 80- 60-50/ ZnSO4(50) 130- 35 -25	—	—	—	—	-	3199	3162	3199	3274	3298	4403	6237	94	66	129	8.3	99	1105	-2939

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Tamil Nadu	South TN 5 & 6/ Chettinad-TN/24	Sandy Clay Loam	ADT-39/ ZnSO4(25) 120- 50-25	32	0.5	226	10	239	2937	3804	4070	4310	4760	5068	4683	39	27	53	3.15	1823	308	77
Tamil Nadu	South TN 5 & 6/ Chettinad-TN/24	Sandy Clay Loam	ADT-39/ ZnSO4(25) 120- 50-25	—	—	—	—	-	3153	4036	4352	4591	4757	5044	4669	31	22	43	2.48	1604	287	88
Tamil Nadu	North Western Zone - Paiyur/ Paiyur-TN/12	Clay Loam	Sona mussorie/ 150- 50-50/ ZnSO4(25) 130- 35 -40	7.8	0.6	289	15	299	3337	5328	6453	6114	7154	7527	6407	85	60	119	3.43	3817	373	747
Tamil Nadu	North Western Zone - Paiyur/ Paiyur-TN/12	Clay Loam	ADT-39/ 120- 40-40/ ZnSO4(25) 112.5- 35 -39	—	—	—	—	-	3843	4885	5978	5964	7163	7620	6281	139	98	194	5.71	3320	457	882
Mahar-ashtra	North Konkan Coastal Zone - Karjat/Palghar/24	Not Available	Shyadri/ ZnSO4(21%) 80- 22.5-12.5	0	0	0	0	0	2716	4224	5069	4939	5854	6418	4581	93	66	129	6.69	3138	564	1273
Mahar-ashtra	North Konkan Coastal Zone - Karjat/Palghar/24	Not Available	Karjat-3/ ZnSO4(21%) 80- 22.5-12.5	—	—	—	—	-	2660	3451	4132	4088	4539	4775	3654	53	38	74	4.72	1879	236	885
									Rice-Gram/Bengal Gram/Chick Pea														
Chhatt-isgarh	CG Plain Zone / Kawardha-CTG / 24	Black Cotton Soil	Karma mahsuri/ 100- 60-40/ ZnSO4(20) 60- 40-30	0	0	0	0	0	1974	2777	4714	3256	5191	5322	3594	85	60	118	7.7	3217	131	1597
Chhatt-isgarh	CG Plain Zone / Kawardha-CTG / 24	Black Cotton Soil	Vaibhav/ 20 - 50-20 / control 15- 46-0	—	—	—	—	-	538	877	1408	1078	1452	1580	1113	15	11	22	4.61	914	128	339

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Rice-Green Gram																							
West Bengal	Coastal saline Zone W.B./ Kakdwip-WB/24	Coastal Saline Soil	Pratikshya/ 80- 40-40/ 0- 0-0	5.6	0.9	190	46	228	3067	3531	4011	4112	4464	4614	4184	41	29	57	3.58	1397	150	280
West Bengal	Coastal saline Zone W.B./ Kakdwip-WB/24	Coastal Saline Soil	Chait Moong/ 20 - 40-40/ 0- 0-0	—	—	—	—	-	528	614	749	715	842	876	746	13	9	18	6.33	314	34	96
Odisha	East & South Eastern Coastal Plain /Kendrapara-OR/17	Not Available	Ranidhana/ 80- 40-40/ ZnSO4(21%) 40- 30 -20	5.8	0.6	285	17	174	2779	3329	3558	3648	4006	4137	3405	59	42	83	4.88	1227	131	601
Odisha	East & South Eastern Coastal Plain /Kendrapara-OR/17	Not Available	Local/ 20 - 40-20 / Molybdnum 10-30-0	—	—	—	—	-	422	483	515	529	564	581	454	11	8	16	6.54	142	17	110
Rice-Groundnut																							
Tamil Nadu	North Western Zone - Paiyur/ Paiyur-TN/ 12	Sandy Clay Loam	ADT-39/ 150- 50-50/ ZnSO4(25) 95- 30 -30	7.8	0.5	263	16	213	2846	3607	4727	4363	5925	6380	4882	121	85	168	6.32	3079	455	1043
Tamil Nadu	North Western Zone - Paiyur/ Paiyur-TN/ 12	Sandy Clay Loam	TMV-7/ 20 - 50-75/ Borax(10) 57.5- 20 -45	—	—	—	—	-	943	1190	1446	1688	2017	2268	1840	37	26	51	5.53	1074	251	177
Odisha	Mid-Central Table Land Zone - Mahispat/24	Not Available	Naveen/ 80- 40-40/ 50- 20 -30	6	0.6	267	14	143	2567	3701	3781	3984	4282	4412	3616	47	33	65	4.36	1715	130	666
Odisha	Mid-Central Table Land Zone - Mahispat/24	Not Available	Kadiri6/ 20 - 40-40/ 20 - 20 -10	—	—	—	—	-	1294	1631	1796	1809	2012	2085	1725	30	21	41	5.89	718	73	287

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Rice-Maize																							
Gujarat	Middle Gujarat Zone - Anand/ DEROL/ 12	Clay Loam	GR-9/ 80- 50-40/ ZnSO4(25) 75- 12.5-0	6.5	1	234	26	306	816	1167	1392	1270	1407	1434	1150	40	28	56	7.94	591	27	257
Gujarat	Middle Gujarat Zone - Anand/ DEROL/ 12	Clay Loam	PAC - 740/ 210- 130-100/ ZnSO4(25) 126- 45 -0	—	—	—	—	-	1302	2026	2317	2040	2322	2351	1882	81	57	114	9.72	1020	29	440
Bihar	North East Alluvial Plain Zone - Purnea-Kathiahar/ Purnea-BH/24	Alluvial	R.Mahsuri/ 100- 40-20 / Zinc(25) 60- 30 -10	6.8	0.4	223	16	206	1866	2762	3533	3229	4266	4532	3399	100	71	139	10.3	2400	266	867
Bihar	North East Alluvial Plain Zone - Purnea-Kathiahar/ Purnea-BH/24	Alluvial	P-3396/ 120- 75-50/ control 80- 30 -10	—	—	—	—	-	3280	4966	6370	5866	7166	7634	6266	176	125	245	10.3	3886	468	900
Rice-Wheat																							
Madhya Pradesh	Keymore Platue Satpora hills /Katni-MP/24	Not Available	JRH-5/ 120- 60-40/ ZnSO4(21%) 80- 40-0	0	0	0	0	0	2806	4323	5218	4994	5487	5993	4875	29	20	39	2.08	2681	506	612
Madhya Pradesh	Keymore Platue Satpora hills / Katni-MP/24	Not Available	JW 3211/ 120- 60-40/ ZnSO4(21%) 80- 40-0	—	—	—	—	-	1675	3334	4043	3722	4330	4603	3697	32	22	43	3.02	2655	273	633
Uttar Pradesh	Eastern Plain Zone - Kumarganj/ Ambedkarnagar/ 20	Alluvial	NDR-359/ 150- 60-60/ ZnSO4(25) 120- 30 -0	7.6	0.4	177	16	172	1639	2625	3758	2982	4060	4431	3407	66	47	93	6.38	2421	371	653

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Uttar Pradesh	Eastern Plain Zone - Kumarganj/ Ambedkarnagar/ 20	Alluvial	HD 2329/ 150- 60-40/ ZnSO4(25) 100- 30 -0	—	—	—	—	-	1157	2038	2950	2346	3264	3484	2703	40	28	55	4.97	2107	220	561
Uttara-khand	Hill Zone - Ranichauri/ Jeolikote-UK/ 24	Hilly	PHB-71/ 150- 60-60/ Sulphar 120- 55-0	6.4	0.7	267	30	169	2793	3957	4818	4307	5790	6224	4136	76	54	106	5.75	2997	434	1654
Uttara-khand	Hill Zone - Ranichauri/ Jeolikote-UK/ 24	Hilly	DBW621-50/ 150- 60-40/ Sulphar 110- 50-0	—	—	—	—	-	2533	3196	4117	3778	4633	4749	3420	70	49	96	6.42	2100	116	1213
Uttar Pradesh	Central Plain Zone - Kanpur/ Daleep Nagar (Kanpur Dehat)/24	Not Available	Hybrid Sudha/ 150- 60-40/ ZnSO4(25) 170- 65-0	7.9	0.4	0	13	147	2112	2962	4457	3552	5106	5622	4657	34	24	47	2.9	2994	516	449
Uttar Pradesh	Central Plain Zone - Kanpur/ Daleep Nagar (Kanpur Dehat)/24	Not Available	PBW-343/ 120- 60-40/ control 170- 65-0	—	—	—	—	-	1916	2661	3610	2963	3862	4368	3727	53	38	74	5.57	1946	506	135
Madhya Pradesh	Northern hill zone of chhati-sgarh-Dindori/ Dindori-MP/24	Not Available	MTU-1010/ 120- 60-40/ ZnSO4(25) 50- 20 -0	0	0	0	0	0	1939	2759	3698	3402	3947	4365	3057	28	20	39	2.98	2008	418	890
Madhya Pradesh	Northern hill zone of chhati-sgarh-Dindori/ Dindori-MP/24	Not Available	GW 366/ 120- 60-40/ ZnSO4(25) 60- 20 -0	—	—	—	—	-	1619	3280	3909	3611	4276	4460	3063	24	17	33	2.37	2657	184	1213
Jharkhand	Central and North Eastern Plateau Zone-IV / Pakur/24	Not Available	Naveen/ 100- 50-25/ Zn 5 60- 30 -0	5.7	0.6	244	6	170	825	1536	2453	1760	3099	3219	2209	63	45	88	10.2	2274	120	890

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Jharkhand	Central and North Eastern Plateau Zone-IV / Pakur/24	Not Available	K-9107/ 100- 50-25/ Zn 5 60- 30 -0	—	—	—	—	-	642	1409	2481	1698	2974	3056	2031	58	41	80	9.87	2332	82	943
Punjab	Central Plain Zone III/ Amritsar-PB/ 24	Not Available	PR 115/ 120- 30 -30 / ZnSO4(21%) 150- 30 -0	7.8	0.4	248	32	130	4832	5989	6426	6654	6992	7365	7286	57	40	78	3.01	2160	373	-294
Punjab	Central Plain Zone III/ Amritsar-PB/ 24	Not Available	HD 2967/ 120- 30 -30 / MnSO4 (1%) 150- 60-0	—	—	—	—	-	2809	3591	4290	4521	5164	5498	5425	58	41	80	4.46	2355	334	-261
J & K	Sub-Tropical Zone/ Dhainsar-JK/ 12	Not Available	Basmati- 370/ 30 - 20 -10/ ZnSO4(20) 40- 37.5 -0	7.3	0.5	239	14	129	1396	1826	2432	2204	2810	2892	2225	35	24	70	3.8	1414	82	585
J & K	Sub-Tropical Zone/ Dhainsar-JK/ 12	Not Available	PBW-550/ 100- 50-25/ control 63- 46-0	—	—	—	—	-	1489	2031	2607	2378	3005	3102	2364	53	37	106	5.37	1516	97	641
									Maize-Wheat														
Himachal Pradesh	Sub-mountain and low hills sub-tropical zone /Kangra- HP/24	Submontaneous	Hybrid;Kanchan/ 90- 45 -30 / Zinc(20) 70- 0-0	5.6	0.5	232	18	104	1629	1962	2439	2388	3000	3200	1838	36	26	51	5.33	1371	200	1162
Himachal Pradesh	Sub-mountain and low hills sub-tropical zone /Kangra- HP/24	Submontaneous	HPW-236/ 80- 40-40/ Zinc(20) 70- 0-0	—	—	—	—	-	1725	2163	2607	2623	3253	3416	1938	60	43	85	8.27	1528	163	1315

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Rajasthan	Sub-Humid Southern Plain and Aravalli Hill Zone - Udaipur/Udaipur-RJ/24	Not Available	NK - 30/ 90- 35 -30 / ZnSO4(25) 60- 15-0	8.1	0.5	366	33	372	950	2071	3335	2479	3577	3771	1963	49	35	69	6.55	2627	194	1614
Rajasthan	Sub-Humid Southern Plain and Aravalli Hill Zone - Udaipur/Udaipur-RJ/24	Not Available	RAJ-4037/ 120- 40-30 / control 90- 20 -0	—	—	—	—	-	1404	2550	3440	3131	3990	4200	2490	48	34	67	5.49	2586	210	1500
J & K	Sub-Tropical Zone/ Dhainsar-JK/ 12	Not Available	Kanchan/ 60- 40-20 / ZnSO4(10) 26.25- 38 -0	7.6	0.5	231	14	141	1351	1789	2336	2169	2793	2945	2285	44	31	87	4.79	1442	152	508
J & K	Sub-Tropical Zone/ Dhainsar-JK/ 12	Not Available	PBW175/ 60- 30 -20 / control 26.25- 38 -0	—	—	—	—	-	1462	1986	2500	2268	2980	3083	2428	48	34	96	4.94	1518	103	552
Gujarat	Middle Gujarat Zone - Anand/ DEROL/ 12	Sandy Loam	GM-6/ 174- 110-84/ ZnSO4(25) 110- 35 -0	6.2	0.9	258	31	318	767	1195	1375	1210	1392	1468	1115	55	39	78	11	625	76	277
Gujarat	Middle Gujarat Zone - Anand/ DEROL/ 12	Sandy Loam	PAC - 740/ 210- 130-100/ ZnSO4(25) 126- 45 -0	—	—	—	—	-	1279	3604	2294	2017	2299	2324	1860	856	605	1210	93.6	1020	25	439
Maize-Gram/Bengal gram/Chick pea																							
Karnataka	Northern dry zone / ARS Gadag/ 12	Deep Black soil	M900/ 150- 75-37.5 / ZnSO4(25) 90- 45 -0	8.9	0.4	71	16	433	1202	2699	3756	3276	5008	5498	2959	143	101	200	10	3806	490	2049

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Karnataka	Northern dry zone / ARS Gadag/ 12	Deep Black soil	JG 11/ 25- 50-0/ Znso4(15) 20-25-0	—	—	—	—	-	525	605	962	887	1166	1331	681	49	35	69	13.7	641	165	485
Mahar-ashtra	Central Maharashtra Plateau Zone - Aurangabad/ Aurangabad-MH/24	Black Cotton Soil	Maharaja/ 150- 75-75/ ZnSO4(25) 0- 0-0	0	0	0	0	0	3449	3809	4193	4259	4732	4833	4095	120	85	167	9.89	1283	101	637
Mahar-ashtra	Central Maharashtra Plateau Zone - Aurangabad/ Aurangabad-MH/24	Black Cotton Soil	BDNG-797/ 25- 50-0/ ZnSO4(25) 0- 0-0	—	—	—	—	-	755	890	1081	1051	1263	1341	954	31	22	43	10.4	508	78	309
Soyabean-Wheat																							
Mahar-ashtra	Western Vidarbha Zone/Amravati-MH/12	Not Available	JS-9305/ 30 - 75-30 / NPK+Sulphur 25- 25-15	0	0	0	0	0	1042	1175	1374	1424	1713	1860	1221	55	39	78	9.6	671	147	492
Mahar-ashtra	Western Vidarbha Zone/Amravati-MH/12	Not Available	AKW-3722/ 100- 50-50/ NPK+Sulphur 25- 25-15	—	—	—	—	-	1016	1230	1574	1305	1910	2159	1322	64	45	90	10.5	894	249	588
Soyabean-Gram/Bengal gram/Chick pea																							
Mahar-ashtra	Western Vidarbha Zone/Amravati-MH/12	Not Available	JS-9305/ 30 - 75-30 / NPK+Sulphur 25- 57.5-0	0	0	0	0	0	1021	1227	1455	1478	1730	1921	1207	75	53	106	12.7	709	191	523
Mahar-ashtra	Western Vidarbha Zone/Amravati-MH/12	Not Available	JAKI 9218/ 20 - 40-20 / NPK+Sulphur 25- 57.5-0	—	—	—	—	-	770	929	1198	1055	1456	1658	990	36	26	52	7.72	686	202	466

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)														
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Soyabean-Onion																							
Mahar-ashtra	Western Maharashtra Plain Zone - Pune/PUNE MH/24	Sandy Clay	JS-335/ 50- 75-25/ Fe(20)+Zn(20) 40- 50-0	7.7	0.4	153	10	290	1014	1174	1252	1299	1391	1459	1085	12	9	18	3.42	377	68	306
Mahar-ashtra	Western Maharashtra Plain Zone - Pune/PUNE MH/24	Sandy Clay	N-2-4-1/ 100- 50-50/ Fe(20)+Zn(20) 90- 65-0	—	—	—	—	-	11414	13455	14262	14899	16576	17814	13046	225	159	312	5.38	5162	1238	3530
Cotton-Wheat																							
Haryana	Western Zone - Sirsa/ Sirsa-HR/ 24	Alluvial	Bio6488/ 175- 60-60/ ZnSO4(21%) 150- 60-30	8.5	0.2	122	11	226	1163	1616	2065	1778	2202	2381	2059	50	35	69	9.11	1039	179	143
Haryana	Western Zone - Sirsa/ Sirsa-HR/ 24	Alluvial	HD2851/ 150- 60-30 / ZnSO4(21%) 150- 60-0	—	—	—	—	-	1398	3767	4917	4210	5249	5481	4903	117	82	161	9.44	3851	232	346
Gujarat	North Gujarat Zone - Dantiwada/ Jagudan GJ/ 22	Alluvial	Beejdhan 8/ 180- 40-40/ MnSO4 100- 40-0	0	0	0	0	0	952	1646	1957	2073	2249	2435	2067	83	58	114	14.4	1297	186	182
Gujarat	North Gujarat Zone - Dantiwada/ Jagudan GJ/ 22	Alluvial	GW-496/ 120- 60-30 / Zinc(25) 80- 40-0	—	—	—	—	-	2189	2992	3475	3235	3855	4207	3395	94	66	129	9.31	1666	352	460
Cabbage-Tomato																							
Karnataka	AEZ 8.2/ Kolar-KAR/ 11	Red Soil	Unnati/ 150- 100-125/ ZnSO4(10) 250 - 250 -112.5	6.7	0.4	150	14	113	24777	31433	38429	42882	46152	50840	51425	2228	1575	3150	12.8	21375	4688	-5273

State	NARP Zone/ Centres/ No. of trials	Soil Type	Variety/ Recommened Fertilizer Dose/ Micro. Dose FP (Fert. Dose)	Initial Soil Status					Yield (kg/ha)													
				pH	OC (%) ha)	N (kg/ ha)	P (kg/ ha)	K (kg/	Control	N	NP	NK	NPK	NPK+ M. Nut.	F. Pract	SE(d)	SE (M)	CD (5%)	CV	Yield gap 1 ----- RF vs Control (kg/ ha)	Yield gap 2 ----- RF+ vs RF (kg/ ha)	Yield gap 3 ----- RF vs FP (kg/ ha)
Karnataka	AEZ 8.2/ Kolar-KAR/ 11	Red Soil	US 440/ 250 - 250 -250 / ZnSO4(10) 180- 250 -220	—	—	—	—	-	6755	11415	16325	21022	25085	29450	32399	1830	1294	2588	21.1	18330	4365	-7314
Rajasthan	Transitional Plain Zone of Inland Drainage - Fatehpur (Sikar)/ Fatehpur-RJ/24	Sandy Loam	RGC-1003/ 3.75 - 26.25-3.75 / ZnSO4(20) 0- 0-0	0	0	0	0	0	807	964	1144	1121	1302	1372	0	17	12	24	5.99	495	70	—NA—
Rajasthan	Transitional Plain Zone of Inland Drainage - Fatehpur (Sikar)/ Fatehpur-RJ/24	Sandy Loam	RAJ-4037/ 35 - 25-7.5 / ZnSO4(20) 0- 0-0	—	—	—	—	-	3217	3612	4008	4083	4474	4714	0	37	26	51	3.67	1257	240	—NA—
Ragi/Fingermillet-Potato																						
Karnataka	AEZ 8.2/ Kolar-KAR/ 12	Red Soil	ML-365/ 100- 50-50/ ZnSO4(10) 80- 60-0	6.6	0.6	207	10	146	1164	2694	3847	3754	4332	4459	4501	114	81	162	7.92	3168	127	-169
Karnataka	AEZ 8.2/ Kolar-KAR/ 12	Red Soil	NA/ 250 - 250 -250 / ZnSO4(10) 200 - 250 -200	—	—	—	—	-	6536	9974	16561	14479	18820	19659	21661	1665	1178	2356	26.5	12284	839	-2841
Groundnut-Sorghum																						
Karnataka	Northern dry zone / ARS Gadag/ 12	Medium Black Soil	TMV-2/ 25- 50-25/ Feso4_25 20 - 50-0	8.4	0.7	124	19	371	606	828	1327	1069	1485	1597	948	60	43	85	13.1	879	112	537
Karnataka	Northern dry zone / ARS Gadag/ 12	Medium Black Soil	M35-1/ 50- 25-0/ Znso4(15) 10-20-0	—	—	—	—	-	633	911	1087	1044	1300	1442	1193	73	52	103	16.4	667	142	107

and Maharashtra state. Except Kerala (Problem Areas Zone) In all location there is the significant higher yield due to application of Zn in both season as micronutrient and highest percentage increase in yield over Recommended Fertilizer (NPK only) were recorded at Maharashtra (North Konkan Coastal Zone)in both kharif and rabi season which is 27.8 & 24.2% higher followed by Tamil Nadu(North Western Zone) 14.1 and 11.7% in rabi and kharif season. Application of Zinc @ 20 kg ha-1 in both the crops resulted in additional yield of 293 and 1088 kg ha-1 in kharif and rabi season over and above the recommended fertilizer at Andhra (High Altitude and Tribal Zone). However, application of recommended dose of fertilizer recorded higher yield over the control at all the sixlocationsin both season within range of 50% to 189% and highest yield gap 3865kg ha-1 recorded at Special Zone(Thiruvalla) of Keralain kharif season and highest percentage increase in yield 189.1 were recorded at Special Zone (Thiruvalla) of Kerala in rabi season. Except (North Konkan Coastal Zone) of Maharashtra and (North Western Zone) of Tamil Nadu there is no much significance yield difference between recommended fertilizer dose and farmer practices, even at one or two location there was low yield recorded under recommended fertilizer dose than farmer practices likewise High Altitude and Tribal Zone (Seethampeta) of Andhra recorded -2939 and -2892kg ha^{-1} less yield recorded in rabi and kharifseason followed by South TN 5 & 6 (Chettinand) of Tamilnadurecorded just 77 and 88kg ha^{-1} higher yield over farmer practice in rabi and kharif season. Application of Zinc @ 20 kg ha-1 in kharif and rabi resulted in additional yield of 1073 & 1105 kg ha^{-1} over and above recommended dose of fertilizer at High Altitude and Tribal Zone (Seethampeta) of Andhra. At North Konkan Coastal Zone of Maharashtra application of 120:50:50:6 kg NPK Zn ha^{-1} during kharif and 100:50:50:6kg NPK Zn ha^{-1} during rabi gives 1273kg ha^{-1} and 885kg ha^{-1} additional yield over the farmer practices which was 40% high in kharif and 30% high in rabithan farmer practices. At all the centre application of Zinc along with Recommended dose of Fertilizer (NPK) gives significantly higher yield than farmer practices on an average 10-15% higher yield recorded. In rice-rice system, across Maharashtra state there was huge mean system yield gap of 2202kg ha^{-1} exists between farmers and recommended nutrient practice.In rice-rice system, across the NARP zones, it was found that mean yield gap of 387kg ha^{-1} exists between farmers and recommended nutrient practice. Additional yield of 805kg ha^{-1} is possible through application of required quantity of zinc to the system in addition to recommended level of NPK nutrient.

Rice-wheat: A total 176 trial conducted at 8 locations compromising of 7 NARP zones. Under this total six states covered which are Jharkhand, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Punjab and Jammu Kashmir. Except Jammu & Kashmir (Sub-Tropical Zone) and Jharkhand (Central and North Eastern Plateau Zone), In all location there is the significant higher yield due to application of Znin both crop as micronutrient and highest percentage increase in yield over Recommended Fertilizer (NPK only) were recorded at Central Plain Zone (Kanpur) of UP which is 10.1% higher in case of rice and 13.1% in wheat, followed by KeymorePlatueSatpora hills (Katni) of MP 9.2% in rice and 6.3% in wheat. However, application of recommended dose of fertilizer recorded higher yield over the control at all the 8 locations within range of 44% to 363% and highest yield gap 2997 kg ha^{-1} in rice and 2657 kg ha^{-1} in wheat were recorded at Hill Zone (Jeolikote) of Uttarakhand and Northern hill zone (Dindori) MP. Highest percentage increase in yield 275.6 in case of rice and 363.2 in case of wheat were recorded at Central and North Eastern Plateu Zone (Pakur) of Jharkhand.Except Punjab, at all location there were huge yield gap recorded in recommended NPK application and farmer practices under both crops. Application of 100:50:25 and 100:50:25 Kg NPK ha^{-1} in rice and wheat gave additional yield of 890 kg ha^{-1} and 943 kg ha^{-1} over the farmer practice at Central and North Eastern Plateu Zone (Pakur). In Hill Zone (Jeolikote) of Uttarakhand 24 trials were conducted and it was found that significantly higher additional yield of 2088 and 1329kg ha^{-1} can be obtained from rice and wheat respectively through application of 150:60:60: Kg NPK + 20 kg Sulphurha-1 to rice

and 150:60:40: Kg NPK + 20 kg Sulphurha-1 to wheat, which were contribute 50.8 and 38.6% hike in yield over the farmers practice. At Central Plain Zone (Amritsar) of Punjab it was observed that in this zone famer already using high dose of NPK so there no significant additional yield recorded by recommended NPK alone or with micronutrient. It was observed that in Uttar Pradesh at Eastern Plain Zone (Ambedkarnagar) significantly higher yield recorded (653 kg and 561 kg ha^{-1}) over famer practices with application of recommended dose of NPK but in Central Plain Zone (Kanpur) only marginal additional yield were recorded by application of recommended dose of NPK over the farmer practices. In rice-wheat system, Northern hill zone (Dindori) MP there was huge mean system yield gap of 2402 kg ha^{-1} exists between farmers and recommended nutrient practice.In rice-wheat system, across the NARP zones, it was found that mean system yield gap of 1217 kg ha^{-1} exists between farmers and recommended nutrient practice. Additional yield of 786 kg ha^{-1} is possible through application of required quantity of zinc to the system in addition to recommended level of NPK nutrient.

Rice-green gram: A total 41 trials were conducted in two NARP zones. In Coastal saline Zone (West Bengal) and East & South Eastern Coastal Plain zone (Kendrapara) of Orissa, it was found that significantly higher additional yield of 430 and 732kg ha^{-1} respectively can be obtained from rice through application of 80:40:40: Kg NPK + 25 kg zinc ha^{-1}. In green gram, the additional yield over farmer practice was found to be 110 kg ha^{-1} due to application of 20:40:20: Kg NPK ha^{-1} at Orissa. Application of zinc as micronutrient in rice and Molybdenum in green gram didnot gave significantly higher yield over NPK alone at both centres.

Rice-groundnut: A total 36 trials were conducted in two NARP zones.Significantly higher yield of rice and groundnut was observed due to addition of zinc @ 25 and boron@ 10 kg ha^{-1} to these crops respectively in North Western Zone (Paiyur) of TN. The increase was observed to be 7.7 and 108.2% in rice and 12.4 and 113.9% in ground nut, over recommended nutrient application and control respectively. At Mid-Central Table Land Zone (Angul) Orissa in application of zinc @ 25in rice and Gypsum @ 250 kg ha^{-1} in groundnut along with RDF recorded 20% higher yield over the farmer practice.

Rice-gram: A total of 24 trials were conducted in CG Plain Zone (Kawardha) of Chhattisgarh, it was found that significantly higher additional yield of 1728 kg ha^{-1} can be obtained from rice through application of 100:60:40: Kg NPK + 20 kg zinc ha^{-1}. In gram, the additional yield over farmer practice was found to be 339 kg ha^{-1} due to application of 20:50:20: Kg NPK ha^{-1}. It was 48.0 and 30.4% higher yield than farmer practices in rice and gram respectively.

Rice-maize: Total 36 trials were conducted under rice-maize cropping system at two NARP zone. In North East Alluvial Plain Zone (Purnea) of Biharhuge yield gap recorded in recommended NPK application and farmer practices under both crop, In case of rice application of 100:40:20 Kg NPK ha^{-1} gave additional yield of 2400 kg ha^{-1} and 867 kg ha^{-1} over the control and farmer practice respectively which were 128.6 and 25.5% higher over the control and farmer practice respectively. In case of maize application of 120:75:50 Kg NPK ha^{-1} gave additional yield of 3886 kg ha^{-1} and 900 kg ha^{-1} over the control and farmer practice respectively which were 118.5 and 14.4% higher over the control and farmer practice respectively. At Gujarat (Middle Gujarat Zone-Anand) both crops rice and maize not recorded any response to application of Zn as a micronutrient but RDF recorded on an average 22% higher yield in both crops over the farmer practices.

Maize-wheat: A total 72 trial conducted at 4 locations compromising of 4 NARP zones. Under this total four states covered which are Rajasthan, Gujart, Himachal Pradesh and Jammu Kashmir. At all the four location application of RDF along with Zinc recorded significantly higher yield (24 to 92%) over the farmer practices. At Sub-mountain and low hills sub-tropical zone (Kangra) of Himachal Pradesh, application of 20 kg Zinc ha^{-1} recorded additional yield of 200 and 163 kg ha^{-1} in

maize and wheat. At Kangraapplication of 90:45:30: Kg NPK + 20 kg zinc ha^{-1} in maize and 80:40:40: Kg NPK + 20 kg zinc ha^{-1} in wheat gave significantly higher yield 74.1 and 76.3% respectively over the farmer practices. At Rajasthan(Sub-Humid Southern Plain and Aravalli Hill Zone-Udaipur) application of recommended dose of fertilizerin maize and wheat recorded 2627 and 2586 kg ha^{-1} increase in yield over the control which was 276.5 and 184.2% higher than control. It was observed that farmer's practices of nutrient management resulted in lower yield (508 and 552 kg ha^{-1}) of maize and wheat compared to application of recommended quantity of NPK at Sub-Tropical Zone (Dhainser) of Jammu & Kashmir. In the Middle Gujarat Zone (Anand) of Gujarat applicationof 25 kg zinc ha^{-1} in maize and wheat along with RDF gave significantly higher yield (31.6 and 24.9%) over the farmer practices.

Maize-gram: A total 36 trials were conducted in 2 NARP zones. In Northern dry zone (Gadag) of Karnataka, yield difference between farmers and recommended NPK practices were found to be 2049 kg ha^{-1} in Maize and 485 kg ha^{-1} in green gram. Application of micronutrient zinc @ 25 kg ha^{-1} to maize and @ 15 kg ha^{-1} in wheat resulted in significantly higher yield (490 and 165 kg ha^{-1} respectively) than RDF. At Kangra application of 150:75:75: Kg NPK ha^{-1} in maize and 25:50:0: Kg NPK + in gram gave significantly higher yield 15.5 and 32.4% respectively over the farmer practices.

Soybean-wheat: A total 12 trials were conducted in Western Vidarbha Zone (Amravati) of Maharashtra, It was observed that farmer's practices of nutrient management resulted in lower yield (492 and 588 kg ha^{-1}) of soybean and wheat compared to application of recommended quantity of nutrient. Application of sulphur in addition to recommended NPK resulted additional yield of 147kg ha^{-1} in soybean.

Soybean-gram: A total 12 trials were conducted in Western Vidarbha Zone (Amravati) of Maharashtra, It was observed that there was huge yield gap between farmer's practices and recommended nutrient application and which gave (additional yield of 523 and 466 kg ha^{-1}) in soybean and bengal gram respectively as compared to farmer practices. Which were 43.3 and 47.1% higher yield than farmer practices in soybean bengal gram respectively.

Soybean-onion: A total 24 trials were conducted in Western Maharashtra Plain Zone (Pune) of Maharashtra, It was observed that there was huge yield gap between farmer's practices and recommended nutrient application and which gave (additional yield of 306 and 3530 kg ha^{-1}) in soybean and onion respectively as compared to farmer practices. Which were 28.2 and 27.1% higher yield than farmer practices in soybean onion respectively.

Cotton-wheat: A total 46 trials were conducted in 2 NARP zones. In Western Zone (Sirsa) of Haryana application of recommended dose of fertilizer 175:60:60 Kg NPK ha^{-1} cotton and 150:60:30: Kg NPK ha^{-1} in wheat gave significantly higher yield (additional yield of 1039 and 3851 kg ha^{-1}) over the control and (143 and 346 kg ha^{-1}) over farmer practices. Micronutrient application had only marginal effect on cotton and wheat. North Gujarat Zone (Jagudan) of Gujarat application of RDF in cotton and wheat gave significantly higher yield (8.8 and 13.5%) over the farmer practices. In terms of kg ha^{-1} it was 182 and 460 kg ha^{-1} over the farmer practices respectively.

Cabbage-tomato: A total 12 trials were conducted at (Kolar) Karnatka, application of Zinc as micronutrient resulted 10.1 and 17.4% increase in yield over the NPK alone in both cabbage and tomato, but farmer's practices recorded higher yield than recommended dose of fertilizer alone and applied with micronutrient.

Cluster bean-wheat: The yield difference between control and recommended NPK application was found to be 495 kg ha^{-1} in cluster bean and 1257 kg ha^{-1} in wheat atTransitional Plain Zone of Inland Drainage (Sikar) of Rajasthan. Application of micronutrient recorded 5% yield increase in both cluster bean and wheat.

Finger millet tomato: A total 12 trials were conducted at (Kolar) Karnatka, application of Zinc as micronutrient resulted no significant increase in yield over the NPK alone in both cabbage and tomato, and farmer's practices also recorded higher yield than recommended dose of fertilizer alone and applied with micronutrient.

Groundnut-sorghum: Application of 25:50:25 Kg NPK + 25 kg Fe ha^{-1} to groundnut and 50:25:0 Kg NPK + 15 kg Zn ha^{-1} to Sorghum gave additional yield of 649 and 249 kg ha^{-1} respectively over the famer practices at Northern dry zone (Gadag) of Karnataka. And micronutrient contribution in above yield was 112 and 142 kg ha^{-1} respectively.

Summary of results on response of prevalent cropping system to applied nutrient in various NARP zones are:

- Across the various NARP zones and cropping systems, farmer's package resulted in lower yield compared to recommended package owing to the 29, 25, 71 and 100 % lower application of N P_2O_5 K_2O and micronutrients.
- On-farm system yield gap between recommended dose of N P_2O_5 K_2O + micronutrient and farmer's package was found to be 1192, 2059, 2636, 3575 and 1622 kg ha^{-1} in rice- rice, rice- wheat, maize- wheat, soybean-onion and rice-greengram systems respectively.
- Application of micronutrients based on soil test resulted in additional yield of 805, 786, 341, 877 and 246 kg ha^{-1} in rice-rice, rice- wheat, maize-wheat, soybean-onion and rice -green gram systems respectively.
- In all the NARP zones and systems, application of recommended N P_2O_5 K_2O alone or N P_2O_5 K_2O + micronutrient resulted in higher yield and use efficiency of nutrients. Suboptimal application in terms of number and quantity resulted in significantly lower yield and use efficiency of nutrients especially nitrogen.

Rice at tillering stage in nutrient response experiment at Srikakulam district (Andhra Pradesh)

Wheat at maturity in Samba district (Jammu and Kashmir)

7.4.2 Diversification of existing farming systems

Title of the experiment: Diversification of existing farming systems under marginal household conditions

Objectives

- To enhance the productivity and profitability of marginal farmers households through IFS approach
- To improve the livelihood and nutritional security through diversification approach
- To estimate the impact of capacity building in diversification of crop + livestock system

Year of start: 2013-14

The OFR-2 experiment on "On-Farm evaluation of new diversified cropping systems under irrigated/rainfed conditions" was concluded in 2012-13. A new experiment in farming systems perspective entitled "Diversification of existing farming systems under marginal households" was initiated with the background that 63 % households in India are in marginal category with average land holding size of 0.38 ha. Due to their size of holding, marginal farm households do not have sufficient marketable surplus for getting the decent livelihood and are most vulnerable to climate related risks. The assumptions made are marginal households are having family members of 5 with crop + livestock as the dominant farming systems and if these system is diversified, sufficient marketable surplus can be generated for sustainable livelihood.

Modules: The experiment was designed with innovative approach in which changes are compulsorily made in all components of farming systems by way of introducing new crops, livestock species and product or processing techniques in marginal households aiming to increase the marketable surplus and income of the family from a less land resource. The major strength of marginal household is having sufficient manpower (due to family size) for farm operations. After benchmarking, modules comprising of cropping system diversification (most efficient cropping systems was synthesized keeping in view of the farmers resources, perception, willingness, market and requirement other components in the system), livestock diversification [(Mineral mixture + deworming+ round the year fodder supply for existing components) + introduction of location specific low cost livestock components viz., BYP,

Farming System	Notation	Module name	Details
Existing	M0	Bench mark	Recording of bench mark data on crop, livestock, other components and household as a whole
Improved	M1	Cropping system diversification	Most efficient cropping systems wasintroduced keeping in view of the farmers resources, perception, willingness, market and requirement of other components in the system besides improving the practices of existing systems
	M2	Livestock diversification	Mineral mixture + deworming+ round the year fodder production + introduction of location specific low cost livestock components *viz.,*Backyard poultry, duckery, piggery & goat
	M3	Product diversification	Preparation of mineral mixture/value addition of market surplus products/kitchen /roof gardens
	M4	Capacity building	Training of farm households on farming systems especially on newly added practices & components and assessing its impact

duckery, piggery, goat etc)], product diversification (Preparation of mineral mixture/value addition of market surplus products/Kitchen /roof gardening) and capacity building (Training of farm households on farming systems including post harvest and value addition and assessing its impact) were implemented in randomly selected 24marginal farm households in each district.The general guidelines used for designing the modules are given below

Households: Twenty fourmarginalhouseholds were selected for experiment in all the locations. The average holding size of in the study locations ranged from 0.20 to 1.00 ha in various farming systems. At very few locations, the size of holding of farming system was marginally higher than 1 ha.

Locations: In the first year of study, 28 centres in 13 agro climatic regions covering 27 NARP zones have implemented the modulesin various farming systems. The details of locations, farming systems, size of holding, number of households in each farming system and module wise interventions made are given in Table 7.2.1. Three locations namely Fathepur (Rajasthan), Kamrup (Assam) and Thiruvalla (Kerala) have partially implemented the interventions and hence, the data is not included in this report.

Data analysis methodology: Based on the benchmark data, farming systems practiced by the households were identified and grouped in to different farming system categories such as field crops+ dairy, field crops + dairy+ goat *etc* as given in Table 7.4.2. Five parameters namely production (on equivalent basis of base pre-dominant crop), marketable surplus (calculated by deducting the family consumption for food, feed, seed *etc* from the total production), cost (total cost of the system including all components and diversification), returns (calculated by deducting the total cost from gross returns of the system) and profit (calculated by deducting the cost of the system from the gross income obtained from marketable surplus) were used for comparison of existing with improved (diversified) system and also different farming systems. Farming system with more than one household was subjected to ANOVA and paired t-test analysis.Paired t-test has been carried out for comparing existing and diversified systems with respect to production, marketable surplus, cost, return and profit. Similarly, one-way ANOVA has been carried out to identify the best farming system with respect to production, marketable surplus, cost, return and profit for the district.Standard error of mean values is also presented in parenthesis in Table 7.4.3.

Results

The components of existing and diversified farming systems in marginal farm households are given in Table 7.4.2, while the production, marketable surplus and economics of different farming systems are given in 7.4.3. Location wise and summary of results is explained briefly below.

Western Himalaya

Kangra (Himachal Pradesh): Three major farming systems *viz.*, field crops, field crops + dairy and field crops + dairy + goat were found among which field crop + dairy is being practiced by 58% households having mean area of 0.70 ha. Diversification of crops in *kharif* and *rabi* along with introduction of kitchen garden resulted in improvement in production (57%), marketable surplus (84 %), reduction in cost (43 %) and increase in profit (176 %). Among the parameters, significant difference was observed between existing and diversified system for production, marketable surplus, cost and profit for field crop + dairy and field crop + dairy + goat farming system. Among the different farming system, field crop + dairy registered significantly higher production (9675 kg), marketable surplus (3309 kg), and profit (Rs 12,315) from 0.70 ha area compared to field crop + dairy +goat system.

Samba (Jammu and Kashmir): Only one farming system *viz;* crop + dairy was found in the district and practiced by 100 % householdshaving mean area of 0.83 ha. Diversification and effective recycling resulted in significantlyhigher production (71 %), reduction in cost (27 %), increased returns (34 %) and profit (Rs. 69875) from 0.83 ha.

Table 7.4.2. Components of existing and diversified farming systems in marginal farm households at different locations

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
I. Western Himalaya														
Kangra (Himachal Pradesh)/Submont-anellow hills subtropical /104 rainy days/2336 mm rain	Field crops	0.26	1	Maize/ rice	Wheat	-	-	-	Maize/ rice	Wheat/ berseem/ oats/potato/ onion	-	-	Kitchen Garden	-
	Field crops + dairy (1-2)	0.70	14	Maize/ rice/colo cassia/ sorghum	Wheat/ mustard/ potato/ berseem/ oats	-	Cow (1) + Buffalo (1-2)	-	Maize/ rice/ sorghum/ blackgram	Wheat/ berseem/ mustard/ gobhi/ potato/oat/ chickpea/ onion		Cow (1) + Buffalo (1-2)	Kitchen Garden	-
	Field crops + dairy (1-2) + goat (2-3)	0.67	9	Maize/ rice/ sesamum/ sorghum/ blackgram	Wheat/ mustard/ gobhi/ Berseem	-	Cow (1) + Buffalo (1)+ Goat (2-3)	-	Maize/ rice/ sorghum/ blackgram	Wheat/ berseem/ mustard/ gobhi/ potato/oat/ chickpea/ onion	-	Cow (1) + Buffalo (1)	Kitchen Garden	
Samba (J&K)/ sub tropical low altitude / 75 rainy days/ 1548 mm rain	Field crops + dairy (2-3)	0.83	24	Rice/ maize	Berseem	-	Cow (1-2) + Buffalo (1-2)	-	Rice/ maize/ blackgram	Wheat	-	Cow (1) + Buffalo (1)	-	-
Nainital (Uttara-khand)/Hills of Uttarakhand/ Warm Moist Sub Humid/ 90.5 rainy days/2597 mm rain	Field crops +dairy	0.33	15	Rice, Wheat Soybean, Berseem, urd, Mustard, lentil, gram Jowar (F)		-	Bullocks (1-2) Cow (1) Calves (1) Buffalo (1)		Rice, Tomato, urd, Maize, French Bean, Soyabean, Coriander, Chilli/Wheat, Pea,Onion, Potato, Lentil, Gram/Maize, Coriander, Chilli		-	Cow (1) Buffalo (1) Poultry (11)	Coriander Leaves, Seeds of Brinjal. Couliflower, methi & palak	Herbicide &pecticide, Backyard poultry production, Goat rearing, Vermicompost

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy + goat	0.27	3	Rice , Wheat, maize, pea,gram, lentil		-	Bullocks (1-2) Cow (1) Calves (1) Buffalo (1-2) Goat (4-5)		Rice, French Bean,, Coriander, Chilli,/Wheat, Pea,Gram, Lentil/Maize		-	Buffalo (2) Goat (4-5), poultry (20)	Coriander Leaves, Seeds of Brinjal. Couliflower, methi & palak	-Do-
	Field crops + dairy + goat + poultry	0.32	1	Rice, Wheat, maize, potato, oats, barseem, urd, Jowar (F)		-	Bullocks (2) Calves (1) Buffalo (2) Goat (4) Poultry (11)		Rice, Maize, Coriander, Chilli/Weat+ Pea,Wheat, Potato/Maize		-	Buffalo (2)	Coriander Leaves, Seeds of Brinjal. Couliflower, methi & palak	-Do-
	Field crops + dairy + poultry	0.29	3	Rice, Soyabean, Wheat, maize, potato, barseem, Gram, Jowar(F)		-	Bullocks (2) Cow (1) Calves (1-2) Buffalo (1)		Rice, Tomato, Coriander, Chilli/Wheat, Pea, Onion/Maize		-	Cow (1) Buffalo (1) Poultry (15)	Coriander Leaves, Seeds of Brinjal. Couliflower, methi & palak	-Do-
II. Eastern Himalaya														
Ambedkarnagar (Uttar Pradesh)/ Eastern Plain Zone/Sub-humid/ 54.4 rainy days/ 1426 mm rain	Field crops	0.30	1	Rice	Wheat/ mustard/ berseem	-	-	-	Rice	Wheat/ mustard/ chickpea	-	Cow (3)	-	-
	Field crops + dairy (1-2)	0.38	11	Rice/ fodder sorghum	Wheat/ mustard/ berseem/ potato/ chickpea/ pea	-	Cow (1) + Buffalo (1-2)	-	Rice	Wheat/ chickpea/ potato/ berseem/ mustard/ pea	Greengram/ okra	Cow (2-3) + Buffalo (1-2)	-	-
	Field crops + dairy (1-2) + goat (5-6)	0.38	8	Rice/ fodder sorghum	Wheat/ mustard/ potato/ berseem/ sugarcane	Sugarcane/ okra/ blackgram/ mentha	Cow (1) + Buffalo (1-2)	-	Rice	Chickpea/ potato / mustard/ pea/ berseem	Blackgarm/ greengram/ fodder sorghum/ okra	Cow (2-3) + Buffalo (1-2) + Goat (5-6)	-	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
III. Lower Gangetic Plains														
South 24 Paragnas (West Bengal)/ lower gangetic plains/100.8 rainy days/1789mm rain	Field crops	0.56	2	Rice	Tomato	Greengram/ okra	-	-	Rice	Sunflower	Green gram	Poultry (37)	Kitchen gardening, dal making	Improved cultivation techniques Sunflower, of Integrated pest management of lady's finger
	Field crops + dairy (1-2)	0.39	8	Rice	Greengram/ sunflower/ potato/ brinjal	Green gram/ okra/ sesamum	Cow (1-2)		Rice	Tomato/ onion/ brinjal/ sunflower/ potato	Green gram/ okra	Cow (2-3) + Poultry (15-16)	Kitchen gardening, dal making	-Do-
	Field crops + dairy (2) + fish	0.46	1	Rice	Tomato	Green gram/ okra	Cow (2) + Pond (1)		Rice	Sunflower	Green gram	Cow (2) + Poultry (18)	Kitchen gardening, dal making	-Do-
	Field crops + dairy (3) + goat (5-6)	0.45	3	Rice	Sunflower/ greengram/ potato	Green gram/ okra	Cow (3) + Goat (5-6)		Rice Green gram/ Okra	Sunflower/ onion/ potato/ fruit crops	Green gram/ okra	Cow (3-4) + Poultry (24-25)	Kitchen gardening, dal making	-Do-
	Field crops + dairy (4) + goat (12) + poultry (30)	0.26	1	Rice	Rice		Cow(4) + Goat (12)+ Poultry (30)		Rice	Sunflower	Green gram	Cow(4) + Poultry (49)	Kitchen gardening, dal making	-Do-
	Field crops + dairy (3-4) + poultry (15-16)	0.52	6	Rice	Sunflower/ potato/ greengram/ sesamum	Okra/ green gram	Cow (3-4)+ Poultry (15-16)		Rice	Lathyrus/ okra/ sunflower/ potato	Green gram/ okra/ onion	Cow (3-4)+ Poultry (31-32)	Kitchen gardening, dal making	-Do-
	Field crops + goat (2)	0.67	1	Rice	Tomato	Okra	Goat (2)		Rice	Sunflower	Green gram	Poultry (17)	Kitchen gardening, dal making	-Do-
	Field crops+ poultry (8)	0.44	2	Rice	Sunflower	Green gram/okra	Poultry (8)		Rice	Sunflower	Green gram/okra	Poultry (51)	Kitchen gardening, dal making	-Do-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
IV. Middle Gangetic Plains														
Purnea (Bihar)/ north east alluvial plain (BI-2) /40.5 rainy days/1013 mm rain	Field crops	0.50	1	Rice	Wheat/ maize	-	-	-	Rice	Maize	-	-	Kitchen garden, dal making	IFS
	Field crops + dairy (2-3)	0.75	4	Rice/ vegetable	Maize/ potato	Chilli/ brinjal	Cow (2)	-	Rice	Maize	Greengram	Cow (2) goat	Kitchen garden, ber budding	Vermi-compost
	Field crops + dairy (2-3) + goat (1-2)	0.58	19	Rice/ vegetable	Maize/ wheat/ potato/ Vegetable	-	Cow (1-2) + Buffalo (0-1)+ Goat (1-2)	-	Rice/ vegetable	Maize	-	Cow (1-2) Goat Buffalo (1)	Kitchen garden, dal making, ber budding	Vermi-compost
V. Upper Gangetic plains														
Kanpur Dehat (Uttar Pradesh)/ Central Plain Zone / Kanpur	Field crops	0.80	3	Rice	Wheat	-	-	-	Rice/ maize/ green gram	Wheat/ potato/ mustard-mentha/ green gram	-	Cow (1) + Goat (4)	-	Improved practices of rabi, goat rearing, poultry production, kitchen gardening
	Field crops + dairy (1-2)	0.85	8	Rice/ maize/ pegion pea	Wheat/ chickpea/ mustard	-	Cow (1) + Buffalo (1)	-	Rice/ maize/ pegionpea / sorghum	Wheat/ chickpea/ mustard/ potato	Green gram	Cow (1) + goat (1)	-	-Do-
	Field crops + dairy (2-3) + goat(2-3)	0.76	8	Rice/ maize/ pearl millet	Wheat/ mustard/ potato	-	Buffalo (2) + Goat(2-3)	-	Rice/ maize/ pearl millet/ sorghum	Wheat/ mustard/ Potato/ chickpea	Green gram	Cow (1) + Goat (1)+ Poultry (1-2)	-	-Do-
	Field crops + goat (2-3)	0.33	5	Rice/ pegionpea	Wheat/ Mustard	-	Goat (2-3)	-	Rice/ pigeonpea / greengram/ maize	Wheat/ mustard/ chickpea	Green gram	Goat (1)	-	-Do-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
VI. Trans Gangetic Plains														
Sirsa (Haryana) / Western/ 29 rainy days/292 mm rain	Field crops	0 .40	1	Cotton	Wheat	-	-	NKG	Cotton/guar	Wheat	-	-	-	-
	Field crops + dairy (1-2)	0.58	22	Cotton/ pearl millet/ guar	Wheat/ barseem	-	Cow (1) + Buffalo (1)	Ghee making, dal making, NKG	Cotton/guar	Wheat	-	Cow (1) + Buffalo (1) + Goat (1)	kitchen garden	-
Amritsar (Punjab)/ Central Plain Zone/ 47 rainy days/ 936 mm rain	Field crops + dairy (3-4)	1.08	24	Rice	Wheat	-	Cow (1) + Buffalo (3-4)	-	Rice	Wheat	-	Cow (1) + Buffalo (3-4)	-	-
VII. Eastern Plateau and Hills														
Kabirdham (Chhatt-isgarh)/chhattisgarh Plain Zone/Sub humid Area	Field crops	0.84	12	Rice	Chickpea	Vegetable		-	Rice/ soyabean	Vegetable	Vegetable	Cow (1-2)+ Poultry (3-4)	-	-
	Field crops + dairy (1-2)	0.77	9	Rice/ soyabean	Wheat/ chickpea	Vegetable	Cow (1-2)	-	Rice/ soyabean	Vegetable	Vegetable	Cow (1-2) + Goat (1) + Poultry (1-2)	-	-
	Field crops + dairy (1) + goat (1)	0.60	1	Rice/ Soybean	Chickpea	Vegetable	Cow(1) + Goat (1)	-	Rice/ soybean	Vegetable	Vegetable	Cow (2)	-	-
	Field crops + dairy (2) + goat (9) + poultry (3)	0.60	1	Rice/ Soybean	Chickpea	Vegetable	Cow (2)+ Goat(9)+ Poultry (3)	-	Rice/ soybean	Vegetable	Vegetable	Cow (1)+ Goat (2) + poultry (6)	-	-
	Field crops + dairy (2) + poultry (6)	0.80	1	Rice	Chickpea	Vegetable	Cow (2)+ Poultry (6)	-	Rice/ soybean	Vegetable	Vegetable	Cow (2)	-	-
Pakur (Jharkhand)/ eastern plateau and hill-VII/central and north eastern plateau zone / 86 rainy days/ 1228 mm rain	Field crops	0 .76	22	Rice	Wheat/ lentil/ chickpea/ potato/ mustard	-		-	Rice	Wheat/ chickpea	-	Goat (2-3)+ Pig (1) + Poultry (4-5)	Kitchen Garden, Dal Making	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy (3-4)	0 .72	2	Rice	Chickpea		Cow (3-4)	-	Rice	Wheat/ chickpea	-	Goat (1)	Kitchen Garden, Dal Making	-
Dindori (Madhya Pradesh)/Northern Hills Zone of Chhattisgarh (CG-3)/72.6 rainy days/ 1593mm rain	Field crops	0.72	3	Rice/ soybean	Wheat/ chickpea/ lentil	-		-	Rice/ soybean/ kodo	Wheat/ lentil	-	Cow (1-2) + Buffalo (1)+ Poultry (2-3)	-	-
	Field crops + dairy (1-2)	0.76	16	Rice/ soybean/ kodo	Wheat/ chickpea/ lentil	-	Cow (1-2)+ Buffalo (1)	-	Rice/ soybean/ kodo	Wheat/ chickpea/ lentil	-	Cow (1-2) + Buffalo (1)	-	-
	Field crops + dairy (1-2) + goat (8)	0.73	2	Rice/ soybean	Wheat/ chickpea	-	Cow (1-2)+ Buffalo (1)+ Goat (8)	-	Rice/ soybean/ kodo	Wheat/ chickpea/ lentil	-	Cow (1)	-	-
	Field crops + dairy (1) + poultry (4-5)	0.69	2	Rice/ soybean	Wheat/ chickpea/ lentil	-	Cow (1)+ Poultry (4-5)	-	Rice/ soybean/ kodo	Wheat/ chickpea/ lentil	-	Cow (1-2)+ poultry (5-6)	-	-
	Field crops + goat (2)	0.65	1	Rice/ soybean/ kodo	Wheat/ lentil	-	Goat (2)	-	Rice/ soybean	Wheat/ lentil	-		-	-
Angul (Odisha)/ Mid-Central Table Land, /81 rainy days/1560 mm rain	Field crops	.80	1	Rice/ brinjal/ pointed Guard/ mango/ banana/ cashew nut	Pigion pea/ maize	Sesamum	-	-	Rice/ brinjal/ casewnut/ mango/ banana/ pointed guard	Pegion pea/maize/ onion/ cowpea/ coauli flower/ cabbage	Sesamum/ brinjal/ okra	Cow (1) + Poultry (25)	-	-
	Field crops + dairy (1-2)	0.83	14	Rice/ brinjal/ cowpea/ pointed Guard/ mango/ okra/ bitter Guard/ banana/ cashewnut	Groundnut/ maize/ tomato/ cowpea/ okra/ brinjal/ cucumber/ onion/ potato	Black gram/ okra/ seas-amum	Cow (1-2)	-	Rice/ brinjal/ cowpea/ okra/ mango/ bitterguard/ banana/ cashewnut	Groundnut/ tomato/ cowpea/ okra/ brinjal/ cucuber/ onion/ garden pea/ cauliflower/ maize/ potato/ bean/ clusterbean/ sunflower	Black gram/ green gram/ okra/ bitter guard/ sesamum/ cucumber/ brinjal/ cowpea/ pointed guard/ water melon/ ridge guard	Cow (1) + Poultry (40-41)	Compost Making	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy (1-2) + Poultry	0.89	8	Rice/ ginger/ mango/ banana	Brinjal/ cowpea/ tomato/ cauliflower/ potato/ gardenpea/ okra/ cabbage/ pointedguard/ maize	Brinjal/ cucumber	Cow (2-3) + Poultry (25-30)	-	Rice/ ginger/ mango/ banana/ bitter guard	Brinjal/ cowpea/ bitter guard/ cauliflower/ potato/ gardenpea/ okra/ cabbage/ pointedguard/ maize/ onion/ sunflower	Brinjal/ cucumber/ okra/ watermelon	Cow (2-3) + Poultry (65-70)+ Fish	-	-
	Field crops + Poultry (2)	0.80	1	Rice/ cashew nut	Brinjal/ bitter guard/ cowpea/ pointedguard/ maize	Seasamum	Poultry (2)	-	Rice/ cashewnut/ bitter gourd/ cowpea/ brinjal/ pointed gourd	Maize/ onion/ cauliflower/ cabbage/ gardenpea	Sesamum/ brinjal/ okra	Cow (1) + poultry (34)	-	-
VIII. Central Plateau and hills														
Katni (Madhya Pradesh)/ Kymore Pleateau and Satpura Hills/70 rainy days/ 1444mm rain	Field crops	0.70	3	Rice	Wheat	-	-	-	Rice/ soybean	Wheat/ chickpea	-	-	-	-
	Field crops + dairy (2)	0.71	20	Rice/ marigold	Wheat	-	Cow (2)	-	Rice/ soybean	Wheat/ chickpea	-	Cow (2)	-	-
	Field crops + dairy (1-2) + goat (14)	1.00	1	Rice	Wheat	-	Cow (2) + Buffalo (2)+ Goat (14)	-	Rice/ soybean	Wheat/ chickpea	-	Cow (2) + Buffalo (1) + Goat (2)	-	-
Udaipur (Rajasthan)/ Sub-humid Southern plain and aravali hills/47 rainy days/ 828 mm rain	Field crops	0.70	2	Maize	Wheat	-	-	-	Maize	Wheat/ tomato/ greengram	-	Poultry (20)	-	Crop production, vegetable production, vermicompost, rearing of Poultry
	Field crops + dairy (1-2)	0.60	7	Maize	Wheat	-	Cow (1) + Buffalo (1)	-	Maize	Wheat/ tomato/ greengram/ barley/ tinda		Cow (1) + Buffalo (1)	-	-do-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy (1-2) + goat (8-9)	0.66	15	Maize/ guar	Wheat	—	Cow (1) + Buffalo (1)+ Goat (8-9)	-	Maize	Wheat/ tomato/ greengram/ pea/tinda	-	Cow (2-3) + Buffalo (1)+ Poultry (9-10)	-	-do-
IX. Western Plateau and Hills														
Aurangabad (Maharashtra)/CMP/ 57.5 rainy days/ 666 mm rain	Field crops	0.47	21	Maize/ cotton/ sugar cane/ pearl millet	Wheat/ chickpea/ coriander/ fenugreek	Fodder maize	-	-	Cotton/ sugar cane/ pearl millet/ Okra/ hy.napier/ chilli/ soyabean/ coriander	Coriendar/ wheat/ chickpea	Fodder maize	Cow (2-3) + Goat (1-2)	Kitchen garden, compost	Importance of secondary and micro nutrients in cotton, clean milk production and importance of vaccination and mineral mixture
	Field crops + dairy (6)	0.75	3	Maize/ cotton/ sugar cane	Wheat/ coriander	Fodder maize	Cow (6)	-	Sugarcane/ cotton/ maize/ lucune/ hy. Napier/ ginger/ okra	Coriendar/ wheat/ chickpea	Fodder maize	Cow (4) + Goat (1)	-do-	-do-
Pune (Maharashtra)/ deccan Plateau, hot semi-arid eco sub region(6.1)/ Ganeshkhind Pune-7/48 rainy days/ 606 mm rain	Field crops + dairy (1-2)	0.53	24	G.Nut/ soybean/ rice/maize/ hy .nepiar fodder	Onion/ potato/ chickpea/ wheat/ maize/ garlic/ fodder	Pearl millet/ ground nut	Cow (1-2) + Buffalo (0-1)	-	G.Nut/ soyabean/ maize	Onion/ wheat/ potato/ chickpea	Cucurbit's crops/ fodder' s crops	Cow (1) + Buffalo (0-1)+ Goat (0-1)	Onion/ wheat/ potato/ chickpea	-
Amravati (Maha-rahtra/) Central Maharastra Plateaue Zone (IX)/ Western Vidarbha Zone/ 71 rainfall days/ 1198 mm	Field crops + dairy (1-2)	0.87	20	Soybean/ cotton/ pigeonpea/ orange	Chickpea/ wheat	-	Cow (1-2)	-	Soybean/ cotton/ okra/ orange/ marigold/ sorghum/ pigeonpea	Chickpea/ wheat	Groundnut/ sesamum	Cow (1-2)+ Buffalo(1)+ Goat (1)	Kitchen Garden, Dal Making, Compost, Mineral Mixture, Bur Budding, Boundary Plantation	Soybean Based Multi-tier/ Inter Cropping System , Goat rearing

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + goat (2-3)	0.8	3	Soyabean	Chickpea/ wheat	-	Goat (2-3)	-	Soybean/ pigeonpea	Chickpea/ linseed	Sesamum	Goat (3-4)+ Poultry (3-4)	-do-	-do-
	Field crops + poultry (6)	0.8	1	Soyabean	Chickpea	-	Poultry (6)	-	Soybean/ pigeonpea	Chickpea/ linseed	-	Poultry (6-7)+ Goat (1)	-do-	-do-
X. Southern Plateau and Hills														
Warangal (Telan-gana)/C.T.Zone/ rice eco system/ 67.3 rainy days/ 1263 mm rain	Field crops	1.00	1	Rice	Maize	Maize		-	Rice	Greengram		Poultry (5)		
	Field crops + dairy (3-4)	0.90	6	Rice/ cotton/ maize	Rice/ maize/ groundnut	-	Cow (2) + Buffalo (1-2)	-	Rice	Rice/ greengram/ cowpea/ sunhemp	-	Cow (1) + Buffalo (1-2)+ Poultry (5-6)		Compost Making, Mineral Mixture
	Field crops + dairy (2) + goat (41-42)	0.87	3	Rice/ cotton/ maize	Rice/ maize		Cow (1) + Buffalo (1-2)+ goat (41-42)		Rice	Rice/ sunhemp/ maize		Cow (1) + Buffalo (1-2)+ Poultry (5)+ Goat (51-52)	Kitchen gardening, dal making	Compost Making, Mineral Mixture
	Field crops + dairy (3-4) + goat (25-26)+ poultry (7-8)	0.92	6	Rice/ cotton/ maize	Rice/ chilly/ maize	-	Cow (1-2) + Buffalo (1-2)+ Goat (25-26)+ Poultry (7-8)	-	Rice	Rice/ cowpea/ sunhemp	-	Cow (2-3) + Buffalo (0-1)+ Goat (45-46)+ Poultry (9-10)	Kitchen gardening, dal making	Compost Making, Mineral Mixture
	Field crops + dairy (2-3)+ poultry (6-7)	0.83	8	Rice/ cotton/ maize	Rice/ okra/ maize	-	Cow(0-1) + Buffalo (1-2)+ Poultry (6-7)		Rice	Rice/ greengram/ cowpea/ sunhemp		Cow (1-2) + Buffalo (2-3) + Poultry (7-8)		Compost Making
Kolar (Karnataka)/ AEZ 8.2/ Eastern Dry Zone/ 42 rainy days/ 612 mm rain	Field crops + dairy (1-2)	0.91	12	Fingermillet/ polebean/ maize/ avare/ mulberry/ cauliflawer/ tomato/ ridgeguard/ sweetcorn/ cabbage/ flatbean	Radish/ carrot/ tomato/ sweet corn/ bitter guard	Tomato/ mullbery/ maize/ coriender	Cow (1-2)	-	Fingermillet/ polebean/ avare/ maize/ mulberry/ cauliflower/ tomato/ ridgeguard/ flatbean/ carrot/ redgram/ potato/ okra	Radish/ carrot/ sweet corn/ bitter guard	Tomato/ mulberry/ maize/ coriender	Cow (1-2) + Goat (1) + Poultry (1)	Feeding schedules in adverse climatic conditions, azolla, Vermi-composting	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy (1-2)+ goat (5)	1.00	5	Fingermillet/ mullberry/ tomato	-	-	Cow (1) + Buffalo (1) + Goat (5)	-	Finger/ millet mulberry/ tomato	Coriander/ tomato	Mango/ mulberry	Cow (1-2)+ Buffalo (1) + Goat (8-9)+ Poultry (1)	Feeding schedules in adverse climatic conditions, azolla, Vermi-composting	-
	Field crops + dairy (3-4) + goat (2-3) + poultry (6)	1.50	6	Fingermillet/ rice/ mulberry/ tomato/ ridgeguard	Carrot/ coriender/ radish	Tomato/ mango/ mulberry	Cow (2-3) + Buffalo (1) + Goat (2-3) + Poultry (5)	-	Fingermillet/ rice/ tomato/ mulberry/ ridgeguard/ polebean/ groundnut	Carrot/ coriender/ radish	Tomato/ mulberry/ mango/ polebean	Cow (2-3)+ Buffalo (1) + Goat (11-12)+ Poultry (7-8)	Feeding schedules in adverse climatic conditions, azolla, Vermi-composting	-
	Field crops + dairy (1-2) + poultry (20)	0.30	1	Fingermillet	-	Tomato	Cow (1) + Buffalo (1) + Poultry (20)	-	Fingermillet	-	Tomato	Cow (1) + Buffalo (1) + Poultry (25)	Feeding schedules in adverse climatic conditions, azolla, Vermi-composting	-
Gadag (Karanataka)/ Northern Dry Zone/ Arid/31.5 rainfall days/325 mm	Field crops + dairy (1-2)	1.14	24	Maize/ vegetable/ groundnut/ Bt. cotton	Vegetable/ chickpea/ wheat/ sunflower/ Bt.cotton/ sorghum/ groundnut	-	Cow (1) + Buffalo (1)	-	Green gram/ maize/ groundnut/ sunflower/ Bt. cotton	Sorghum/ chick pea	-	Cow (1) + Buffalo (1)	-	Integrated Farming System a noble approach for enhancing farm income
Dharmapuri & Krishnagiri (TamilNadu)/ NWZ/Bimodal rainfall/Start of deccan plateau/ 36.5 rainy days/ 656 mm rain	Field crops + dairy (1)	0.67	22	Rice/ turmeric/ groundnut/ button rose/ coconut/ fodder grass/ okra/ jasmine/ cotton/ fodder maize/ redgram/ topiaca/ fodder sorghum/ horsegram/ blackgram	Rice/ coconut/ tomato/ ragi/ brinjal/ cowpea/ fodder sorghum/ fodder grass/ GNut	Coconut	Cow (1)	-	Rice/ turmeric/ groundnut/ button rose/ coconut/ fodder grass/ okra/ jasmine/ cotton/ fodder maize/ redgram/ topiaca/ fodder sorghum/ horsegram/ blackgram	Rice/ ragi/ raddish/ groundnut/ blackgram/ fodder grass/ tomato/ cotton		Cow (2)	-	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy + poultry	0.80	2	Rice/ jasmine/ fodder grass	Rice	-		-	Rice/ jasmine/ fodder grass	Rice/ ragi	-	Cow (2)	-	-
XI. East Coast Plains and Hills														
Srikakulam (Andhra Pradesh)/high altitude and tribal area zone/57.5 rainy days/ 1277mm rain	Field crops	0.2	1	Rice/ Maize-Maize-(S)			Rice-Blackgram-(s)	Cow-2, Poult-5						
	Field crops + dairy	0.63	6	Rice/ Maize/ Greengram-Rice/ Groundnut/ Maize-(s)	Cow-10, Buf-9		Rice-Blackgram/ Rice/ Piegionpea/ Greengram/ Maize/ Fingermillet-sesame	Cow-3, Poult-59	Ber budding					
	Field crops + dairy + goat	0.73	3	Rice/ Maize/ Greengram-Rice/ Maize-(s)	Cow-2, Buf-4, Goat-125		Rice-Blackgram/ Piegionpea/ Fingermillet/ Greengram/ Maize-Sesame	Poul-26						
	Field crops + dairy + goat + poultry	0.73	6	Rice/ Maize/ Greengram-Rice/ Chilli/ Maize-(s)	Cow-3, Buf-6, Goat-156, Poul-34		Rice-Blackgram/ Rice/ Greengram/ Fingermillet-sesame	Cow-9, Goat-39, Poul-47						
	Field crops + dairy + poultry	0.62	8	Rice/ Maize/ Greengram-Rice/ Maize/ Okra-(s)	Cow-4, Buf-15, Poult-55		Rice-Blackgram/ Sugarcane/ Maize/ Greengram/ Fingermillet-Blackgram	Cow-12, Buf-6, Poul-86, Pig-2						

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
Kendrapara (Odisha)/east-south eastern coastal plain zone/77 rainy days/2002 mm rain	Field crops + dairy (2)	0.88	8	Rice/ jute	Greengram/ rice/ blackgram/ vegetable	-	Cow (2)	-	Rice/ jute	Greengram/ rice blackgram/ vegetable/ bitterguard	-	Cow (3-4)+ Poultry (10)	Kitchen gardening, compost making, ber budding	-
	Field crops + dairy (1-2)+ Fish	1.02	5	Rice/ jute/ vegetable	Greengram/ blackgram/ vegetable	-	Cow (2)+ Buffalo (1)+ Fish	-	Rice/ jute	Greengram/ mustard/ blackgram/ vegetable/ bitterguard	-	Cow (2-3)+ Poultry (10)	Kitchen gardening, compost making, ber budding	-
	Field crops + dairy (1-2) + goat (23-24)	1.09	7	Rice/ vegetable	Greengram/ rice/ blackgram/ vegetable	-	Cow (2)+ Goat (23-24)	-	Rice	Greengram/ rice/ Vegetable/ blackgram/ groundnut/ mustard	-	Cow (3-4)+ Poultry (8-9)+ Goat (5-6)	Kitchen gardening, compost making, ber budding	-
	Field crops + dairy (1) + goat (3-4) + Fish	1	2	Rice/ vegetable	Greengram/ blackgram		Cow (1)+ Goat (36-37) Fish	-	Rice	Greengram/ blackgram/ Vegetable/ groundnut/ mustard/ bitterguard	-	Cow (2)+ Poultry (10)+ Goat (3-4)	Kitchen gardening, compost making, ber budding	-
	Field crops + dairy (3) + goat (28-29) + Poultry (40-41)	0.89	2	Rice	Rice/ greengram/ blackgram/ Vegetable	-	Cow (3)+ Goat (28-29)+ Poultry (40-41)	-	Rice/ jute	Rice/ blackgram/ greengram/ bitterguard/ groundnut		Cow (3-4)+ Poultry (10)+ Goat (3-4)	Kitchen gardening, compost making, ber budding	-
Sivagangai (Tamil Nadu)/Southern/ Semi Arid Eco-Sub Region 8.1/Southern Zone TN 5 & 6/ 41 rainy days/ 563 mm rain	Field crops + dairy + poultry	0.8	14	Rice-Rice/ BG/ Brinjal/ Okra/ Maize/ Cucumber-G.nut/ BG/ Brinjal/ Pumpkin			Cow (2), Poultry (4)		Rice-Rice/ G.Nut/ BG/ Brinjal/ Pumpkin/ Okra/ Maize	-		Cow (2), Poultry (4)	-	

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
	Field crops + dairy	0.8	10	Rice-Rice/ BG/ Cucumber-G.Nut/ Pumpkin/ Blackgram			Cow (2)		Rice-Rice/ G.Nut/ Pumpkin/ Cucumber/ BG	-		Cow (2)	-	
XII. West Coast Plains and Ghats														
Palghar (Maha-rashtra)/North konkan coastal Zone/107 rainy days/2954 mm rain	Field crops + dairy (1-2)	0.39	24	Rice	Rice / cowpea	-	Cow (1) + Buffalo (1)	-	Rice	Rice / cowpea/ chilli	-	Cow (2) + Buffalo (1)	Kitchen Garden, Compost	-
XIII. Gujarat Plains and Hills														
Mehsana (Gujarat)/ north Gujarat agro climate zone /44.8 rainy days/551 mm rain	Field crops	0.95	2	Cotton/ fodder sorghum	Wheat/ mustard/ lucerne	Fodder sorghum	-	-	Cotton/ brinjal/ sorghum/ chilli	Castor/ wheat/ lucerne/ pearlmillet	Fodder sorghum/ pearlmillet/ cluster bean	Cow (2) + Buffalo (3) making	Kitchen Gardening, Compost	-
	Field crops + dairy (1-2)	0.97	15	Cotton/ castor/ pearlmillet/ sorghum/ rice/ clusterbean/ fodder sorghum/ lucern	Wheat/ mustard/ lucerne	Sorghum/ pearl millet/ fodder sorghum	Cow (1)+ Buffalo (2)	-	Cotton/ cluster bean/ castor/ sorghum/ lucern/ pearl millet/ tomato/ fodder maize/ brinjal/ cowpea/ okra/ chikori/ greengram	Wheat/ castor/ mustard/ oat/ lucerne/ chicory	Fodder sorghum/ pearl millet	Cow (1)+ Buffalo (2-3)	Compost making	-
	Field crops + dairy (3-4) + goat (40-41)	1.07	7	Fodder sorghum/ cotton/ peralmillet/ caster/ cluster bean/ rice/ gwar	Wheat/ lucerne/ tobacco	Sorghum/ lucerne/ pearl millet	Cow (1)+ Buffalo (2-3) + Goat (40-41)	-	Cotton/ cluster bean/ fodder sorghum/ castor/ bottle guard/ rice	Wheat/ lucerne/ cumin/ mustard/ fennel/ okrai/ chicory	Fodder sorghum / lucerne/ pearl millet	Cow (1) + Buffalo (2-3)	Compost making	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm	Existing components (As per benchmark, 2013) Crop (s)/Cropping system (s)					Improved /diversified model Crop (s)/Cropping system (s)					
				Kharif	*Rabi*	Summer	Livestock / household (including fisheries if any)	Product diversi-fication	*Kharif*	*Rabi*	Summer	Livestock / household (including fisheries	Product diversi-fication	Capacity building
Panchmahal (Gujarat)/middle gujarat III/44 rainfall days/ 1008mm rain	Field crops + dairy (2-3)	0.90	7	Rice/ maize/ pigeon pea	Maize/ wheat	Pearl millet	Cow (0-1) + Buffalo (2-3)	-	Rice/ maize/ pigeon pea/guar/ Bt.cotton	Maize/ Wheat/ Guar/ Cotton	Pearl millet	Cow (0-1) + Buffalo (2-3)	-	Package of practices for Bt. cotton and guar, rearing of calves, Importance of green fodder in animal nutrition, management of goatry and backyard poultry
	Field crops + dairy (1-2) + goat (3-4)	0.69	7	Rice/ maize/ pigeon pea	Maize/ wheat	Groundnut/ pearl millet	Cow (1-2) + Buffalo (1-2) + Goat (3-4)	-	Rice/ maize/ pigeon pea/ guar/ Bt.cotton/ castor	Maize/ Wheat/ Guar/ Cotton/ castor	Groundnut/ pearl millet	Cow (1-2)+ Buffalo (1-2) + Goat (3-4)	-	-do-
	Field crops + dairy (1-2) + goat (4-5) + Poultry (5-6)	1.06	7	Rice/ pigeon pea/ maize	Maize	Pearl millet	Cow (0-1) + Buffalo (1-2) + Goat (4-5) + Poultry (5-6)		Rice/ maize/ pigeon pea/ guar/ Bt.cotton	Maize/ guar/ cotton	Pearl millet	Cow (0-1) + Buffalo (2-3) + Goat (4-5) + Poultry (5-6)		-do-
	Field crops + goat (8) + Poultry (12)	0.84	1	Rice/ maize	Maize	Groundnut	Goat (8) + Poultry (12)		Rice/ maize/ cotton	Maize/ cotton	Groundnut	Goat (8)+ Poultry (12)		-do-
	Field crops + dairy (1) + Poultry (6)	0.84	1	Rice/ maize	Maize		Buffalo (1)+ Poultry (6)		Rice/ maize/ cotton	Maize/ cotton		Buffalo (1) + Poultry (6)		-do-
	Field crops + goat (3)	0.54	1	Rice/ maize	Maize	-	Goat (3)		Rice/ maize/ castor	Maize/ castor		Goat (3)		-do-

Table 7.4.3. Production (on equivalent basis of base crop), marketable surplus and economics of existing and improved farming systems in marginal households

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
Kangra (Himachal Pradesh)																	
FC	0.26	1	1417	0	7950	9050	7950	2365	108	6649	14731	13199	-	-	-	-	-
FC+D	0.70	14	6132 (598)	1789 (429)	17014 (1838)	56573 (6168)	4454 (4181)	9675 (442)	3309 (322)	7447 (214)	81613 (5792)	12315 (4251)	0.001***	0.082*	<0.001***	0.204	<0.001***
FC+D+G	0.67	9	5293 (747)	1754 (535)	18553 (2293)	44964 (7693)	32497 (5215)	9213 (552)	2769 (401)	7032 (267)	53928 (7224)	4165 (5302)	0.007***	0.038**	<0.001***	0.749	0.116
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	0.007***	<0.001***	0.175	<0.001***
CD [P = 0.05]	**FS 2 vs FS3**	1990	1426	6112	20506	13901		1471	1070	711	19254	14133					
Samba (Jammu and Kashmir)																	
FC+D	0.83	24	4872	2699	60985	60814	6486	8345	2995	5007	81813	69875	<0.001***	0.228	<0.001***	<0.001***	<0.001***
Ambedkarnagar (Uttar Pradesh)																	
FC	0.3	1	2024	960	14580	5660	-4980	4457	2208	23390	27864	2001	-	-	-	-	-
FC+D	0.38	11	6887 (885)	3026 (558)	37865 (2717)	40355 (6915)	-2621 (4742)	9200 (2061)	3195 (1425)	28978 (1747)	76820 (23006)	7766 (15496)	0.181	0.803	0.001***	0.075*	0.124
FC+D+G	0.38	8	6608 (1038)	3912 (655)	41368 (3186)	36397 (8109)	6904 (5561)	10262 (2416)	6478 (1671)	33955 (2048)	84055 (26977)	40540 (18171)	0.288	0.394	0.066*	0.202	0.310
Overall FS			**P value Significance - Existing vs Improved**										0.073*	0.325	0.001***	0.024**	0.136
CD [P = 0.05]	**FS2 vs FS3**	2877	1815	8833	22485	15419		6700	4633	5679	74802	50385					
South 24 Paragnas (West Bengal)																	
FC	0.56	2	11123 (2006)	8539 (1717)	57779 (10888)	46333 (9885)	22534 (9086)	17446 (2317)	12334 (2213)	48239 (13365)	85109 (18988)	28220 (18669)	0.211	0.183	0.074*	0.266	0.176
FC+D	0.39	8	4785 (1003)	2206 (858)	32870 (5444)	13462 (4942)	11238 (4543)	7348 (1158)	4419 (1106)	53774 (6682)	35820 (9494)	22200 (9334)	0.055*	0.092*	0.010**	0.083*	0.306
FC+D+F	0.46	1	9068	6703	48780	36351	14669	15922	10724	60369	58229	26785	-	-	-	-	-
FC+D+G	0.45	3	4497 (1638)	1919 (1402)	29589 (8890)	20018 (8071)	-9135 (7419)	8026 (1892)	4953 (1807)	47266 (10912)	51100 (15503)	12907 (15243)	0.099*	0.154	0.352	0.020**	0.099*
FC+D+G+P	0.26	1	7621	4840	35934	36466	10046	8855	4794	42960	64668	14562	-	-	-	-	-
FC+D+P	0.52	6	7880 (1158)	4236 (991)	51237 (6286)	23743 (5707)	-10104 (5246)	9891 (1338)	6146 (1278)	66910 (7716)	53899 (1096)	7806 (1077)	0.160	0.229	0.021**	0.035**	0.190

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
FC+G	0.67	1	14031	11637	85576	46318	24474	21151	16300	61480	69415	30302	-	-	-	-	-
FC+P	0.44	2	4290 (2006)	1678. (1717)	27117 (1088)	12413 (988)	11364 (908)	6515 (2317)	2956 (2213)	51093 (13365)	27091 (1898)	15620 (1866)	0.027**	0.327	0.013**	0.071*	0.723
Overall FS			**P value Significance - Existing vs Improved**										0.110	0.248	0.001***	0.004***	0.268
CD	FS1 vs FS2		4756	4071	25807	23430	21537	5493	5247	31678	45004	44249					
[P=0.05]	FS1vs FS4		5492	4701	29799	27054	24869	6343	6059	36579	51967	51095					
	FS1 vs FS6		4912	4205	26653	24198	22243	5673	5419	32717	46480	45701					
	FS1 vs FS8		6017	5150	32643	29636	27242	6948	6637	40070	56927	55972					
	FS2 vs FS4		4073	3486	22100	20064	18443	4704	4493	27128	38539	37893					
	FS2 vs FS6		3249	2781	17629	16005	14713	3753	3584	21640	30744	30228					
	FS2 vs FS8		4756	4071	25807	23430	21537	5493	5247	31678	45004	44249					
	FS4 vs FS6		4254	3641	23082	20956	19263	4913	4693	28334	40253	39578					
	FS4 vs FS8		5492	4701	29799	27054	24869	6343	6059	36579	51967	51095					
	FS6 vs FS8		4912	4205	26653	24198	22243	5673	5419	32717	46480	45701					
			Purnea (Bihar)														
FC+D+G	0.58	19	9908 (750)	7536 (741)	47111 (3974)	49793 (4526)	26199 (4769)	11929 (1276)	10231 (1190)	119423 (13899)	95291 (12636)	64738 (12147)	0.235	0.636	<0.001***	0.585	0.009***
FC+D	0.75	4	14777 (1635)	12439 (1614)	61971 (8661)	71024 (9864)	49983 (10394)	23212 (4230)	21214 (3946)	243575 (46097)	174240 (41909)	138265 (40286)	0.009***	0.010**	0.031**	0.038**	0.801
FC	0.50	1	4744	3144	15300	27400	13000	7960	6310	8500	47848	19998	-	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**										0.033**	0.803	<0.001***	0.948	0.010**
CD [P = 0.05]	**FS1 vs FS2**		3741	3694	19818	22570	23783	6844	6384	74581	67805	65179					
			Kanpur Dehat (Uttar Pradesh)														
FC	0.80	3	6617 (1777)	5771 (1389)	33933 (8713)	38850 (12597)	29550 (11873)	10569 (2321)	8608 (1858)	56823 (12259)	59439 (14378)	37858 (10706)	0.103	0.097*	0.160	0.075*	0.277
FC+D	0.85	8	10755 (1088)	6647 (851)	56343 (5336)	61426 (7714)	16778 (7270)	12988 (1421)	9807 (1138)	65571 (7507)	76869 (8805)	42306 (6556)	0.003***	0.025**	0.085*	0.026**	0.069*
FC+D+G	0.76	8	10649 (1088)	7966 (851)	55709 (5336)	61965 (7714)	31916 (7270)	13255 (1421)	9749 (1138)	68946 (7507)	77301 (8805)	38290 (6556)	0.002***	0.006***	0.002***	0.006***	0.102
FC+G	0.33	5	5860 (1377)	4636 (1076)	29760 (6749)	34700 (9758)	21240 (9196)	7944 (1798)	5912 (1439)	40560 (9495)	46820 (11137)	24469 (8293)	0.085*	0.192	0.048**	0.130	0.592

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
CD[P=0.05]	FS1 vs FS2		4347	3397	21312	30813	29040	5677	4545	29984	35169	26187	<0.001***	<0.001***	<0.001***	<0.001***	0.013**
CD[P=0.05]	FS1 vs FS3		4347	3397	21312	30813	29040	5677	4545	29984	35169	26187					
CD[P=0.05]	FS1 vs FS4		4705	3677	23067	33352	31432	6144	4919	32454	38066	28344					
CD[P=0.05]	FS2 vs FS3		3211	2509	15740	22757	21448	4193	3356	22145	25974	19341					
CD[P=0.05]	FS2 vs FS4		3673	2870	18007	26035	24537	4797	3840	25335	29715	22126					
CD[P=0.05]	FS3 vs FS4		3673	2870	18007	26035	24537	4797	3840	25335	29715	22126					
							Sirsa (Haryana)										
FC+D	0.58	23	3325	2631	79389	58235	29518	5550	4107	67433	75840	37671	<0.001***	<0.001***	0.046**	0.050**	0.005***
FC	0.40	1	1061	732	21900	21600	8100	1610	1031	14050	35497	9257	-	-	-	-	-
Overall FS			P value Significance - Existing vs Improved										<0.001***	<0.001***	0.040**	0.044**	0.005***
							Amritsar (Punjab)										
FC+D	1.08	24	14136	10023	83683	155589	94693	25260	19034	77632	161640	116476	<0.001***	0.053*	0.010**	0.010**	<0.001***
							Kabirdham (Chhatisgarh)										
FC	0.84	12	5777 (509)	4617 (466)	16862 (2083)	52463 (4594)	38545 (4270)	11115 (353)	9310 (346)	14783 (132)	55146 (4503)	46694 (4408)	0.495	0.898	0.404	0.661	0.184
FC+D	0.77	9	6913 (588)	5398 (538)	22267 (2405)	60689 (5305)	42509 (4931)	13259 (407)	11082 (399)	14922 (152)	68213 (5199)	59535 (5089)	0.392	0.684	0.003***	0.335	0.067*
FC+D+G	0.60	1	5233	3283	18500	44300	20900	5626	5031	15010	58691	50841	-	-	-	-	-
FC+D+G+P	0.60	1	4192	3346	13050	37250	27100	7312	6716	15320	80464	72664	-	-	-	-	-
FC+D+P	0.80	1	7800	6058	20390	73200	52310	5592	4970	14440	58817	50667	-	-	-	-	-
Overall FS			P value Significance - Existing vs Improved										0.374	0.449	0.010**	0.186	0.006***
CD[P=0.05]	FS 1 vs FS 2		1629	1488	6660	14688	13653	1128	105	20	4395	4092					
							Pakur (Jharkhand)										
FC	0.76	22	1392 (111)	376 (142)	10955 (810)	1969 (405)	7199 (1189)	2628 (27)	777 (16)	17390 (258)	8890 (235)	7621 (268)	<0.001***	0.010**	<0.001***	<0.001***	0.044**

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
FC+D	0.72	2	840 (369)	305 (471)	6925 (2687)	1475 (1345)	3875 (3945)	2219 (90)	709 (52)	13897 (855)	8294 (779)	6812 (889)	0.051*	0.089*	0.191	0.097*	0.316
Overall FS			P value Significance - Existing vs Improved										<0.001***	0.005***	<0.001***	<0.001***	0.026**
CD [P= 0.05]	FS1 vs FS2		798	1019	5821	2913	8545	195	114	1851	1687	1927					
			Dindori (Madhya Pradesh)														
FC	0.72	3	5538 (1395)	3998 (1038)	26567 (8387)	54831 (12953)	32208 (8850)	9250 (1377)	6904 (1156)	57793 (7269)	67076 (11319)	35412 (9077)	0.223	0.329	0.038**	0.630	0.906
FC+D	0.76	16	6527 (604)	4390 (450)	37890 (3632)	58062 (5609)	26644 (3832)	12820 (596)	8779 (501)	43549 (3147)	100640 (4901)	43310 (3930)	0.921	0.816	0.141	0.055*	0.086*
FC+D+G	0.73	2	11471 (1709)	9150 (1271)	44375 (10272)	124250 (15864)	90130 (10839)	17347 (1687)	13333 (1416)	40209 (8902)	164459 (13863)	106397 (11117)	0.394	0.345	0.874	0.267	0.196
FC+D+P	10.69	2	6145 (1709)	4307 (1271)	27100 (10272)	63222 (15864)	36205 (10839)	8326 (1687)	5983 (1416)	45767 (8902)	66629 (13863)	35004 (11117)	0.094*	0.116	0.167	0.037**	0.097*
FC+G	0.65	1	8729	7045	27000	101320	76560	3819	3026	29164	22386	11686	-	-	-	-	-
Overall FS			P value Significance - Existing vs Improved										0.924	0.989	0.016**	0.031**	0.031**
CD [P= 0.05]	**FS1 vs FS2**		3183	2368	19129	29543	20185	3141	2638	16578	25817	20703					
CD [P= 0.05]	**FS1 vs FS3**		4618	3436	27755	42866	29288	4558	3827	24054	37459	30039					
CD [P= 0.05]	**FS1 vsFS4**		4618	3438	27755	42866	29288	4558	3827	24054	37459	30039					
CD [P= 0.05]	**FS2 vs FS3**		3794	2823	22803	35218	24063	3744	3144	19763	30775	24679					
CD [P= 0.05]	**FS2 vs FS4**		3794	2823	22803	35218	24063	3744	3144	19763	30775	24679					
CD [P= 0.05]	**FS3 vs FS4**		5059	3763	30404	46957	32083	4993	4193	26350	41034	32906					
			Angul (Odhisha)														
FC	0.80	1	4960	3160	25900	23700	5700	9288	7120	43782	63008	45383					
FC+D	0.83	14	6006 (1093)	3811 (537)	33116 (3021)	26939 (8721)	4993 (2813)	7399 (754)	5000 (678)	42073 (3613)	42714 (6237)	17926 (5041)	0.002***	0.004***	0.001***	0.002***	0.001***
FC+D+P	0.89	8	17622 (1445)	6127 (711)	50385 (3996)	125831 (11536)	10879 (3721)	18180 (998)	8636 (896)	59587 (4780)	175538 (8250)	44149 (6668)	0.004***	0.003***	0.024**	0.005***	0.001***
FC+P	0.80	1	6245	3825	27300	35150	10950	6930	4745	41952	44408	18183					

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
Overall FS			**P value Significance - Existing vs Improved**										0.249	<0.001***	<0.001***	. 0.502	<0.001***
CD [P = 0.05]	**FS2 vs FS3**		3768	1853	10417	30074	9700	2601	2336	12461	21508	17383					
								Katni (Madhya Pradesh)									
FC	0.70	3	3720 (1511)	2833 (1594)	16967 (3699)	20233 (15508)	11366 (16712)	7838 (1059)	4597 (868)	30673 (206)	75135 (14203)	31385 (11713)	0.136	0.182	0.034**	0.145	0.121
FC+D	0.71	20	5195 (585)	3361 (617)	16505 (1433)	35443 (6006)	17100 (6472)	5980 (410)	5445 (336)	29340 (80)	51395 (5501)	44168 (4537)	0.298	0.015**	<0.001***	0.071*	0.006***
FC+D+G	1.00	1	13920	10350	14550	124650	88950	8235	6806	29340	81835	62535	-	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**										0.216	0.016**	<0.001***	0.036**	0.005***
CD [P = 0.05]	**FS1 vsFS2**		3360	3545	8226	34489	37166	2362	1935	459	31674	26122					
								Udaipur (Rajasthan)									
FC	0.70	2	4020 (2084)	2160 (1988)	5900 (3455)	44350 (24870)	21100 (23802)	5889 (1355)	3217 (1167)	26446 (9249)	45929 (13175)	34867 (11668)	0.402	0.056*	0.208	0.888	0.426
FC+D	0.60	7	4948 (1114)	2143 (1063)	13014 (1847)	48836 (13294)	13771 (12723)	5635 (724)	3948 (624)	4996 (4944)	169311 (7042)	27404 (6237)	0.406	0.625	<0.001***	0.041**	0.003***
FC+D+G	0.66	15	7814 (761)	5876 (726)	14760 (1262)	82913 (9081)	60428 (8691)	9013 (495)	8108 (426)	51493 (3377)	120202 (4811)	87428 (4261)	0.433	0.081*	<0.001***	0.002***	<0.001***
Overall FS			**P value Significance - Existing vs Improved**										0.833	0.093*	<0.001***	<0.001***	<0.001***
CD [P = 0.05]	**FS1 vs FS2**		4913	4688	8147	58645	6126	3196	2753	21810	31066	27514					
CD [P = 0.05]	**FS1 vs FS3**		4613	4401	7649	55061	52695	3000	2584	20477	29167	25832					
CD [P = 0.05]	**FS2 vs FS3**		2805	2676	46512	33481	32042	1824	1571	12451	17736	15708					
								Aurangabad (Maharashtra)									
FC	0.47	21	1665 (360)	1413 (364)	22745 (2468)	52170 (16254)	40842 (16619)	3677 (209)	3181 (164)	85189 (5730)	80291 (7420)	57936 (6073)	<0.001***	<0.001***	<0.001***	0.152	0.381
FC+D	0.75	3	1264 (952)	800 (964)	21405 (6529)	35459 (43004)	14615 (43971)	3594 (553)	3058 (434)	88096 (15160)	73641 (19632)	49521 (16070)	0.142	0.084*	0.081*	0.340	0.270
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	<0.001***	0.093*	0.263
CD [P = 0.05]	**FS 1 vs FS2**		2110	2136	14476	95342	97485	1225	961	33610	43525	35629					

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
Pune (Maharashtra)																	
FC+D	0.53	24	7521	6288	85567	49805	27612	13127	11111	104818	81664	67557	0.008***	0.039**	<0.001***	0.004***	0.001***
Amravati (Maharashtra)																	
FC+D	0.87	23	2725 (269)	2579 (261)	25328 (452)	51377.75 (7423)	33361 (5830)	5337 (266)	4767 (233)	33226 (3397)	96523 (5039)	65763 (4183)	0.742	0.214	0.039**	0.470	0.893
FC+G	0.80	3	2049 (695)	2049 (674)	22700 (3748)	37067 (19165)	3706 7 (15053)	3980 (686)	3841 (602)	23408 (8770)	71523 (13011)	67403 (10801)	0.763	0.601	0.808	0.768	0.561
FC+P	0.80	1	6147	5860	29000	54250	44300	7391	7007	43855	76725	63845	-	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**										0.374	0.090*.	0.064*	0.233	0.660
CD [P = 0.05]	**FS1 vs FS2**	1550	1504	8358	42741	33571	1529	1343	19559	29017	24087						
Warangal (Telangana)																	
FC	1.00	1	6300	5100	61500	14100	-300	8024	6149	70525	27145	4399	-	-	-	-	-
FC+D	0.90	6	11094 (3508)	9708 (3453)	69763 (10068)	63362 (37698)	46728 (37174)	15707 (4302)	13475 (2093)	26699 (10381)	95705 (45926)	68243 (18184)	<0.001***	<0.001***	.001***	0.004***	0.006***
FC+D+G	0.87	3	29172 (4961)	27189 (4883)	121500 (14239)	228567 (53313)	204767 (52573)	53115 (6084)	37419 (2961)	195264 (14680)	282709 (64949)	257192 (25716)	0.064*	0.091*	0.042**	0.789	0.185
FC+D+G+P	0.92	6	30477 (3508)	28081 (3453)	122983 (10068)	243271 (37698)	213987 (37174)	53139 (4302)	38923 (2093)	180114 (10381)	282938 (45926)	21639 (18184)	0.035**	0.002***	0.003***	0.731	0.021**
FC+D+P	0.83	8	12129 (3038)	10258 (2990)	77584 (8719)	68523 (32647)	45516 (32194)	17644 (3725)	14827 (1813)	111557 (8990)	105145 (39773)	70023 (15748)	0.001***	0.003***	0.001***	0.009***	0.042**
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	<0.001***	0.018**	0.001***
CD [P = 0.05]	**FS2 vs FS3**		12717	12517	36500	136663	134766	15596	7589	37632	166490	65921					
CD [P = 0.05]	**FS2 vs FS4**		10383	10220	29802	111585	110036	12733	6196	30726	135939	53824					
CD [P = 0.05]	**FS2 vs FS5**		9713	9560	27877	104378	102929	11911	5796	28742	127159	50348					
CD [P = 0.05]	**FS3 vs FS4**		12717	12517	36500	136663	134766	15596	7589	37632	166490	65921					
CD [P = 0.05]	**FS3 vs FS5**		12175	11985	34946	130845	129028	14931	7266	36030	159402	63115					
CD [P = 0.05]	**FS4 vs FS5**		9713	9560	27877	104378	102929	2696	2264	14230	22161	17771					

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
Kolar (Karnataka)																	
FC+D	0.91	12	22608 (3760)	21424 (3713)	126705 (19368)	144587 (31527)	130379 (30879)	48794 (11889)	38219 (12703)	190764 (38988)	394991 (131900)	268087 (143540)	0.001***	0.013**	0.006***	0.001***	0.024**
FC+D+G	1.00	5	27419 (5825)	26399 (5752)	166573 (30005)	176679 (48841)	164442 (47837)	98855 (18418)	83541 (19679)	278467 (60400)	909281 (204340)	725222 (222372)	0.074*	0.150	0.189	0.121	0.248
FC+D+G+P	1.50	6	36445 (5318)	34112 (5251)	152346 (27391)	270762 (44585)	242771 (43669)	74812 (16813)	53538 (17965)	285540 (55138)	613039 (186536)	357753 (202997)	<0.001***	0.023**	0.001***	<0.001***	0.112
FC+D+P	0.30	1	17806	15676	52140	161528	135968	26856	26121	86600	239668	230844	-	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	0.003***	<0.001***	<0.001***	0.026**
CD [P = 0.05]	**FS1 vs FS2**		14463	14282	4496	121261	118770	45728	48859	149961	507332	552103					
CD [P = 0.05]	**FS1 vs FS3**		13586	13416	69977	113905	111565	42954	45895	140864	476555	518610					
CD [P = 0.05]	**FS2 vs FS3**		16453	16247	84747	137946	135111	52020	55582	170595	577137	628067					
Gadag (Karnataka)																	
FC+D	1.14	24	932	893	15169	47291	44670	3230	3078	10087	115589	105407	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Dharmapuri & Krishnagiri (Tamil Nadu)																	
FC+D	0.67	22	5897 (651)	4506 (636)	87934 (7752)	88354 (12728)	21571 (7165)	11929 (1276)	10231 (1190)	119423 (13899)	95291 (12636)	64738 (12147)	<0.001***	<0.001***	0.011**	0.628	0.005***
FC+D+P	0.80	2	12843 (2158)	10960 (2109)	141129 (25711)	140458 (42215)	60224 (23762)	23212 (4230)	21214 (3946)	243575 (46097)	174240 (41909)	138265 (40286)	0.080*	0.093*	0.023**	0.231	0.088***
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	0.003***	0.489	0.002***
CD [P = 0.05]	**FS1 vs FS2**		4675	4569	55693	91442	51472	9163	8547	99850	90779	87263					
Srikakulam (Andhra Pradesh)																	
FC	0.20	1	6300	5100	61500	14100	-300	8282	6294	67650	18625	8770					
FC+D	0.63	6	11756 (3497)	10370 (3444)	69763 (10103)	71312 (38157)	54678 (37622)	13404 (734)	11673 (643)	81523 (4259)	72511 (5988)	59200 (4907)	<0.001***	<0.001***	0.001***	<0.001***	<0.001***
FC+D+G	0.73	3	29172 (4946)	27189 (4870)	121500 (14288)	228567 (53962)	204767 (53206)	30224 (1039)	27681 (909)	131430 (6024)	231912 (8468)	208542 (6940)	0.074*	0.084*	0.013**	0.115	0.137
FC+D+G+P	0.73	6	30463 (3497)	28165 (3444)	120983 (10103)	244577 (38157)	217002 (37622)	32417 (734)	29668 (643)	133815 (4259)	259669 (5988)	222959 (4907)	0.003***	0.003***	<0.001***	0.012**	0.016***

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
FC+D+P	0.62	8	12146 (3029)	10359 (2982)	77584 (8750)	68161 (33045)	46727 (32582)	14663 (636)	12387 (557)	96654 (3689)	83785 (5186)	53012 (4250)	.002***	0.004***	0.001***	0.012**	0.020**
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	<0.001***		
<0.001***<0.001***																	
CD [P= 0.05]	**FS2 vs FS3**		12679	12485	36626	138326	136388	2662	2330	15441	21707	17790					
CD [P= 0.05]	**FS2 vs FS4**		10352	10194	29905	112943	111360	2174	1903	12608	17724	14526					
CD [P= 0.05]	**FS2 vs FS5**		9684	9535	27974	105648	104168	2033	1780	11793	16579	13587					
CD [P= 0.05]	**FS3 vs FS4**		12679	12485	36626	138326	136388	2662	2330	15441	21707	17790					
CD [P= 0.05]	**FS3 vs FS5**		12139	11953	35067	132437	130582	2549	2231	14784	20783	17033					
CD [P= 0.05]	**FS4 vsFS5**		9684	9535	27974	105648	104168	2033	1780	11793	16579	13587					
			Kendrapara (Odhisha)														
FC+D	0.88	8	6225 (582)	3478 (556)	28950 (3606)	39520 (4698)	9314 (4616)	9079 (722)	5790 (668)	37058 (2803)	72574 (6620)	32548 (5651)	<0.001***	<0.001***	0.001***	<0.001**	<0.001***
FC+D+F	1.02	5	5607 (736)	2928 (704)	25331 (4561)	36343 (5942)	6876 (5839)	6985 (913)	3974 (846)	31325 (3546)	63124 (8373)	17915 (7148)	0.005***	0.014**	0.190	0.004***	0.075*
FC+D+G	1.09	7	7081 (622)	4182 (595)	33633 (3855)	44407 (5022)	12517 (4934)	8078 (772)	4616 (715)	34034 (2997)	64348 (7077)	21708 (6041)	0.058*	0.300	0.890	0.019**	0.196
FC+D+G+F	1.00	2	5854 (1164)	2309 (1113)	35194 (7211)	29272 (9396)	-9730 (9232)	6477 (1444)	3127 (1337)	28669 (5607)	73069 (13239)	11457 (11302)	0.408	0.433	0.010**	0.329	0.265
FC+D+G+P	0.89	2	9780 (1164)	5101 (1113)	55381 (7211)	52248 (9396)	779 (9232)	12571 (1444)	7469 (1337)	59019 (5607)	91838 (13239)	30607 (11302)	0.040**	0.041**	0.493	0.026**	0.022**
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	0.017**	<0.001***	<0.001***
CD [P= 0.05]	**FS1 vs FS2**		1964	1878	12169	15855	15579	2437	2256	9461	22340	19071					
CD [P= 0.05]	**FS1 vsFS3**		1783	1705	11047	14394	14143	1783	1705	11047	14394	14143					
CD [P= 0.05]	**FS1 vs FS4**		3380	3129	13120	30980	26447	3380	3129	13120	30980	26447					
CD [P= 0.05]	**FS1 vs FS5**		3380	3129	13120	30980	26447	3380	3129	13120	30980	26447					

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
CD [P = 0.05]	FS2 vs FS3		2017	1929	12498	16285	16001	2017	1929	12498	16285	16001					
CD [P = 0.05]	FS2 vs FS4		2882	2756	17859	23269	22863	3577	3311	13885	32787	27989					
CD [P = 0.05]	FS2 vs FS5		2882	2756	17859	23269	22863	3577	3311	13885	32787	27989					
CD [P = 0.05]	FS3 vs FS4		2762	2641	17114	22299	21910	3428	3173	13306	31420	26822					
CD [P = 0.05]	FS3 vs FS5		2762	2641	17114	22299	21910	3428	3173	13306	31420	26822					
CD [P = 0.05]	FS4 vs FS5		3445	3294	21345	27812	27327	4275	3957	16596	39187	33453					
Sivagangai (Tamil Nadu)																	
FC+D	0.80	10	]7988 (1319)	6612 (1329)	60877 (4103)	74951 (38121)	17964 (14943)	9910 (1685)	7882 (1667)	42836 (5128)	93707 (18263)	65419 (18069)	0.133	0.336	<0.001***	0.297	0.014**
FC+D+P	0.80	14	11692 (1115)	10051 (1124)	71746 (3468)	144270 (32218)	47531 (12629)	14792 (1424)	12515 (1409)	60427 (4334)	141374 (15435)	109947 (15271)	0.068*	0.163	0.007***	0.920	0.009***
Overall FS			P value Significance - Existing vs Improved										0.017**	0.084*	<0.001***	0.734	<0.001***
CD [P = 0.05]	FS1 vs FS2		3581	3610	11141	103511	40577	4576	4528	13925	49591	49062					
Palghar (Maharashtra)																	
FC+D	0.39	24	4931	3113	44267	14900	-6915	11892	9721	80814	67839	40697	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Mehsana (Gujarat)																	
FC	0.95	2	4041 (2488)	2271 (2281)	60100 (28186)	101550 (90455)	30750 (82058)	7883 (4626)	7098 (2006)	188700 (43052)	166067 (204426)	130741 (61658)	0.487	0.430	0.318	0.624	0.509
FC+D	0.97	15	7225 (908)	5606 (833)	103270 (10292)	185740 (33029)	120980 (29963)	14251 (1689)	10014 (732)	128056 (15720)	192629 (74645)	152456 (22514)	0.967	0.284	0.189	0.948	0.224
FC+D+G	1.07	7	4728 (1330)	3292 (1219)	70141 (15066)	118988 (48350)	61565 (43861)	9010 (2472)	6758 (1072)	119330 (23012)	192367 (109270)	98240 (32957)	0.116	0.505	0.086*	0.130	0.244
Overall FS			P value Significance - Existing vs Improved										0.932	0.710	0.012*	0.956	0.273
CD [P = 0.05]	FS1 vs FS2		5510	5051	62403	200234	181689	10242	4443	95314	452582	136506					
	FS1 vs FS3		5868	5380	66466	213271	193519	10909	4732	101520	482048	145394					
	FS2 vs FS3		3350	3071	37946	121756	110480	6228	2702	57958	275201	83005					

Farming System	Area (ha)	No. of Households	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
Panchmahal (Gujarat)																	
FC+D	0.90	7	8547 (1227)	6561 (1194)	69764 (7727)	32804 (8015)	8976 (7795)	12906 (1894)	11115 (1830)	82572 (7575)	98118 (21500)	73036 (20690)	<0.001***	<0.001***	0.002***	<0.001***	<0.001***
FC+D+G	0.69	7	9488 (1227)	7034 (1194)	73178 (7727)	40684 (8015)	11228 (7795)	16421 (1894)	14390 (1830)	89764 (7575)	140143 (21500)	111701 (20690)	0.032**	0.021**	0.005***	0.021**	0.016**
FC+D+G +P	1.06	7	11035 (1227)	8673 (1194)	76200 (7727)	56225 (8015)	27875 (7795)	15264 (1894)	12748 (1830)	90500 (7575)	123208 (21500)	87978 (20690)	0.001**	0.004***	0.007***	<0.001***	<0.001***
FC+D+P	0.84	1	4633	3183	35400	20200	2800	11766	10423	60450	104280	85465	-	-	-	-	-
FC+G	0.54	1	3233	2675	16900	21900	15200	5962	5023	33200	50270	37120	-	-	-	-	-
FC+G +P	0.84	1	8149	6682	40200	57592	39988	13535	11090	60060	129425	95201	-	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
CD [P = 0.05]			3648	3549	22959	23816	23161	5630	5438	22508	63881	61476					

Note: FC: Field crops, D: Dairy, P: Poultry,G:Goat, F: Fish
* indicates significance at 10% level
* indicates significance at 5% level
*** indicates significance at 1% level
- Values in ( ) indicates standard error of mean values
- The farming system with only one household were not considered for ANOVA as well as for paired t test.

Nainital (Uttarakhand): Four farming systems viz; field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry and field crops + dairy + poultry were found among which field crops + dairy system is practiced by 68 % households having mean area of 0.33 ha. Diversification of cropping systems, livestock and products along with suitable capacity building programmes were undertaken during the year.

Eastern Himalaya

Ambedkarnagar (Uttar Pradesh): Three farming systems *viz*; field, crops, field crops + dairy and field crops + dairy + goat was found among which field crops + dairy was practiced by 55 % farm households having mean area of 0.38 ha while field crops + dairy + goat system was found in 40 % households having mean area of 0.38 ha. Diversification of cropping and livestock components resulted in significantly higher return in field crop + dairy system and reduction in cost in both field crop + dairy and field crop +dairy +goat systems.Among the systems, significantly higher production (10262 kg) and return (Rs 84,055) was observed in field crops +dairy + goat system while the cost was lesser in field crop + dairy system (Rs 28,978) due to diversification of existing systems. Diversification of cropping systems alone resulted in improvement in production (33 %), marketable surplus (5.5 %), reduction in cost (24%), increased return (90%) and profit in field crop + dairy system.

Lower Gangetic Plains

South 24 Paragnas (West Bengal): Eight farming systems *viz;* , field crops, field crops + dairy, field crops + dairy + fish, field crops + dairy + goat, field crops + dairy + goat + poultry, field crops + dairy + poultry, field crops + goat and field crops + poultry were found among which field crops + dairy system is practiced by 33 % households having mean area of 0.39 ha followed by field crops + dairy +poultry by 25 % households having mean area of 0.52 ha. Significantly higher production (7348 kg), marketable surplus (4419 kg), cost (Rs 53,774), and return (Rs 35,820) was observed with diversification in field crops + dairy compared to existing system. However, the profit due to diversification was not significant. Similarly, in case of field crop + dairy + poultry, cost, return and profit were significantly higher due to diversification. Among the farming systems, it was observed that cost and returns were significant with field crop + dairy + goat +poultry recording lower cost (Rs 42,960/ households) and field crop system recoding higher returns (Rs 85,109/ households).

Middle Gangetic Plains

Purnea (Bihar): Three farming systems *viz;*, field crops, field crops + dairy and field crops + dairy + goat was found among which 79% households were having the field crops + dairy + goat system. Diversification of existing farming systems recorded significantly higher cost (Rs 1,19,423) and profit (Rs 64,738) in field crops + dairy + goat compared to existing system. Similarly, diversification of field crop + dairy system resulted in significantly higher production (23212 kg), marketable surplus (21214 kg), cost (Rs 2, 43,575) and net returns (Rs 1, 74,240). Among the farming systems, significantly higher production and profit was observed with diversification of field crops + dairy while lower cost was with field crops + dairy + goat.

Upper Gangetic Plain

Kanpur Dehat (Uttar Pradesh): Four farming systems *viz;,* field crops, field crops + dairy, field crops + dairy + goat and field crops + goat were found among which field crops + dairy and field crops + dairy + goat were practiced by 66 % households. Diversification of existing systems resulted in significantly higher production, marketable surplus, returns and profit in both the dominant farming systems. The improvement was found to be 21, 47,25 and 1.5 times respectively for field crop + dairy and 24, 22, 24, 19% respectively for field crops + dairy + goat system. Among the farming systems, significantly higher production, (12988 kg), marketable surplus (9807 kg) and profit (Rs 42,306) was observed with diversification of field crop + dairy system from 0.85

ha. However, higher return was observed in field crops + dairy + goat (Rs 77301 from 0.76 ha). Lower cost was found to be in field crop + goat system (Rs 40560 from 0.33 ha).

Trans Gangetic Plains

Sirsa (Haryana): Two farming systems *viz;* field crops and field crops + dairy was found among which 95 % households were having field crops + dairy system having mean area of 0.58 ha. Diversification of field crops + dairy system with cropping systems resulted in improvement in production (66 %), marketable surplus (56 %) , reduction in cost (16%) , return (30 %) and profit (27 %) for the households. Among the farming systems, higher production, marketable surplus, returns and profit were observed in field crops + dairy system.

Amritsar (Punjab): Only one farming system *viz*;, field crops + dairy was observed in all the households having mean area of 1.08 ha. Improvement of existing system with improved practices of crops and livestock resulted in significantly higher production (78%), increased return (3 %) and profit (23 %).

Eastern plateau and hills

Kabirdham (Chhatisgarh): Five farming systems namely field crops, field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry and field crops + dairy + poultry were found among which field crops alone was practiced by 50% households having mean area of 0.84 ha followed by field crops + dairy by 37.5 % households having mean area 0.77 ha. Significantly lower cost (32 %) and higher profit (40%) was observed in field crops + dairy system. Improvement in production and marketable surplus in the same system was observed by 91 and 105 % due to diversification of existing cropping systems. Among the farming systems, performance of field crops + dairy system was found to be significantly higher in terms of production, marketable surplus, lower cost, returns and profit compared to field crops alone.

Pakur (Jharkhand): Two farming systems namely field crops and field crops + dairy were found among which 91% households were having the field crops + dairy system with mean area of 0.76 ha. Diversification of cropping systems in field crops alone system resulted in significantly higher production, marketable surplus, cost, return and profit. Among the farming systems higher improvement in production (164 %), marketable surplus (132 %) returns (4 times) and profit (75%) was observed in field crops + dairy system.

Dindori (Madhya Pradesh): Five farming systems namely field crops, field crops + dairy, field crops + dairy + goat, field crops + dairy + poultry and field crops + goat were found among which 66% farm households were having field crops + dairy system with mean area 0.76 ha. Diversification resulted in significantly higher return and profit in field crops + dairy and field crops + dairy + poultry farming systems. The improvement in production (96%), marketable surplus (99 %) and profit (62 %) was observed in field crops + dairy system. Among the farming systems, though production and marketable surplus was non-significant, cost, return and profit was significant. Lower cost (Rs 40,209), higher returns (Rs 1,64,459) and profit (Rs 1,06,397) was observed in field crops + dairy + goat system in 0.73 ha.

Angul (Odisha): Four farming systems namely field crop, field crop + dairy, field crops + dairy + poultry and field crops + poultry were found among which 58% households were having field crops + dairy with mean area 0.83 ha followed by 33 % households having field crops + dairy + poultry system with 0.89 ha as mean area. Diversification of field crops + dairy system resulted in improvement in production (23 %), marketable surplus (31%), cost (27%), returns (58 %) and profit (3.5 times). The same was observed to be 3,40, 18, 39 and 4 times in case of field crops + dairy + poultry system. Among these two systems, significantly higher marketable surplus, cost and returns was observed in field crops +dairy + poultry system compared to field crop + dairy system.

Central Plateau and hills

Katni (Madhya Pradesh): Three farming systems *viz;*, field crops, field crops + dairy and field crops + dairy + goat were found among which 83 % households were having field crops + dairy farming system. Diversification resulted in significantly higher marketable surplus, cost, return and profit in field crops + dairy system. The improvement was found to be 15, 62,77,45 and 2.5 times in production, marketable surplus, cost, returns and profit respectively. In case of field crops alone system, only cost was significantly differing between existing and improved system while other parameters were non-significant. Among the farming systems, significantly higher marketable surplus (5445 kg), lower cost (Rs 29,340) and higher profit (Rs 44,168) was observed with diversification approach in field crops + dairy system while significant higher returns (Rs 75,135) was observed in field crop alone due to diversification.

Udaipur (Rajasthan): Three farming systems *viz;* field crops, field crops + dairy and field crops + dairy + goat were found among which 62.5 % households were having the field crops + dairy + poultry system with mean area of 0.66 ha followed by 29% households having field crops + dairy with mean area of 0.60 ha. Significantly higher marketable surplus, cost, return and profit were observed under diversification of field crops + dairy + goat system. The improvement was found to be 15,37, 3 times, 44 and 44% in production, marketable surplus, cost, returns and profit respectively. Among the farming systems, significantly higher marketable surplus, returns and profit were observed in field crops + dairy + goat system while lower cost was observed in field crops (Rs 26,446 in 0.70 ha).

Western Plateau and hills

Aurangabad (Maharashtra): Two farming systems namely field crops and field crops + dairy were found among which 87.5 % households were having field crops alone with mean area of 0.47 ha. Significantly higher production, marketable surplus, and cost was observed in field crops alone system due to diversification. The improvement was found to be 120 %, 225 % and 3 times respectively. Field crops + dairy record significantly higher marketable surplus (3.8 times), and cost (4 times). Among the farming systems, field crops alone was found to be better compared to field crop + dairy in terms of production, marketable surplus, cost and returnsdue to diversification.

Pune (Maharashtra): All the households were having field crops + dairy farming system with mean area of 0.53 ha. Significantly higher production (74 %), marketable surplus (76 %) , cost (22 %), return (63 %) and profit (2.5 times) was recorded due to diversification of cropping systems and livestock component in field crops + dairy system.

Amravati (Maharashtra): Three farming systems *viz;*, field crops + dairy, field crops + goat and field crops + poultry were foundamong which 83% households were having field crops + dairy system with mean area of 0.87 ha followed by 12.5 % households with field crops + goat having mean area of 0.80 ha. Only cost was significantly different between existing and improved farming system for field crops + dairy while all other parameters were non-significant. Among the farming systems, significantlyhigher marketable surplus was recorded in field crops + poultry, while lower cost was observed in field crops + goat system.

Southern Plateau and hills

Warnagal (Telangana): Five farming systems *viz;*, field crops, field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry andfield crops + dairy + poultry were found among which 33 % households were having field crops + dairy + poultry having mean area of 0.83 ha followed by 25% households each of field crops + dairy (mean area 0.90 ha) and field crops + dairy + goat + poultry (mean area 0.92 ha). Significantly higher production (45 %), marketable surplus (44 %), cost (43 %), returns (53 %) and profit (53 %) due to diversification approach were observed in field crops + dairy + poultry system. Similar trend was

also observed in field crops + dairy and field crops + dairy + goat + poultry systems. Among the farming systems, after diversification, higher production (53139 kg) marketable surplus (38923 kg) returns (Rs 2,82,938) and profit (Rs 2,18,639) was observed in field crops + dairy + goat + poultry. Lower cost was observed field crops + dairy system.

Kolar (Karnataka): Four farming systems namely field crops + dairy, field crops + dairy + goat, field crops + dairy +goat + poultry and field crops + dairy + poultry were observed among which 50% households were having field crops + dairy system with mean area of 0.91 ha. Significantly higher production (2 times), marketable surplus (1.7 times), cost (1.5 times), returns (2.7 times) and profit (2 times) was observed due to diversification of field crops + dairy system. The higher returns and profit are due to growing of vegetables and mulberry in the farming system. Similar results were also observed in other farming systems such as field crops + dairy + goat and field crops + dairy + goat + poultry. Among the farming systems field crops + dairy + goat system recorded higher production (98 855 kg), marketable surplus (83541 kg), returns (Rs 9,09,281) and profit (Rs 7,25,222) with diversification. Lower cost was observed in the field crops + dairy + poultry system (Rs 86,600).

Gadag (Karnataka): Only one farming system of field crops + dairy was observed with mean area of 1.14 ha. Significantly higher production (3.4 times), marketable surplus (3.4 times), cost (6 times), return (2.4 times) and profit (2.3 times) was observed with diversification of field crops + dairy system compared to existing system.

Dharmapuri / Krishnagiri (Tamil Nadu): Two farming systems namely field crops + dairy and field crops + dairy + poultry were found among which 92% households were having field crops + dairy system with mean area of 0.67 ha. Significantly higher production (11929 kg), marketable surplus (10231 kg), return (Rs 95,291) and profit (Rs 64,738) were recorded with diversification than existing system in field crops + dairy system. The cost also increased by 35 %. Similarly, under field crops + dairy + poultry system, significant improvement in production, marketable surplus, cost and profit was observed. Among the two farming systems, diversification approach resulted in higher production, marketable surplus and profit in field crops + dairy + poultry. However, the cost was lower in field crops + dairy system (Rs 1,19,423).

East cost plains and hills

Srikakulam (Andhra Pradesh): Five farming systems namely field crops, field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry and field crops + dairy + poultry were found among which 33 % households were having field crops + dairy + poultry having mean area of 0.62 ha followed by 25 % each of field crops + dairy and field crops + dairy + goat + poultry having mean area of 0.63 and 0.73 ha respectively. Significantly higher production (20 %), marketable surplus (19 %), cost (24 %), returns (22 %) and profit (13 %) were observed due to diversification of field crops + dairy + poultry system. Similar trend was also observed in field crops + dairy and field crops + dairy + goat + poultry systems. Among the different farming systems, due to diversification of existing systems, significantly higher production (32417 kg), marketable surplus (29668 kg), return (Rs 2,59,669) and profit (Rs 2,22,959) was obtained from 0.73 ha area of field crops + dairy + goat + poultry system. Lower cost was recorded in field crop alone system (Rs 67,650 from 0.20 ha area).

Kendrapara (Odisha): Five farming systems namely field crops + dairy, field crops + dairy + fish, field crops + dairy + goat, field crops + dairy + goat + fish and field crops + dairy + goat + poultry were found among which 33 % households were having field crops + dairy (mean area 0.88 ha) followed by field crops + dairy + goat having mean area of 1.09 ha. Diversification of existing systems resulted in significantly higher production (45 %), marketable surplus (66 %), cost (28 %), returns (83 %) and profit (3.5 times) in field crops + dairy system. Similar trend was also observed in all other systems with varying degree of improvement.

Higher gain in profit due to diversification was observed in field crops + dairy + goat + poultry system. Among the various faming systems, higher production, marketable surplus, return and profit was observed in field crops + dairy + goat + poultry system due to diversification of existing systems. Lower cost was observed in field crops + dairy + goat + fishery system (Rs 28,669 in 1 ha).

Sivagangai& Pudukottai (Tamil Nadu): Two farming systems namely field crops + dairy + poultry and field crops + dairy were found among which 58 % households were having field crops + dairy + poultry with mean area of 0.80 ha. Diversification of existing systems, resulted in significantly higher production and profit in field crops + dairy + poultry system while only profit was significant in field crops + dairy system. However, in both the systems, the improvement of existing system through diversification resulted in significant reduction in cost (30 and 16 % respectively in field crops + dairy and field crops + dairy + poultry). Among the systems, diversification resulted in significantly higher production, marketable surplus, reduction in cost and profit in field crops + dairy + poultry system compared to field crops + dairy system.

West coast plains and ghats

Palghar (Maharashtra): Only one farming system of field crops + dairy was observed with mean area of 0.39 ha. Improvement of existing farming systems with critical interventions and diversification approach resulted in significant improvement in production (14 %) , marketable surplus (3 times), cost (82 %), returns (4.5 times) and from loss to profit (Rs 40,697) in field crops + dairy system.

Gujarat plains and hills

Mehsana (Gujarat): Three farming systems namely field crops, field crops + dairy and field crops + dairy + goat were found among which 62.5 % households were having field crops + dairy with mean area of 0.97 ha followed by field crops + dairy + goat in 29% households having area of 1.07 ha. The interventions and diversification were not significant in all the farming systems except significant cost increase in field crops + dairy + goat system. Among the different farming systems, diversification resulted in higher production, marketable surplus, return and profit in field crops + dairy system compared to other systems. Lower cost of the system was observed in field crops + dairy + goat.

Panchmahal: Six farming systems *viz;,* field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry, field crops + goat + poultry,field crops + dairy + poultry and field crops + goat were found among which the first three farming systems were found in each 29% of households having mean area of 0.90, 0.69 and 1.06 ha respectively significantly higher production, marketable surplus, cost, returns and profit was observed in all the 3 dominant farming systems namely field crops + dairy, field crops + dairy + goat and field crops + dairy + goat + poultry. The higher improvement in production (73 %), marketable surplus (104%), returns (244 %) and profit (8-10 times) was observed in field crops + dairy + goat due to diversification. Among the farming systems, performance of field crops + dairy + goat was found to be significantly better in terms of production, marketable surplus, return and profit. The cost of diversification was only marginally (4 %) higher in field crops + dairy + goat than field crops + dairy and field crops + dairy + goat + poultry system.

The results across the locations are summarized below

- The number of farming systems in different districts varied from 1 to 8. Presence of maximum of 8 farming systems was observed in South 24 Paragnas district (West Bengal) and minimum of one farming systems in 5 districts namely Samba (Jammu & Kashmir) , Amritsar (Punjab), Palghar and Pune (Maharashtra) and Gadag (Karnataka).

- Existence of six farming systems at Panchmahal (Gujarat) and 5 farming systems at Kabirdham (Chhatisgarh), Dindori (Madhya Pradesh), Srikakulam (Andhra Pradesh), Warangal (Telangana), Kendrapara (Odisha) districts were also observed.

- Field crops + dairy was found to be the common farming system at all locations in marginal households and it is the dominant system practiced in 17 districts based on number of households adopting the system.

- Field crops + dairy + poultry is found to be the dominant farming system in Udaipur (Rajasthan), Warangal (Telangana), Srikakulam (Andhra Pradesh) and Sivagangai (Tamil Nadu). Similarly, field crops + dairy + goat were found to be pre-dominant system in Purnea (Bihar) district. At Kanpur Dehat (Uttar Pradesh), both field crops + dairy and filed crops + dairy + goat were found as dominant systems. In case of South 24 Paragnas (West Bengal) and Panchmahal (Gujarat), highly diversified system was noticed.

- Field crop alone was found to be dominant practice adopted by large number of households in Kabirdham (Chhatisgarh) and Aurangabad (Maharashtra) districts.

- Across the locations and farming systems, improvement of existing farming systems with diversification approach in cropping system, livestock, product diversification and capacity building module resulted in considerable improvement in production (up to 2 times), marketable surplus (1-2 time), reduction in cost (20 %) due to recycling, returns (2 times) and profit (cash flow for family by 1-2 times).

- Based on the statistical analysis, best performing farming system has been identified for each district which needs to be up-scaled along with all possible interventions and diversification approach for improving the livelihood of marginal farm households.

Farming system interventions of yellow sticky trap and kitchen garden in the adapted villages of Kendrapara district (Odisha)

7.4.3 On-Farm evaluation of farming system modules

Title of the experiment: On-Farm evaluation of farming system modules for improving profitability and livelihood of small and marginal farmers

Objectives

- To address critical constraints of small and marginal farm holders for overall improvement of productivity
- To increase the profitability of small and marginal households and ensure livelihood

Year of start: 2011-12

Modules: The experiment was designed with holistic approach where in improvement of productivity of existing components of the farming system was concentrated by appropriate interventions besides farmer opinion based introduction of new components in optional module. Benchmarking of all components was done before making interventions in different modules. Four modules comprising of **crop** (low cost interventions in existing cropping systems based constraint analysis), **Livestock** (low cost interventions in existing livestock components based on constraint analysis), **On farm processing & value addition** (on farm agro processing and value addition of marketable surplus produces) and **optional** (Introduction of additional components based on households perception) were implemented in 2 farm households in each village comprising of 1 marginal and small household. The experiment was implemented in randomly selected 12marginal farm households in each district.The general guidelines used for designing the modules are given below

Households: Twelve households consisting of 6 each in small and marginal categories was selected for experiment in all the locations except Kangra (Himachal Pradesh) and South 24 Paragnas (West Bengal) where in all the selected 12 households belong to marginal. The average holding size of households in the study locations ranged from 0.27 to 1.44 ha for small households.

Locations: 29 centres in 13 agro climatic regions covering 28 NARP zones have implemented the interventions in different modules while others have partially made the interventions. The details of locations, number of households covered and farming systems are given in Table 7.4.4. Two locations namely Fathepur (Rajasthan) and Kamrup (Assam) have partially implemented the interventions and hence, the data is not included in this report.

Data analysis methodology: Based on the benchmark data, farming systems practiced by the households were identified and grouped in to

Farming System	Notation	Module name	Details
Existing	M0	Bench mark	Recording of bench mark data on crop, livestock, other components and household as a whole
Improved	M1	Crop	Low cost interventions in existing cropping systems based cononstraint analysis
	M2	Livestock	Low cost interventions in existing livestock components based on constraint analysis
	M3	On farm processing & value addition	On farm agro processing and value addition for marketable surplus
	M4	Optional	Introduction of additional components based on households perception

different farming system categories such as field crops+ dairy, field crops + dairy+ goat *etc* as given in Table 7.3.1. Four parameters namely production (on equivalent basis of base pre-dominant crop), marketable surplus (calculated by deducting the family consumption for food, feed, seed *etc* from the total production), cost (total cost of the system including all components and diversification) and profit (calculated by deducting the cost of the system from the gross income obtained from marketable surplus) were used for comparison of existing with improved system and also different farming systems. Farming system with more than one household was subjected to ANOVA and paired t-test analysis. Paired t-test has been carried out for comparing existing and diversified systems with respect to production, marketable surplus, cost and profit. Similarly, one-way ANOVA has been carried out to identify the best farming system with respect to production, marketable surplus, costand profit for the district.Standard error of mean values is also presented in parenthesis in Table 7.4.5.

Results

The interventions made in different modules are given in Table 7.4.4, while the production, marketable surplus and economics of different farming systems are given in 7.4.5. Location wise and summary of results is explained briefly below.

Western Himalaya

Kangra (Himachal Pradesh): Two farming systems namely field crops + dairy and field crops + dairy + goat were found among which 75% households were having field crops + dairy system with mean area of 0.78 ha. Interventions made in crop, livestock, processing and optional module resulted in improvement in production and profit by 72 and 29 % in field crops + dairy and 65 and 15 % in field crops + dairy + goat system respectively. Among the two systems, field crop + dairy recorded higher production and profit. In both the systems total cost was found to be lesser with interventions due to better recycling of wastes.

Samba (Jammu and Kashmir): Only one farming system of field crops+ dairy was observed with mean area of 1.14 ha. Interventions in crop module (introduction of pea in *rabi*), livestock and optional module (nutritional kitchen garden) resulted in significant improvement in production (61 %), marketable surplus (54%) and profit (53 %). The cost also reduced to the extent of 33% due to better recycling of output of one component as input for other component.

Nainital (Uttarakhand): Five farming systems namely field crops + dairy, field crops + dairy + apiary, field crops + dairy + poultry, field crops + dairy + fish and field crops + dairy + poultry + goat were found among which 58% households were having field crops + dairy with mean area of 0.70 ha followed by 16% households practicing field crops + dairy + poultry having mean area of 1.05 ha. Interventions in crop, livestock, processing (grading, packing) and optional (kitchen garden and boundary plantation) modules were undertaken.

Eastern Himalaya

Ambedkarnagar (Uttar Pradesh): Field crops + dairy farming system were found in all the households with mean area of 0.72 ha. Interventions made in crop, livestock and optional (kitchen garden) modules resulted in significant improvement in production (66 %), marketable surplus (55 %), reduction in cost (23 %) and profit (58 %) in the field crops + dairy system.

Lower Gangeticplains

South 24 Paragnas (West Bengal): Three farming systems namely field crops, field crops + dairy and field crops + dairy + poultry were found among which 66% households were having field crops + dairy with mean area of 0.44 ha followed by field crops in 25% households having area of 0.77 ha. Interventions made in crop, livestock, processing (sunflower oil, vermicompost) and optional (nutritional kitchen garden) resulted in significant improvement in production, marketable surplus, cost and profit in field crops while the same was not influenced in field crops + dairy system. The improvement in field crops due to interventions was found to be 83, 99 and 141 % in production, marketable surplus and profit respectively. Among

Table 7.4.4. Details of interventions made in crop, livestock, processing and optional modules at different locations

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
I. Western Himalaya														
Kangra (Himachal Pradesh) /Submon tanellow hills subtropical /104 rainy days/2336 mm rain	Field crops + dairy (1-2)	0.78	9	Maize/ sorghum/ rice/ colocasia	Wheat/ mustard/ berseem	-	Cow (0-1)+ Buffalo (1-2)	-	Maize/ sorghum/ rice	Wheat/ mustard/ berseem/ gobhi/ oats	-	Cow (1)+ Buffalo (1-2)	Graded seed	Nutritional kitchen garden
	Field crops + dairy (1-2) + goat (2)	0 .57	3	Maize/ sorghum/ rice	Wheat/ barley/ mustard/ berseem/ gobhi/ oats	-	Cow (0-1)+ Buffalo (1-2)+ Goat (2)	-	Maize/ sorghum/ rice	Wheat/ mustard/ berseem/ gobhi/ oats	-	Cow (1)+ Buffalo (1-2)	Graded seed	-do-
Samba (J&K)/ sub tropical low altitude /75 rainy days/1548 mm rain	Field crops + dairy (1-2)	1.14	12	Rice/ fodder crops/ mesh	Wheat/ berseem	-	Cow (1-2)+ Buffalo (0-1)		Rice	Wheat/ pea/ berseem	Blackgram	Cow (1-2)+ Buffalo (0-1)	-	-do-
Nainital (Uttara-khand)/Hills of Uttarakhand/Warm Moist Sub Humid/ 90.5 rainy days/ 2597 mm rain	Field crops + dairy	0.70	7	Rice Soybean, maize, Gahat, Gram, Tomato, Chari, Mango, Coriander, Anwla, Okra	Wheat Berseem, Potato, Onion, Pea, Lentil		Cow (1-2) Calf (1-2) Buffalo (1)		Rice, Urd, Tomato, Soyabean/ Onion	Wheat, Pea, Berseem/ Maize, Bhendi, Coriander		Cow (1-2) Calf (1-2) Buffalo (1)	Tomato, onion, Okra, Packing	Nutritional kitchen garden, fruits & boundary plantations
	Field crops + dairy + apiary	0.38	1	Rice Pinalu Haldi, Naipear, Maize fodder	Wheat Berseem, Pea, Onion, Potato		Cow (3) Calf (2) Buffalo (1) Honey Bee (2 boxes)		Rice, Urd, Bhindi, Coriander	Wheat, Berseem, Pea/ Maize		Cow (3) Calf (2) Buffalo (1) Honey Bee (2 boxes)	Packing of Bhindi	-do-
	Field crops + dairy + poultry	1.05	2	Rice, Soybean, Maize, Urd, Gahat	Wheat, Berseem, Lentil, Gram, Maize, Corinder, Ginger, Onion, oat		Cow (3) Buffalo (1-2) Poultry (25) Bullock (2)		Rice, Soybean, Urd, Maize	Wheat, Potato, Onion, Pea/ Maize (F) Coriander		Cow (3) Buffalo (1-2) Poultry (25) Bullock (2)	Packing of Potato	-do-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
	Field crops + dairy + fish	1.00	1	Rice, Maize	Turmeric, ginger	Wheat, Maize Cob, Pea, Onion, Garlic	Cow (3) Calf (1) Buffalo (1) fish pond (1)		Rice, Maize, Bhendi, Coriander	Wheat, Pea, Onion, Berseem		Cow (3) Calf (1) Buffalo (1) fish pond (1)	Grading of bhindi, Coriander	-do-
	Field crops + dairy + poultry + goat	0.50	1	Rice, ginger, French bean, Colocasia	Wheat, Maize, Chilli, Onion		Calf (3) Buffalo (1) Goat (15) Poultry (15) Bullock (2)		Rice, Colocasia, Bhindi, Maize (F), Coriander	Wheat, Onion, Pea		Calf (3) Buffalo (1) Goat (15) Poultry (15) Bullock (2)	Grading	-do-
II. Eastern Himalaya														
Ambedkarnagar (Uttar Pradesh)/ Eastern Plain Zone/Sub-humid/ 54.4 rainy days/ 1426 mm rain	Field crops + dairy (1-2)	0.73	10	Rice/ pigeon pea/ sorghum	Wheat/ berseem/ pea/ chickpea/ mustard/ tomato/ potato	-	Cow (0-1) +Buffalo (1-2)	-	Rice	Wheat/ pea/ mustard/ potato/ Chickpea	-	Cow (0-1) +Buffalo (1-2)	-	Nutritional kitchen gardening
III. Lower Gangetic Plains														
South 24 Paragnas (West Bengal)/ lower gangetic plains/ 100.8 rainy days/ 1789mm rain	Field crops	0.71	3	Rice	Okra/ sunflower	Green gram/ okra/ sunflower	-	-	Rice	Sunflower	Green gram/ okra/ sunflower/ tomato	Cow (1-2)+ Poultry (16-17)+ Fish pond	Sunflower oil/ Vermi-compost	Nutritional kitchen garden
	Field crops + dairy (2-3)	0.44	8	Rice	Okra/ sunflower	Green-gram/ okra/ rice	Cow (2-3)	-	Rice	Sunflower/ tomato/ potato/ pointed guard	Green-gram/ okra/ sunflower	Cow (2-3)+ Goat (1-2)+ Poultry (24-25)+ Fish pond	-do-	-do-
	Field crops + dairy (3)+ poultry (15)	0.40	1	Rice	Okra/ cucumber/ sunflower	-	Cow (2)+ Poultry (15)	-	Rice	Okra/ sunflower/ cucumber	-	Cow (1)+ Poultry (22) + Fish pond	-do-	-do-
IV. Middle Gangetic Plains														
Purnea (Bihar)/ north east alluvial plain (BI-2) /40.5 rainy days/1013 mm rain	Field crops	0.95	1	Rice	Wheat/ maize/ brinjal	-			Rice	Wheat/ maize	Chickpea	-	-	Nutritional kitchen garden

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module			Livestock module	Processing module	Improved Crop module			Livestock module	Processing module	Optional module
				Kharif	*Rabi*	Summer			*Kharif*	*Rabi*	Summer			
	Field crops + dairy (1-2)	1.30	6	Rice/ brinjal/ chilli/ vegetable/ maize fodder	Maize/ wheat/ vegeatble/ potato/ lentil	-	Cow (1-2)		Rice	Wheat/ maize	Chickpea	Cow (4-5)+ Goat (0-1)	Potato	-do-
	Field crops + dairy (1-2)+ goat (4-5)	1.13	3	Rice/ brinjal/ okra	Maize/ wheat/ cucumber	-	Cow (1-2) + Goat (4-5)		Rice	Wheat/ maize	Chickpea	Cow (1-2)+ Goat (3)	Brinjal, maize	-do-
	Field crops+ goat (2-3)	0.7	2	Rice/ vegetable	Maize/ wheat/ cucumber	-	Goat (2-3)		Rice	Wheat/ maize	Chickpea	Cow (2-3)+ Goat (2)	-	-do-
V. Upper Gangetic plains														
Kanpur Dehat (Uttar Pradesh)/ Central Plain Zone /Kanpur	Field crops	1.00	1	Rice	Wheat	-	-	-	Rice	Wheat	-	Cow (1)	Rice	Nutritional kitchen garden
	Field crops + dairy (1-2)	1.10	10	Rice/ pigeon pea / maize/ pearl millet	Wheat/ potato/ mustard	Green-gram	Cow (0-1)+ Buffalo (1-2)	-	Rice/ pigeon pea/ maize/ pearl millet	Wheat/ potato/ mustard/ berseem	Green-gram	Cow (0-1)+ Buffalo (1-2)+ Goat (0-1)	Rice, wheat, buffalo	-do-
	Field crops + dairy (2)+ goat (2)	0.60	1	Maize/ pigeon pea/ pearl millet	Wheat/ potato	Green-gram	Buffalo (2) + Goat (2)	-	Maize/ pigeon pea/ pearl millet	Wheat/ potato	Green-gram	Buffalo (2) +Goat (2)	Potato, wheat	-do-
VI. Trans Gangetic Plains														
Sirsa (Haryana)/ Western/ 29 rainy days/ 292 mm rain	Field crops + dairy (2-3)	0.85	12	Cotton/ guar/ rice/ sorghum	Wheat/ berseem	-	Cow (0-1)+ Buffalo (2-3)	Ghee	Cotton	Wheat	-	Cow (0-1)+ Buffalo (2-3)	Ghee	Nutritional kitchen garden
Amritsar (Punjab)/ Central Plain Zone/47 rainy days/ 936 mm rain	Field crops + dairy (3-4)	0.96	12	Rice	Wheat	-	Cow (0-1) + Buffalo (3-4)	-	Rice	Wheat	-	Cow (0-1) + Buffalo (3-4)	-	-do-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
VII. Eastern Plateau and Hills														
Kabirdham (Chhattisgarh)/chhattisgarh Plain Zone/Sub humid Area	Field crops + dairy (1) + poultry (6-7)	1.20	7	Rice	Chickpea/ wheat/ veg.	-	Cow (1)+ Poultry (6-7)	-	Rice/ soybean	Chickpea/ wheat	-	Buffalo (1) + Goat (1-2)+ Poultry (5-6)+ Pig (0-1)	Gram dal. besan, Ghee	Nutritional kitchen garden
	Field crops + dairy (1) + poultry (7-8) + goat (2-3)	1.02	4	Rice	Chickpea/ wheat/ veg.	-	Cow (1)+ Poultry (7-8)+ Goat (2-3)	-	Rice/ soybean	Chickpea/ wheat	-	Cow (1-2)+ Goat (1)+ Poultry (5-6)+ Pig (0-1)	-do-	-do-
	Field crops + poultry (5)	0.90	1	Rice	Chickpea/ wheat/ veg.		Poultry (5)	-	Rice/ soybean	Chickpea/ wheat		Cow (1)+ Poultry (5)	-do-	-do-
Pakur (Jharkhand)/ eastern plateau and hill-VII/central and north eastern plateau zone /86 rainy days/ 1228 mm rain	Field crops	1.14	12	Rice	Wheat/ chickpea	-		-	Rice	Wheat/ chickpea	-	-	Wheat, gram processing	Nutritional kitchen garden
Dindori (Madhya Pradesh)/Northern Hills Zone of Chhattisgarh (CG-3)/72.6 rainy days/1593 mm rain	Field crops + dairy (1-2)	1.25	8	Rice	Wheat/ chickpea		Cow (1-2)+ Buffalo (1)+ Bullock (2)	-	Rice	Wheat/ chickpea		Cow (1-2)+ Buffalo (1)	-	-
	Field crops + dairy (4-5) + goat (3)	0.90	2	Rice	Wheat/ chickpea		Cow (2)+ Buffalo (2-3)+ Bullock (2)+ Goat (3)		Rice	Wheat/ chickpea	-	Cow (2)+ Buffalo (2-3) + Goat (3)	-	-
	Field crops + dairy (6) + goat (4)+ poultry (3)	1.80	1	Rice	Wheat/ chickpea		Cow (6)+ Bullock (2)+ Goat (4) + Poultry (3)		Rice	Wheat/ chickpea		Cow (6)+ Goat (4) + Poultry (3)	-	-
	Field crops + dairy (2) + poultry (6)	0.75	1	Rice	Wheat/ chickpea	-	Cow (2)+ Bullock (2)+ Poultry (6)		Rice	Wheat/ chickpea	-	Cow (6)+ Poultry (6)	-	-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
Angul (Odisha)/ Mid-Central Table Land, /81 rainy days/1560 mm rain	Field crops + dairy (1-2)	1.18	4	Rice/ ginger/ snake guard/ ridge guard	Groundnut/ brinjal	Bitter guard/ okra	Cow (0-1)+ Buffalo (0-1)	-	Rice/ cowpea/ brinjal/ bitter guard/ okra/ cucumber/ colocasia	Groundnut/ maize/ onion/ garden pea/ okra/ tomato/ cauliflower/ sunflower/ clusterbean	Bitter guard/ pumpkin/ water melon/ okra	Cow (0-1)+ Buffalo (0-1) + Poultry (80-81)	-	Fruits , boundary plantations, fisheries
	Field crops + dairy (3-4) + poultry (65-66)	1.22	8	Rice/ brinjal/ cowpea	Groundnut/ sunflower/ pointed guard/ onion/ cowpea/ brinjal/ gardenpea/ potato	Green-gram/ cowpea/ bltterguard	Cow (3-4) + Poultry (65-66)		Bitter-guard/ cowpea/ brinjal/ okra/ colocasia	Groundnut/ maize/ onion/ garden pea/ okra/ tomato/ cauliflower/ cabbage/ sunflower/ clusterbean/ radish	Bitter-guard/ pumpkin/ okra/ cucumber/ green-gram/ black-gram/ cluster bean	Cow (3-4) + Poultry (138-140)	Ghee making	-do-
VIII. Central Plateau and hills														
Katni (Madhya Pradesh)/ Kymore Pleateau and Satpura Hills/70 rainy days/ 1444mm rain	Field crops	0.80	2	Rice	Wheat	-	-	-	Rice/ soybean	Wheat/ chickpea	-	-	-	-
	Field crops + dairy (1-2)	0.71	10	Rice/ ginger/ marigold	Wheat/ chickpea/ chilli	Green-gram	Cow (1-2)+ Buffalo (0-1)	-	Rice/ soybean	Wheat/ chickpea	- Cow (1-2)+Buffalo (0-1)		-	-
Udaipur (Rajasthan)/ Sub-humid Southern plain and aravali hills/47 rainy days/ 828 mm rain	Field crops + dairy (0-1)	0.75	2	Maize	Wheat	-	Cow (0-1)+ Buffalo (0-1)		Maize/ brinjal	Wheat / tomato	Green-gram/ pea	Cow (0-1)+ Buffalo (0-1)	Vermi-compost	Fruits, boundary plantations
	Field crops + dairy (2)+ goat (4-5)	0.75	10	Maize	Wheat	-	Cow (2)+ Goat (4-5)		Maize/ brinjal/ ridge gaurd/ tinda	Wheat/ tomato/ bottle gourd/ ridge gaurd/ cauliflower	Moong/ onion/ bottle gourd	Cow (2)	-do-	-do-

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
IX. Western Plateau and Hills														
Aurangabad (Maharashtra)/CMP/ 57.5 rainy days/666 mm rain	Field crops	0.58	8	Cotton/ sugarcane/ maize/ pearl millet/ maize fodder/ Hy.napair/ coriander/ okra	Chickpea/ wheat/ Okra/ maize fodder		-	-	Sugarcane/ cotton/ maize/ pearl millet/ maize fodder/ coriander/ napier/ feenu greek	Groundnut/ maize/ onion/ garden-pea/ okra/ tomato/ cauliflower/ sunflower/ cluster bean	Okra/ wheat/ chickpea/ Sorghum/ lucerne/ fodder maize/ feenu greek	Cow (1-2)+ Buffalo (1) + Goat (1)	Sugarcane juice, ghee	-
	Field crops + dairy	0.57	4				-	-	Cotton/ sugarcane/ maize/ pearl millet/ maize fodder	Lucerne/ chickpea	Fodder maize	Cow (1-2)+ Buffalo (1-2)	-	-
Pune (Maharashtra)/deccan Plateau, hot semi-arid eco sub region(6.1)/ Ganeshkhind Pune-7/48 rainy days/606 mm rain	Field crops + dairy (1-2)	0.76	5				Cow (1-2)+ Buffalo (0-1)		Soybean/ rice/ maize/ Hy.nepiar/ maize fodder	Onion/ wheat/ brinjal/ Hy.nepier/ marigold/ garlic/ lucern grass	Pearl millet/ Hynepiar/ smooth-gaurd/ lucern grass/ bitter-gaurd/ bottle-gaurd	Cow (1-2)+ Poultry(2)	Soybean flour	Nutritional kitchen garden
	Field crops + dairy + poultry (1-2)	0.72	7	Groundnut/ soybean/ rice	-	-	Cow (1-2)+ Buffalo (0-1)		Soybean/ groundnut/ rice/ maize fodder/ maize/ lucern grass/ Hy. napier	Onion/ wheat/ chick pea/ lucern grass/ Hy. napier/ sorghum/ garlic	Pearl millet/ Hy. napiar/ lucern grass/ ground nut	Cow (1-2)+ Poultry(7-8)	Soybean flour	-do-
Amravati (Maharashtra/)Central Maharastra Plateaue Zone (IX)/ Western Vidarbha Zone/ 71 rainfall days/ 1198 mm	Field crops + dairy (1-2)	1.08	8	Soybean/ cotton/ pigeon pea/ orange	Wheat/ chickpea		Cow (1-2)	-	Soybean/ pigeon pea/ sorghum/ cotton	Wheat/ chickpea/ linseed		Cow (1-2)	Fortified wheat atta, mineral mixture	Nutritional kitchen garden, fruit/ boundary plantations, compost

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
	Field crops + dairy (1) + goat (3)	1.30	2	Soybean/ orange	Wheat		Buffalo (1)+ Goat (3)		Sorghum/ pigeonpea/ soyabean	Wheat/ chickpea	Sesamum	Cow (1) + Goat (3)	-do-	-do-
	Field crops + dairy (1) + poultry (4)	1.40	1	Soybean/ pigeonpea	Cotton		Cow (1) + Poultry (4)		Soyabean	Wheat	Sesamum	Cow (1)	Mineral mixture	-do-
	Field crops + goat (3)	1.20	1	Soybean/ sorghum	-	-	Goat (3)		Soybean	Sorghum	Chickpea/ linseed	Goat (3)	-do-	-do-
X. Southern Plateau and Hills														
Warangal (Telangana)/C.T.Zone/ rice ecosystem/ 67.3 rainy days/ 1263 mm rain	Field crops + dairy (1-2)	1.32	5	Rice/ cotton/ groundnut/ maize	Rice/ groundnut/ maize	-	Cow (0-1)+ Buffalo (1-2)		Rice	Rice	-	Cow (0-1)+ Buffalo (1-2)+ Poultry (8)	Ghee	Nutritional kitchen garden, Azolla
	Field crops + dairy (4)+ goat (10)	1.00	1	Rice/ cotton	Rice/ maize	-	Cow (1)+ Buffalo (3)+ Goat (10)		Rice	Rice	-	Cow (2)+ Goat(8)+ Poultry (15)	-do-	-do-
	Field crops + dairy (2-3)+ goat (24-25)+ poultry (5-6)	1.44	3	Rice/ cotton/ maize/ chilli	Rice/ maize/ vegetables	-	Cow (1)+ Buffalo (1-2)+ Goat (24-25)+ Poultry (5-6)		Rice	Rice	-	Cow (1)+ Buffalo (2)+ Goat (39-40)+ Poultry (7-8)	-do-	-do-
	Field crops + dairy (1-2)+ poultry (7-8)	1.13	3	Rice/ cotton/ maize	Rice/ groundnut/ maize/ vegetables	-	Cow (0-1)+ Buffalo (1)+ Poultry (7-8)		Rice	Rice	-	Cow (0-1)+ Buffalo (1-2)+ Poultry (8-9)	-do-	-do-
Kolar (Karnataka)/ AEZ 8.2/Eastern Dry Zone/42 rainy days/ 612 mm rain	Field crops + dairy (1-2)	0.88	6	Finger millet/ sericulture/ rice/ cabbage/ groundnut/ tomato	Potato/ radish/ ridge guard	Fodder maize/ tomato	Cow (1-2)+ Buffalo (0-1)	-	Finger millet+ field bean+ redgram/ sericulture/ tomato/ rice/ cabbage/ fodder maize/ pole beans/ chilli	Radish/ coriander/ finger-millet/ fodder maize	Fodder maize/ okra	Cow (2-3)		

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
	Field crops + dairy (3) + goat(1)	0.50	1	Finger-millet/ tomato/ grass	Grass	Cabbage/ maize/ grass	Cow (2)+ Buffalo (1)+ Goat (1)	-	Finger millet	coriander	Tomato	Cow (2)		
	Field crops + dairy (3-4) + goat (5-6) + poultry (6-7)	0.84	3	Sericulture/ brinjal/ finger millet+ redgram/ fodder maize/ grass	Rabi grass	Knol-khol/ fodder maize/ grass	Cow (2-3)+ Buffalo (1)+ Goat (5-6)+ Poultry (6-7)	-	Sericulture/ knol-khol/ finger millet + field bean + redgram/ Fodder maize	Radish/ sericul-ture	Brinjal/ sericul-ture	Cow (1-2)+ Buffalo (1-2)+ Goat (3)+ Poultry (3-4)		
	Field crops + dairy (4)+ pig (2)	0.27	1	Finger Millet/ Fodder maize	-	-	Cow (2)+ Buffalo (2)+ Pig (2)		Finger-millet/ fieldbean/ redgram	-	-	Cow (2)+ Buffalo (1)		
	Field crops + dairy (5) + rabbit (8)	0.5	1	Tomato/ fodder maize	Coriander	Beetroot	Cow (5) + Rabbit (8)		Marigold/ finger-millet	Fodder maize	Carrot/ pole beans	Cow (5)		
Gadag (Karana-taka)/Northern Dry Zone /Arid/ 31.5 rainfall days/ 325 mm	Field crops + dairy (1-2)		12	Groundnut/ Bt. cotton/ Hy. maize/ onion/ chilli	Sorghum/ chickpea/ wheat	-	Cow (1-2) + Buffalo (0-1)	-	Bt.cotton/ groundnut/ Hy. maize/ green gram/ sunflower	Sorghum/ chickpea	-	Cow (1-2) + Buffalo (0-1)	Butter, vermi-compost	Nutritional kitchen garden
Dharmapuri & Krishnagiri (Tamil Nadu)/NWZ/ Bimodal rainfall/ Start of deccan plateau/36.5 rainy days/656 mm rain	Field crops + dairy (2-3)	1.02	10	Rice/ coconut/ fodder grass/ sugar-cane/ green-gram/ ground-nut/ turmeric/ redgram/ fodder sorghum/ chick pea	Rice/ coconut/ okra/ fodder sorghum/ ground-nut/ mango	Lemon	Cow (2-3)	-	Rice/ tuberose/ cotton/ turmeric/ sugar-cane/ coconut/ fodder grass/ Fodder sorghum/ chilli/ sorghum	Rice/ coconut/ fodder grass/ ragi/ ground-nut/ chick pea/ wheat	Fodder sorghum	Cow (2-3)		

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
	Field crops + dairy (2-3)+ goat (3-4)	1.36	2	Rice/ coconut/ jasmine/ fodder grass	Rice	-	Cow (2-3)+ Goat (3-4)	-	Rice/ fodder grass/ jasmine/ groundnut/ coconut	Rice/ ragi	-	Cow (2)		
XI. East Coast Plains and Hills														
Srikakulam (Andhra Pradesh)/high altitude and tribal area zone/57.5 rainy days/1277 mm rain	Field crops	0.90	2	Rice	Blackgram/ ragi	-			Rice	Ragi	-	Buffalo (1) + Poultry (7-8)	-	Azolla
	Field crops + dairy (1-2)	0.30	2	Rice	Sesamum/ blackgram	-	Cow (1-2) + Buffalo (0-1)		Rice	-	-	Cow (1) + Buffalo (2) + Goat (4) + Poultry (8-9)	-	-do-
	Field crops + dairy (4)+ goat (10)	1.00	1	Rice	Rice	-	Cow (1) + Buffalo (3) + Goat (10)		Rice	Rice / maize	-	Cow (2) + Goat (15) + Poultry (8)	-	-do-
	Field crops + dairy (1)+ goat (35) + poultry (5)	0.52	1	Rice	Rice	-	Cow (1)+ Goat (35) + Poultry (5)		Rice	Green-gram	Green-gram/ sesamum	Buffalo (4) + Poultry (10)	-	-do-
	Field crops + dairy (1-2)+ poultry (10)	0.70	2	Rice	Rice/ ragi	-	Cow (0-1) + Buffalo (1-2) + Poultry (10)		Rice	Ragi/ finger-millet	-	Buffalo (1-2) + Poultry (9-10)		-do-
	Field crops + goat (4)	0.20	1	Rice	Sesamum	-	Goat (4)		Rice	-	-	Buffalo (3) + Poultry (8)		-do-
	Field crops + goat (1) + poultry (1)	1.00	1	Rice	Blackgram	-	Goat (1) + Poultry (1)		Rice	-	-	Buffalo (1) + Poultry (9)		-do-
	Field crops+ poultry (12)	0.70	2	Rice	Rice	-	Poultry (12)		-	Mesta	-	Poultry (16)		-do-
Kendrapara (Odisha)/east-south eastern coastal plain zone/77 rainy days/2002 mm rain	Field crops + dairy (2-3)	0.66	2	Rice	Rice/ green-gram/ black-gram/ Veg	-	Cow (2-3)	-	Rice	Rice/ green-gram/ black-gram/ Veg	Jute	Cow (4-5)+ Poultry (9)	Green-gram, black-gram, ghee, coconut oil	Nutritional kitchen garden, mushroom, fish

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module			Livestock module	Processing module	Improved Crop module			Livestock module	Processing module	Optional module
				Kharif	*Rabi*	Summer			*Kharif*	*Rabi*	Summer			
	Field crops + dairy (5) + fish	0.64	2	Rice	Rice/ green-gram/ black-gram/ Veg	-	Cow (5)+ Fish pond	-	Rice	Rice/ green-gram/ black-gram/ Veg	-	Cow (7-8)+ Poultry (15)	Rice, ghee, Coconut oil	-do-
	Field crops + dairy (2) + goat (3)	1.10	1	Rice/ jute	Rice/ green-gram/ black-gram/ Veg	-	Cow (2)+ Goat (3)	-	Rice	Rice/ green-gram/ black-gram/ Veg	Jute	Cow (4)+ Goat (2)+ Poultry (15)	Rice, ghee	-do-
	Field crops + dairy (1) + goat (2-3) + poultry (14-15)	1.00	3	Rice/ jute	Rice/ green-gram/ black-gram/ Veg	-			Rice	Rice/ green-gram/ black-gram/ Veg	Jute	Cow (2-3)+ Goat (3-4)+ Poultry (18-19)	Green-gram, black-gram, ghee, tomato	-do-
	Field crops + dairy (2) + goat (1) + poultry (10) + fish	1.06	1	Rice	Greengram	-	Cow (2) + Goat (1) + Poultry (10) + Fish pond		Rice	Greengram	-	Cow (3)+ Goat (1) + Poultry (18)	Rice, ghee, Coconut oil	-do-
	Field crops + dairy (2) + poultry (10)	0.89	2	Rice/ jute	Black-gram/ veg	-	Cow (2) + Poultry (10)		Rice	Blackgram	Jute	Cow (3-4) + Poultry (20)	Black-gram, jute	-do-
	Field crops + dairy (1) + poultry (10)+ fish	1.2	1	Rice/ jute	Black-gram/ veg	-	Cow (1) + Poultry (10) + Fish pond		Rice	Blackgram/ rice	-	Cow (2) + Poultry (8)	Ghee	-do-
Sivagangai (Tamil Nadu)/Southern/ Semi Arid Eco-Sub Region 8.1/ Southern Zone TN 5 & 6/ 41 rainy days/ 563 mm rain	Field crops + dairy (3-4)	1.05	12	Rice/ sugar-cane/ black-gram/ pumpkin	Rice/ ground nut/ gingelly/ pumpkin/ maize/ black-gram	Black gram	Cow (3-4) + Poultry (15-16)	-	Rice/ sugar-cane	Gingelly/ black-gram/ ground-nut/ rice	Black-gram/ sugar-cane/ pumpkin/ groundnut	Cow (3-4) + Poultry (10-11)	Grains with out chaffy, plump pods, vermi-compost	Nutritional kitchen gardening, poultry

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
XII. West Coast Plains and Ghats														
Palghar (Maharashtra)/North konkan coastal Zone/107 rainy days/2954 mm rain	Field crops + dairy (2-3)	0.56	11	Rice	Rice/ cowpea/ cucumber	-	Cow (1)+ Buffalo (1-2)	Kitchen garden	Rice	Rice/ cowpea/ cucumber	-	Cow (1)+ Buffalo (1-2)		Nutritional kitchen garden
	Field crops + goat (6)	0.40	1	Rice	Rice	-	Goat (6)	Kitchen garden	Rice	Rice	-	Goat (6)		-do-
Pathinamthitta (Kerala)/Hot Humid per Humid eco region/Southern Zone/95 rainy days/3679 mm rain	Field crops + horticulture + dairy (1-2)	1.3	11	Rubber/ coconut/ pepper/ nutmeg/ banana/ Rice/ Vegetable/ tapioca	-	-	Cow (1)+ Buffalo (0-1)		Coconut/ nutmeg/ pepper/ rice	Rice/ banana	Vegetable Buffalo (0-1)+ Poultry (9-10)	Cow (3-4)+	Cured garcinia, coconutoil, graded coconut, garbled pepper, drymace, packed milk after filtration	Fisheries, terrace gardening, apiary, Vermi-compost
	Field crops + horticulture dairy (2) + Poultry (8)	0.96	1	Coconut	Rice	-	Cow (2)+ Poultry (8)	-	Coconut	Rice	-	Cow (2)	Packed milk after filtration	Terrace gardening
XIII. Gujarat Plains and Hills														
Mehsana (Gujarat)/ north Gujarat agro climate zone /44.8 rainy days/ 551 mm rain	Field crops	1.10	2	Pearl millet/ cotton/ sorghum	Wheat/ mustard/ lucerne	Fodder sorghum		-	Cotton/ castor/ green-gram/ sorghum/ clusterbean	Lucerne/ wheat/ mustard	Fodder sorghum	Cow-8		
	Field crops + dairy (1-2)	1.16	10	Sorghum/ rice/ cotton/ pearl millet/ castor/ clusterbean	Cumin/ lucerne/ tobbaco/ mustard	Sorghum/ pearl millet/ cluster-bean/ fodder sorghum	Cow (0-1)+ Buffalo (1-2)	-	Cotton/ sorghum/ cluster-bean/ brinjal/ fodder sorghum/ Green-gram/ pearl millet/ rice/ castor	Wheat/ lucerne/ chikory/ castor/ fodder maize/ mustard	Fodder sorghum/ pearl-millet/ cluster-bean	Cow (0-1)+		

District (state)/ NARP zone/ soil type/ rainfall (mm)/ rainy days	Farming System (s)	Area (ha)Farm	No. of house-holds	Existing components (As per benchmark, 2013) Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Improved Crop module *Kharif*	*Rabi*	Summer	Livestock module	Processing module	Optional module
Panchmahal (Gujarat)/middle gujarat III/44 rainfall days/1008mm rain	Field crops + dairy (3)	0.40	1	Rice	Maize	-	Cow (1)+ Buffalo (2)	Maize, chaff cutting	Rice/ maize	Maize		Cow (1)+ Buffalo (2)	-	Nutritional kitchen garden, fruits, boundary plantations, stubbles of fodder crop
	Field crops + dairy (3) + goat (4-5)	0.72	3	Rice/ maize	Maize	Ground-nut	Buffalo (3)+ Goat (4-5)	Maize, chaff cutting	Rice/ maize	Maize	Ground-nut	Buffalo (3)+ Goat (4-5)	-	-do-
	Field crops + dairy (2-3) + goat (5-6)+ poultry (6-7)	1.04	6	Rice/ maize/ pigeon pea	Maize	Pearl millet	Buffalo (2-3) + Goat (5-6) + Poultry (6-7)	Maize, chaff cutting, pearl-millet	Rice/ maize/ pigeon pea	Maize	Pearl-millet	Buffalo (2-3) + Goat (5-6) + Poultry (6-7)	-	-do-
	Field crops + dairy (1)+ poultry (5)	0.90	1	Rice	Maize	-	Buffalo (1)+ Poultry (5)	Maize, chaff cutting	Rice/ maize	Maize	-	Buffalo (1)+ Poultry (5)		-do-
	Field crops + poultry (5)	0.84	1	Rice	Maize	Groundnut	Poultry (5)	Maize, chaff cutting	Rice/ maize	Maize	Groundnut	Poultry (5)	-	-do-

Table 7.4.5. Improvement of production (on equivalent basis of base crop), marketable surplus and economics of in different farming systems in in various locations

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Kangra (Himachal Pradesh)														
FC+D	0.78	9	7432 (1403)	-	18550 (4484)	55125 (10241)	12848 (511)	-	8703 (584)	71490 (4952)	0.2683	-	0.0945*	0.6801
FC+D+G	0.57	3	7494 (2431)	-	16216 (7768)	58825 (17738)	12389 (885)	-	7382 (1012)	67897 (8577)	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.1120	-	0.0320**	0.4138
CD [P = 0.05]	**FS1 Vs FS2**		2808	-	8970	20482	1023	-	1023	1023				
Samba (Jammu and Kashmir)														
FC+D	1.14	12	4692	3117	81367	103783	7555	4822	54683	159635	0.0039***	0.0129**	0.0036***	0.0090***
Ambedkarnagar (Uttar Pradesh)														
FC+D	0.73	10	10122	5553	41118	60108	16803	8624	31905	95022	0.0090***	0.0602*	0.0484**	0.0262**
South 24 Paragnas (West Bengal)														
FC	0.71	3	6544 (5025)	4734 (4719)	33203 (7964)	26063 (41506)	11988 (2653)	9442 (2460)	82637 (15596)	62984 (18407)	0.019**	0.029**	0.067*	0.021**
FC+D	0.44	8	9223 (3077)	6460 (2889)	39408 (11661)	44653 (25417)	9472 (1624)	6581 (1506)	68203 (9550)	47534 (11272)	0.921	0.961	0.0003***	0.893
FC+D+P	0.40	1	5753	4197	49280	13010	8735	6757	63981	40836	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.245	0.526	0.126	0.159
CD [P = 0.05]	**FS1 Vs FS2**		5893	5534	9339	48671	3111	2885	18289	21585				
Purnea (Bihar)														
FC+D	1.30	6	12758 (1814)	8302 (1841)	66934 (7385)	47887 (10816)	10931 (1490)	9558 (1372)	26863 (2731)	71520 (11078)	0.3805	0.5667	0.0017***	0.0976*
FC+D+G	1.13	3	11759 (2565)	7562 (2603)	79622 (10445)	26208 (15296)	11482 (2108)	9967 (1941)	25233 (3863)	78106 (15668)	0.8295	0.0563*	0.0131**	0.0689*
FC+G	0.70	2	7063 (3142)	5836 (3189)	25564 (12792)	38000 (18734)	10599 (2582)	8924 (2378)	25875 (4731)	69522 (19189)	0.3864	0.4019	0.9795	0.5022
FC	0.95	1	7609	5198	35371	33109	4788	4204	15100	27995	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.5978	0.1500	0.0002***	0.0063***
CD [P = 0.05]	**FS1 Vs FS2**		3143	3189	12793	18734	2582	2378	4731	19189				

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
CD [P= 0.05]	**FS1 Vs FS3**		3629	3682	14772	21633	2982	2746	5463	22158				
CD [P= 0.05]	**FS2 Vs FS3**		4057	4117	16515	24186	3334	3070	6108	24773				
						Kanpur Dehat (Uttar Pradesh)								
FC+D	1.10	10	13286	10813	58787	85256	13891	11450	66056	86746	0.7013	0.6751	0.4421	0.8998
FC+D+G	0.60	1	11545	8100	58550	46500	13951	11243	71875	81588	-	-	-	-
FC	1.00	1	9327	8259	47000	51000	11789	10141	59500	70180	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.4912	0.4582	0.2966	0.5750
						Sirsa (Haryana)								
FC+D	0.85	12	4870	3834	99661	100280	6863	5313	48958	139684	0.0052***	0.0085***	0.0052***	0.0138**
						Amritsar (Punjab)								
FC+D	0.96	12	9509	7047	76996	136790	9509	7643	76996	136790	-	<.0001***	-	-
Overall FS			**P value Significance - Existing vs Improved**								-	<0.0001***	-	-
						Kabirdham (Chhatisgarh)								
FC+D+P	1.20	7	7775 (394)	7173 (393)	24150 (990)	77237 (4328)	13693 (286)	12239 (136)	20888 (517)	135859 (4843)	0.0123**	0.0021***	0.0048***	0.0399**
FC+D+P+G	1.02	4	10298 (521)	9746 (520)	28717 (1310)	105673 (5725)	16315 (378)	15109 (180)	21893 (683)	169907 (6406)	0.0040***	0.0026***	0.0163**	0.0174**
FC+P	0.90	1	9314	8829	27456	94124	13942	13239	19120	135295	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.0001***	.0001***	0.0001***	0.0006***
						Pakur (Jharkhand)								
FC	1.14	12	1633	328	13737	2601	2798	578	8270	8274	<0.0001***	0.0002***	<0.0001***	<0.0001***
						Dindori (Madhya Pradesh)								
FC+D	1.25	9	6436 (755)	4346 (657)	22836 (1350)	64058 (9100)	11695 (718)	9125 (565)	35936 (254)	121964 (9453)	0.1578	0.5765	<.0001***	0.5389
FC+D+G	0.90	2	7819 (1602)	4936 (1394)	18960 (2865)	86600 (19304)	9547 (1524)	27425 (1200)	14750 (540)	114134 (20054)	0.2267	0.0294**	0.0857*	0.1822
FC+D+P	0.75	1	4184	2636	16650	39834	6496	6496	29150	75190	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.5744	0.1016	.0001***	0.7404
CD [P= 0.05]	**FS1 Vs FS2**		1772	1541	3168	21342	1685	1327	598	22171				

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Angul (Odhisha)														
FC+D+P	1.22	8	7144 (556)	4735 (518)	54835 (4345)	16606 (5833)	12760 (1748)	9875 (1672)	82957 (10987)	70161 (10540)	0.0195**	0.0229**	0.0344**	0.0054***
FC+D	1.18	4	4885 (787)	2894. (733)	29375 (6144)	19482 (8249)	8480 (2472)	5926 (2365)	49062 (15539)	52696 (14906)	0.0261**	0.0423**	0.0132**	0.0311**
Overall FS			P value Significance - Existing vs Improved								0.0026***	0.0040***	0.0048***	0.0005***
CD [P = 0.05]	**FS1 Vs FS2**		964	899	7526	10104	3028	2897	19031	18256				
Katni (Madhya Pradesh)														
FC+D	0.71	10	6099 (1312)	3991 (1130)	19755 (2427)	40595 (9991)	9785 (586)	6842 (445)	29960 (223)	68998 (5674)	0.0703*	0.2661	0.0035***	0.1966
FC	0.80	2	3312 (2934)	1587 (2528)	22250 (5428)	5575 (2234)	5168 (1310)	3268 (997)	31240 (499)	16889 (12687)	0.2849	0.9355	0.0120**	0.2394
Overall FS			P value Significance - Existing vs Improved								0.0422**	0.2753	0.0004***	0.2453
CD [P = 0.05]	**FS1 Vs FS2**		3214	2770	5946	24475	1436	1092	547	13898				
Udaipur (Rajasthan)														
FC+D+G	0.75	10	4839 (638)	2436 (470)	7510 (1007)	50555 (7895)	9132 (401)	5057 (328)	28994 (1758)	73077 (4804)	0.3806	0.7111	.0001***	0.0066***
FC+D	0.75	2	5276 (1427)	3209 (1052)	6000 (2251)	57312 (17655)	9203 (897)	5519 (734)	25995 (3932)	78442 (10742)	0.5258	0.5779	0.1171	0.3385
Overall FS			P value Significance - Existing vs Improved								0.2249	0.9933	0.0001***	0.0017***
CD [P = 0.05]	**FS1 Vs FS2**		1563	1153	2467	19341	983	804	4308	11768				
Aurangabad (Maharashtra)														
FC	0.74	12	3395	2907	43538	75781	8122	6013	100818	224089	0.0163**	0.0007***	0.0006***	0.0406**
Pune (Maharashtra)														
FC+D+P	0.76	7	2227 (413)	1668 (389)	53442 (7093)	NA	7950 (1613)	6952 (1827)	93367 (13094)	NA	0.0019***	0.0027***	0.0435**	-
FC+D	0.72	5	795 (488)	610 (460)	37747 (8392)	NA	9085 (1909)	8456 (2162)	63449 (15493)	NA	0.0538*	0.0957*	0.0675*	-
Overall FS			P value Significance - Existing vs Improved								0.0002***	0.0010***	0.0058***	-
CD [P = 0.05]	**FS1 Vs FS2**		640	603	10989	-	2500	2831	20285	-				

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Amravati (Maharashtra)														
FC+D	1.08	8	2654 (381)	2414 (352)	35962 (6022)	48275 (9194)	4193 (175)	3579 (172)	24660 (2583)	71344 (4003)	0.0320**	0.0186**	0.1876	0.0138**
FC+D+G	1.30	2	3593 (762)	3310 (705)	33200 (12044)	78200 (18388)	4917 (351)	4251 (344)	18542 (5166)	105214 (8006)	0.2428	0.2351	0.3136	0.1910
FC+D+P	1.40	1	3229	3040	49000	51100	5971	5105	31698	104412	-	-	-	-
FC+D	1.20	1	2981	2681	24500	67900	3847	3410	35010	84250	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.0021***	0.0008***	0.0331**	0.0014***
CD [P= 0.05]	**FS1 Vs FS2**		853	789	13466	20559	393	385	5776	8952				
Warangal (Telangana)														
FC+D	1.32	5	15858 (2617)	14696 (2669)	105830 (17549)	102374 (30176)	20476 (1839)	17729 (1023)	126405 (7636)	142433 (18902)	0.0062***	0.0053***	0.0022***	0.1040
FC+D+P	1.13	3	19875 (3379)	18029 (3446)	114933 (22656)	145712 (38957)	26863 (2374)	22655 (1320)	130034 (9858)	222027 (24402)	0.1371	0.1150	0.1247	0.1804
FC+D+G	1.00	2	26072 (4139)	24761 (4220)	147605 (27748)	189794 (47712)	32793 (2907)	28004 (1617)	180592 (12074)	244754 (29886)	0.0514*	0.0039***	0.1936	0.0880*
FC+D+G+P	1.44	2	39862 (4139)	38105 (4220)	241175 (27748)	274191 (47712)	54168 (2907)	47076 (1617)	296930 (12074)	404976 (29886)	0.0259**	0.1109	0.0620*	0.0203**
Overall FS			**P value Significance - Existing vs Improved**								.0001***	.0001***	.0001***	0.0003***
CD [P= 0.05]	**FS1 Vs FS2**		4275	4359	28658	49277	3003	1671	12471	30867				
CD [P= 0.05]	**FS1 Vs FS3**		4897	4994	32832	56454	3441	1914	14287	35362				
CD [P= 0.05]	**FS1 Vs FS4**		4897	4994	32832	56454	3441	1914	14287	35362				
CD [P= 0.05]	**FS2 Vs FS3**		5344	5449	35823	61597	3754	2088	15588	38584				
CD [P= 0.05]	**FS2 Vs FS4**		5344	5449	35823	61597	3754	2088	15588	38584				
CD [P= 0.05]	**FS3 Vs FS4**		5854	5969	39242	67476	4113	2288	17076	42266				

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Kolar (Karnataka)														
FC+D	0.88	6	19577 (3460)	18546 (3680)	88457 (14700)	134930 (43495)	23826 (4846)	19471 (4420)	95399 (20220)	190517 (45381)	0.3091	0.8151	0.7872	0.2504
FC+D+G+P	0.84	3	12953 (5286)	11073 (5621)	67656 (22455)	78096 (66441)	19737 (7403)	18423 (6752)	75592 (30887)	161257 (69320)	0.2409	0.2724	0.6686	0.1810
FC+D+G	0.5	1	20752	14627	98777	136423	10361	8771	61722	62616	-	-	-	-
FC+D+Pig	0.27	1	9788	8318	62200	37250	8229	6867	40015	58735	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.2656	0.515	0.9426	0.1187
CD [P= 0.05]	**FS1 Vs FS2**		6318	6719	26839	79412	8848	8071	36918	82854				
Gadag (Karnataka)														
FC+D	1.30	12	5459	4854	14341	51169	11673	10796	53725	86360	<.0001***	<.0001***	<.0001***	0.0001***
Dharmapuri & Krishnagiri (Tamil Nadu)														
FC+D	1.02	10	11011 (1846)	8929 (1790)	110973 (17583)	52854 (12276)	28877 (11332)	16627 (2441)	149232 (18078)	282554 (161395)	0.5258	0.5779	0.1171	0.3385
FC+D+G	1.36	2	17587 (4127)	15404 (4003)	158561 (39317)	98012 (27450)	24948 (25339)	21330 (2365)	149437 (40425)	148131 (360891)	0.1788	0.0290**	0.1344	0.2144
Overall FS			**P value Significance - Existing vs Improved**								0.1420	0.0106**	0.1707	0.1911
CD [P= 0.05]	**FS1 Vs FS2**		4522	4386	43070	30070	27758	5979	44284	395337				
Srikakulam (Andhra Pradesh)														
FC	0.90	2	1903 (1544)	350 (1290)	10000 (9332)	13340 (19134)	4318 (2134)	3451 (1784)	17837 (9422)	34285 (19283)	0.1042	0.1507	0.3398	0.2822
FC+D+G	1.00	1	16917	15292	90310	112690	26684	21256	121840	198683	-	-	-	-
FC+D+G+P	0.52	1	20869	19569	49400	207025	27918	22097	66075	275343	-	-	-	-
FC+G	0.20	1	3238	1946	11000	29090	6200	5145	46605	57147	-	-	-	-
FC+D	1.00	2	5253 (1544)	3528 (1290)	30400 (9332)	41946 (19134)	5903 (2134)	4386 (1784)	22052 (9422)	49095 (19283)	0.9267	0.8885	0.7884	0.9107
FC+G+P	1.00	1	7604 (1261)	5111 (1053)	30033 (7619)	64484 (15623)	13435 (1742)	9784 (1456)	14792 (7693)	120007 (15744)	0.6387	0.8883	0.3879	0.7896
FC+P	0.70	2	6636 (1544)	5786 (1290)	38300 (9332)	51487 (19134)	7625 (2134)	6584 (1784)	42842 (9422)	59111 (19283)	0.0118**	0.0356**	0.0007***	0.1133
FC+D+P	0.70	2	9053	5883	33525	80011	13470	9373	43644	123237				

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Overall FS			P value Significance - Existing vs Improved								0.1973	0.2770	0.1138	0.2502
CD [P= 0.05]	**FS1 Vs FS5**		2184	1825	13198	27060	3018	2523	13325	27271				
CD [P= 0.05]	**FS1 Vs FS6**		1994	1666	12048	24702	2755	2304	12164	24895				
CD [P= 0.05]	**FS1 Vs FS7**		2184	1825	13198	27060	3018	2523	13325	27271				
CD [P= 0.05]	**FS5 Vs FS6**		1994	1666	12048	24702	2755	2304	12164	24895				
CD [P= 0.05]	**FS5 Vs FS7**		2184	1825	13198	27060	3018	2523	13325	27271				
CD [P= 0.05]	**FS6 Vs FS7**		1994	1666	12048	24702	2755	2304	12164	24895				
						Kendrapara (Odisha)								
FC+D	0.66	2	8310 (2174)	5370 (1867)	47452 (11030)	24110 (9552)	16846 (4463)	11409 (4162)	48058 (9381)	111921 (33311)	0.2295	0.2178	0.9659	0.1262
FC+D+P	0.89	2	8254 (2174)	6118 (1867)	55456 (11030)	16506 (9552)	16360 (4463.)	11962 (4162)	48064 (9381)	108201 (33311)	0.2316	0.2871	0.0048***	0.2057
FC+D+G+P	1.00	3	8297 (1775)	4906 (1525)	49186 (9006)	21690 (7799)	19257 (3644)	14191 (3398)	53541 (7659)	125146 (27198)	0.0577*	0.0863*	0.7032	0.0849*
FC+D+F	0.64	2	5491 (2174)	3279 (1867)	30268 (11030)	17224 (9552)	8347 (4463)	5184 (4162)	32644 (9381)	50286 (33311)	0.1066	0.2055	0.2973	0.1510
FC+D+G	1.1	1	17914	13587	71395	82675	27497	21826	61932	189033	-	-	-	-
FC+D+G +P+F	1.06	1	4374	2618	24083	14893	8057	5003	23884	59240	-	-	-	-
FC+D+P+F	1.2	1	7661	4016	34378	33262	11190	7445	37909	71687	-	-	-	-
Overall FS			P value Significance - Existing vs Improved								.0001***	0.0004***	0.8749	.0001***
CD [P= 0.05]	**FS1 Vs FS2**		3075	2642	15599	13510	6313	5886	13267	47110				
CD [P= 0.05]	**FS1 Vs FS3**		2807	2411	14240	12332	5763	5373	12111	43005				
CD [P= 0.05]	**FS1 Vs FS4**		3075	2642	15599	13510	6313	5886	13267	47110				
CD [P= 0.05]	**FS2 Vs FS3**		2807	2411	14240	12332	5763	5373	12111	43005				

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
CD [P = 0.05]	**FS2 Vs FS4**		3075	2642	15599	13510	6313	5886	13267	47110				
CD [P = 0.05]	**FS3 Vs FS4**		2807	2411	14240	12332	5763	5373	12111	43005				
							Sivagangai & Pudukotai (Tamil Nadu)							
FC+D	1.05	12	12017	10301	99702	44190	23147	21154	108599	192838	0.0654*	0.0663*	0.5760	0.0125**
							Palghar (Maharashtra)							
FC+D	0.56	11	7873	6372	63680	30800	15055	11676	49008	38682	0.0024***	0.0004***	.0001***	0.0002***
FC+G	0.40	1	5994	5494	28800	43128	11671	8339	24430	51628				
							Pathinamthitta (Kerala)							
FC+horti-culture+D	1.30	11	14640 (1721)	13733 (1716)	142597 (19078)	105287 (18307)	26947 (3077)	25588 (2969)	209132 (15155)	248978 (44834)	0.0030***	0.0030***	0.0093***	0.0114**
FC+horti-culture+D+P	0.96	1	10817	9892	86060	97832	9515	8856	95790	65970	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**								0.0042***	0.0041***	0.0089***	0.0150**
							Mehsana (Gujarat)							
FC	**1.10**	2	13052 (4318)	7513 (3818)	57200 (38063)	112475 (23529)	31449 (2822)	29214 (1662)	203750 (2919)	158465 (28340)	0.0196**	0.0173**	0.0434**	0.0181**
FC+D	**1.16**	10	16215 (1931)	11111 (1707)	110236 (17022)	100569 (10522)	30734 (1262)	22822 (1305)	114206 (6806)	175113 (12674)	0.4272	0.7666	0.8071	0.1692
Overall FS			**P value Significance - Existing vs Improved**								0.116	0.625	0.519	0.057*
CD [P = 0.05]	**FS1 Vs FS2**		6691	5916	58968	36451	4373	4523	23577	43905				
							Panchmahal (Gujarat)							
FC+D	0.40	1	5818	4521	41600	39850	7228	5899	55200	45990	-	-	-	-
FC+P	0.84	1	4421	3332	25860	34600	5713	4395	16985	61715	-	-	-	-
FC+D+P	0.90	1	5533	3795	40300	35160	7071	5254	38925	58265	-	-	-	-
FC+D+G	0.72	3	9870 (674)	7297 (540)	48620 (5378)	89596 (7130)	9619 (1090)	7565 (959)	77066 (15596)	76323 (7952)	0.8661	0.8824	0.0882	0.1830
FC+D+P+G	1.04	6	10823 (476)	8431 (382)	56553 (3803)	95196 (5042)	10718 (771)	8474 (678)	79915 (5296)	185608 (5623)	0.8886	0.9542	0.0260**	0.3765
Overall FS			**P value Significance - Existing vs Improved**								0.364	0.259	0.665	0.345
CD [P = 0.05]	**FS4 Vs FS5**		1430	1148	11410	15127	2313	2036	15888	16869				

Note: FC: Field crops, D: Dairy, P: Poultry,G:Goat, F: Fish; * indicates significance at 10% level; * indicates significance at 5% level; *** indicates significance at 1% level; - Values in ( ) indicates standard error of mean values' - The farming system with only one household was not considered for ANOVA as well as for paired t test.

the three systems also, performance of field crops systems was found to be better owing to larger holding single compared to other systems.

Middle Gangetic plains

Purnea (Bihar): Four farming systems namely field crops, field crops + dairy, field crops + dairy + goat and field crops + goat were found among which 50% households were having field crops + dairy with mean area of 1.30 ha followed by field crops + dairy + goat with 25 % households practicing with area of 1.13 ha. Interventions made in crop, livestock, processing and optional (nutritionalkitchen garden) modules resulted in significant improvement in marketable surplus and profit of field crops + dairy + goat system and profit of field crops + dairy system. In case of field crops + dairy + goat system, the marketable surplus and profit increased by 31 % and 2 times respectively. The profit of field crops + dairy system increased by 49 % due to interventions in various modules. Among the differentsystem, higher production, marketable surplus and profit were recorded in field crops + dairy + goat system. The cost of the system including cost of interventions was found to be Rs 25,233 in 1.13 ha which is 4 % lesser compared to pre interventions.

Upper Gangetic plains

Kanpur Dehat (Uttar Pradesh): Three farming systems namely field crops , field crops + dairy and field crops + dairy + goat were found among which 83 % households were having field crops + dairy system with mean area of 1.10 ha. Interventions made in crops, livestock, processing and optional (nutritional kitchen garden) resulted in marginal improvement in production, marketable surplus and profit of all the systems. Among the three farming systems, field crops + dairy + goat system recorded higher production (13951 kg), marketable surplus (11243 kg) and profit (Rs 81588) from 0.60 ha area. The least cost increase (12%) due to interventions was observed in field crops + dairy system.

Trans Gangetic plains

Sirsa (Haryana): All the households were having only one farming system of field crops + dairy (2-3 animals) with mean area of 0.85 ha. Interventions in crop, livestock, processing (ghee) and optional (kitchen garden) modules resulted in significant improvement in production (40%), marketable surplus (38.5 %), cost reduction (49 %) and profit (39 %) in the system.

Amritsar (Punjab): All the households were having only one farming system of field crops + dairy with mean area of 0.96 ha. Interventions in existing systems in different modules such as crop, livestock, processing and optional could not influence significantly on production, cost and profit. However, the interventions resulted in higher marketable surplus (8.5 %) significantly.

Eastern plateau and hills

Kabirdham (Chhatisgarh): Three farming systems namely field crops + dairy + poultry, field crops + dairy + poultry + goat and field crops + poultry were found among which 58% households were having field crops + dairy + poultry with mean area of 1.20 ha area followed by 33 % households having field crops + dairy + poultry + goat with area of 1.02 ha. Interventions in crop, livestock, processing (pulse dal, besan and ghee) and optional (nutritional kitchen garden) resulted in significantly higher production (76,58 %), marketable surplus (70, 55 %) and profit (75,60 %) in field crops + dairy + poultry and field crops + dairy + poultry + goat systems respectively. Among the farming systems, field crop + dairy + poultry + goat recorded higher production, marketable surplus and profit.

Pakur (Jharkhand): All the households were having field crops only with mean area of 1.14 ha. The interventions in crop, livestock, processing (wheat gram processing) and optional (nutritional kitchen garden) modules resulted in higher production (2798 kg), marketable surplus (578 kg)

and profit of Rs. 8,274 from 1.14 ha. The cost also reduced by 60 % due to interventions and effective recycling.

Dindori (Madhya Pradesh): Four farming systems namely field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry and field crops + dairy + poultry was found among which 66 % households were having field crops + dairy system with mean area of 1.25 ha followed by 16% households with field crops + dairy + goat system having mean area of 0.90 ha. Interventions made in crop and livestock module resulted in significant increase in marketable surplus of field crops + dairy +goat system and cost of field crops + dairy and field crops + dairy + goat systems. The other parameters were non-significant for all the farming systems. Among the farming systems, field crops + dairy gave higher production and profit, while field crops + dairy + goat gave higher marketable surplus.

Angul (Odisha): Two farming systems namely field crops + dairy and field crops + dairy + poultry were found among which one third households were having field crops + dairy and remaining with field crops + dairy + poultry with mean area of 1.18 and 1.22 ha respectively. Interventions made in crop, livestock, processing (ghee) and optional (fruits plantation, boundary plantation and fisheries) modules resulted in significantly higher production, marketable surplus, cost and profit in both the farming systems. The improvement was found to be 78, 108, 51 and 3 times respectively in field crops + dairy + poultry and 73, 104, 67 and 1.7 times respectively in field crops + dairy system. Among the two farming systems interventions in field crops + dairy + poultry system resulted in higher production marketable surplus and profit even though the cost increases by 51 % compared to existing practices.

Central Plateau and hills

Katni (Madhya Pradesh): Two farming systems namely field crops and field crops + dairy were found among which 83% households were having field crops + dairy system with mean area of 0.71 ha. Interventions made in crop and livestock module resulted in significant improvement in production (60 %) in field crops + dairy system. The cost increase due to interventions was significant in both the systems. The interventions failed to significantly influence on profit of both the systems. Among the two systems, field crops + dairy gave higher production, marketable surplus and profit (Rs 68,998/- in 0.71 ha) with additional cost of Rs 10,205/-due to interventions.

Udaipur (Rajasthan): Two farming systems namely field crops + dairy and field crops + dairy + goat were found among which 83% households were having field crops + dairy + goat system. Interventions made in crop, livestock, processing (vermicompost) and optional (fruits and boundary plantations) resulted in significant improvement in profit (Rs 73,077/- in 0.75 ha) of field crops + dairy + goat. The cost of interventions were also significantly increased (2.8 times) in this system. Among the two systems, even though field crops + dairy recorded higher production marketable surplus and profit, only profit is significantly higher compared to field crops + dairy + goat after interventions. The least cost increase of 2.8 times was observed in field crops + dairy + goat compared to field crops + dairy (3.3 times).

Western Plateau and hills

Aurangabad (Maharashtra): Two farming systems namely field crops and field crops + dairy were found among which 66% households were having field crops systems with mean area of 0.58 ha. The other system was present in 33 % households with mean area of 0.57 ha. Interventions made in crop, livestock and processing (sugarcane juice and ghee) resulted in significant improvement in production (139 %), marketable surplus (106 %) and profit (1.95 times) in field crops system. The cost of interventions was found to be 1.3 times higher.

Pune (Maharashtra): Two farming systems namely field crops + dairy and field crops + dairy + poultry were found among which 58% households were having field crops + dairy + poultry systems

with mean area of 0.72 ha. The interventions made in crop, livestock, processing and optional module (nutritional kitchen garden) resulted in significantly higher production (2.5 times) and marketable surplus (3.1 times) in field crops + dairy + poultry system. The cost of interventions also increased significantly. Among the two systems, higher production and marketable surplus was observed in field crops + dairy system.

Amravati (Maharashtra): Four farming systems namely field crops + dairy, field crops + dairy + goat, field crops + dairy + poultry and field crops + goat were found among which 66 % households were practicing field crops + dairy system with mean area of 1.08 ha. Interventions made in crop, livestock, processing (fortified wheat atta and mineral mixture) and optional (nutritional plantation) resulted in significant improvement in production (57 %) marketable surplus (48 %) and profit (47 %) in field crops + dairy system. The cost of system was reduced by 49 % after interventions mainly due to recycling. Among the systems, higher production, marketable surplus and profit were observed in field crops + dairy + poultry system while the cost reduction due to interventions was found to be higher (49 %) in field crops + dairy system.

Southern Plateau and hills

Warangal (Telangana): Four farming systems namely field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry and field crops + dairy + poultry were found among which 41 % households were having field crops + dairy with mean area of 1.32 ha. Interventions made in crop, livestock, processing (ghee) and optional (nutritional kitchen garden and azolla) resulted in significant improvement in production and marketable surplus of field crops + dairy, production, marketable surplus and profit of field crops + dairy + goat and production and profit of field crops + dairy + goat + poultry system. Among the systems, field crops + dairy, goat + poultry recorded higher production (54168 kg), marketable surplus (47076 kg) and profit (Rs 4.04 lakhs /year) compared to other systems due to interventions. The cost increase due to interventions in this system was found to be only 23 %.

Kolar (Karnataka): Five farming systems namely field crops + dairy, field crops + dairy + goat, field crops + dairy + goat + poultry, field crops + dairy + pig and field crops + dairy + rabbit were found among which 50 % households were having field crops + dairy system with mean area of 0.88 ha. Interventions made in crop and livestock module resulted in minor improvement in production, marketable surplus and profit of field crops + dairy and field crops + dairy + goat + poultry system. Among the farming systems, higher production (23826 kg), marketable surplus (19471 kg) and profit (Rs 1.90 lakhs) was recorded in field crops + dairy system in 0.88 ha. In terms of cost, the least total cost was found to be in field crops + dairy + pig (Rs 40,015 in 0.27 ha) system.

Gadag (Karnataka): All the households were having field crops + dairy system with mean area of 1.30 ha. Interventions made in crop, livestock, processing (butter, vermicompost) and optional (nutritional kitchen garden) resulted in significantly higher production (113 %), marketable surplus (122 %) and profit (68 %) in the system. The cost of the system also increased (2.7 times) significantly due to interventions made in different modules.

Dharmapuri and Krishnagiri (Tamil Nadu): Two farming systems namely field crops + dairy and field crops + dairy + goat was found among which 83 % households were practicing field crops + dairy system with mean area of 1.02 ha. Interventions made in crop and livestock module resulted in significant improvement in marketable surplus (38 %) of field crops + dairy + goat system. Among the two systems, higher production (28877 kg) and profit (Rs 2, 82,554) was observed in field crops + dairy in 1.02 ha. The cost of the system after intervention was found to be almost same in both the systems.

East coast plains and hills

Srikakulam (Andhra Pradesh): Eight farming systems namely field crops, field crop + dairy +

goat, field crops + dairy + goat + poultry, field crops + goat, field crops + dairy, field crops + goat + poultry, field crops + dairy + poultry and field crops + poultry were found among which field crops, field crops + dairy, field crops + poultry and field crops + dairy, field crops + poultry were found in 16 % households each having area of 0.90, 0.30, 1.40 and 1 ha respectively. Interventions made in crop, livestock and optional (azolla) modules resulted in significant improvement in production and marketable surplus of field crops + dairy + poultry system. Among the various farming systems, after interventions, the production (27918 kg), marketable surplus (22097 kg) and profit (Rs 2,75,343) was higher in field crops + dairy + goat + poultry system with the total cost of Rs 66,075/- in 0.52 ha.

Kendrapara (Odisha): Seven farming systems namely field crops + dairy, field crops + dairy + poultry, field crops + dairy + goat + poultry, field crops + dairy + goat, field crops + dairy + fish, field crops + dairy + goat + poultry + fish were found among which 25% households were having area of 1 ha. Field crops + dairy, field crops + dairy + poultry and field crops + dairy + fish were present in 16 % households with mean area of 0.66, 0.89 and 0.64 ha respectively. Interventions made in crop, livestock, processing and optional (nutritional kitchen garden mushroom and fishery) modules resulted in significant improvement in production (132 %), marketable surplus (189 %) and profit (4.7 times) in field crops + dairy + goat + poultry system. In case of field crops + dairy + poultry, the cost was reduced (13.3 %) significantly due to interventions. Among the different farming systems, higher production, marketable surplus and profit was observed in field crops + dairy + goat system. The least cost was found to be in field crops + dairy + goat + poultry + fishery in 1.06 ha area.

Sivagangaiand Pudukottai (Tamil Nadu): All the households were having the field crops + dairy + poultry system with mean area of 1.05 ha. Interventions in crop, livestock, processing and optional modules resulted in significant improvement in production (92 %), marketable surplus (105 %) and profit (3.3 times). The cost increase due to interventions was not significant.

West Coast Plains and ghats

Palghar (Maharashtra): Two farming systems namely field crops + dairy and field crops + goat were found among which 92 % households were having field crops + dairy system with mean area of 0.56 ha. Interventions in crop, livestock and optional (nutritional kitchen garden) modules resulted in significant improvement in production (91 %), marketable surplus (83 %) and profit (25.5 %) in field crops + dairy system. The cost also decreased (24 %) significantly implyingbetter inter-linkage among components due to interventions.

Pathinamthitta (Kerala): Two farming systems namely field crops + horticulture + dairy and field crops + horticulture + dairy + poultry were found among which 92 % households were having field crops + horticulture + dairy system with mean area of 1.30 ha. The interventions made in crop, livestock, processing (curing of garcinia, coconut oil, dry mace, graded pepper and packed milk after filtration) and optional (fisheries, terrace gardening, apiary and vermicompost) in field crops + horticulture + dairy system resulted in higher production (26947 kg), marketable surplus (25588 kg) and profit (Rs 2.48 lakhs / year) from 1.30 ha. The cost of the system also increased (46 %) significantly due to interventions. Among the two farming systems, higher production, marketable surplus and profit were observed in field crops + horticulture + dairy due to interventions. The net returns per rupee invested were also found to be higher (1.19) in the same system.

Gujarat plains and hills

Mehsana (Gujarat): Two farming systems namely field crops and field crops + dairy were found among which field crops + dairy was present in 83 % households with mean area of 1.16 ha. Interventions made in crop and livestock modules resulted in significant improvement in production (140 %), marketable surplus (2.8 times) and profit (40 %) in field crops system while the cost increase

due to interventions was found to be 2.5 times. Among the two systems, field crops + dairy recorded higher profit of Rs 1,75,113/ -from 1.16 ha due to interventions.

Panchmahal (Gujarat): Five farming systems namely field crops + dairy, field crops + poultry, field crops + dairy + poultry, field crops + dairy + goat and field crops + dairy + poultry + goat were found among which field crops + dairy + poultry + goat were present in 50 % of households having mean area of 1.04 ha. Interventions made in crop, livestock, processing and optional (nutritional kitchen garden, fruit, boundary plantations and utilization of stubbles of fodder crop) resulted in higher production, marketable surplus and profit from all the systems. Among the different farming systems, higher production (10718 kg), marketable surplus (8474 kg), and profit (Rs 90,412) was observed in field crops + dairy + poultry + goat system in 1.04 ha due to interventions. The cost increase due to interventions in this systems was found to be Rs 23,362/ which resulted in additional income of Rs 90,412/-. Cost reduction to the extent of 35 and 3-5 % was observed in field crops + poultry and field crops + dairy + poultry systems respectively due to interventions, which implies better recycling within the system.

The results across the locations are summarized as below:

- The number of farming systems in different districts ranged between 1 (Samba, Ambedkarnagar, Sirsa, Amritsar, Pakur and Gadag) to 8 (Srikakulam). Nainital, Kolar and Panchmahal districts were having 5 farming systems while Kendraparahas 7 systems.
- Field crops + dairy was found to be the dominant farming system based on number of households in 20 districts (68 % of total districts studied).
- The dominant systems observed in other districts are field crops (Pakur in Jharkhand), field crops + dairy + poultry (Kabirdham in Chhatisgarh, Pune in Maharashtra and Sivagangai & Pudukottai in Tamil Nadu), field crops + dairy + goat (Udaipur in Rajasthan), field crops + dairy + goat + poultry (Kendrapara in Odisha and Panchmahal in Gujarat) and field crops + horticulture (coconut / rubber) + dairy (Pathinamthitta in Kerala).
- Highly diversified system was observed in Srikakulam district of Andhra Pradesh having many components of farming system namely field crop, dairy, goat, poultry in different combinations ranging from 1 to 4.
- In general, at all the locations, constraint based interventions in crop, livestock, processing and optional modules resulted in improvement in production (1-2 times), marketable surplus (2-5 times) and profit (2-3 times). At many locations, interventions also contributed for significant reduction in cost due to better recycling.

Monitoring of on-farm research experiments at Kendrapara (Odisha)

Azolla production for feeding livestock (dairy and poultry) by farmers at Kendrapara (Odisha)

7.4.4 Frontline demonstration on cropping systems involving oilseeds and training of extension officials and input dealers

The results of the FLD's conducted in farmer's field's by OFR units of AICRP on IFS during 2014-15 are given below.

Objective: To demonstrate the production potential and monetary advantages of well identified cropping and inter cropping systems under real farm situation involving oilseed as one of the component crops in various agro ecosystems.

Technical Programme: The FLD's were conducted at 10 OFR units of All India Coordinated Research Project on Integrated Farming Systems (AICRP on IFS) in five agro ecosystems *viz.,* Arid, Semi-Arid, Sub Humid, Humid and Coastal; covering 10 states. Crops/cropping systems in which FLDs were conducted are given in Table 7.4.6. In Arid ecosystem, at jagudan twelve demonstrations conducted while in Semi-Arid ecosystem, 32 demonstrations in total have were conducted by Amritsar, Seethampeta and Kanpur Dehat centres. A total of 24 demonstrations were conducted in Sub Humid ecosystem at Jeolikote, Kangra, Purnea&Pakur. In Humid & Coastal ecosystem, 10 demonstrations at each centre were conducted at Kakdwip and Tiruvalla. The major cropping systems in which oilseed crops were tested are Hybrid castor in arid ecosystem, gobhisarson, sunflower and sesame in Semi-Arid, mustard,sunflower and gobhisarson in Sub Humid, sunflower in Humid and sesame in Coastal ecosystems. A total of 22 demonstrations were on systems involving sunflower, followed by 18 demonstrations on gobhisarson. The systems involving sesame was undertaken in 15 demonstrations while hybrid castor and mustard crops were taken in 12 and 21 demonstrations respectively. There were only two treatments taken for comparison, i.e. farmers practice (FP) and improved practice (IP). These treatments were applied on a time tested; well recognized oilseed based cropping systems of the location.

Financial source: FLDs on oilseed based cropping systems were 100% financed by Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India through Directorate of Oilseeds Research, Hyderabad.

Table 7.4.6. List of centres of Front Line Demonstrations (FLD) on oilseed based cropping systems (2014-15)

Agro Ecosystem	Name of Centre (State)	Crop/cropping system (s)	Number of demonstrations
1. Arid	Jagudan (Gujarat)	Hybrid castor	12
2. Semi-Arid	Amritsar (Punjab)	Gobhi-Sarson	12
	Seethampeta (Andhra Pradesh)	Sunflower andSesame	10
	Kanpur Dehat	Mustard	10
3. Sub humid	Jeolikote (Uttarakhand)	Mustard	3
	Kangra (Himachal Pradesh)	Maize-GobhiSarson	6
	Purnea (Bihar)	Sunflower and Mustard	10
	Pakur, (Jharkhand)	Mustard	5
4. Humid	Kakdwip (West Bengal)	Rice-Sunflower	10
5. Coastal	Thiruvalla (Kerala)	Sesame	10
Total			88

During 2014-15, an amount of Rs 85,000/- has been released to the different centres.Further Rs 1,44,000/- was released to centres for organizing 4 training programmes.

Salient findings

Out of 88 demonstrations on oilseed based cropping systems, 22 were on cropping system involving sunflower at 3 centres, 18 demonstrations on cropping system involving gobhisarsonat 3 centres, The systems involving castor was undertaken in 12 demonstrations while sesame and mustard crops were taken in 15 and 18 demonstrations respectively.

Yield (Table 7.4.7)

During the year 2014-15 in *Kharif* & *Rabi* season system base five demonstrations on Hy.castor (K) +Lucerne as intercrop and two demonstrations on Hy. Castor (sunhamp green manuring and without green manuring) were conducted in operational area of OFR in Kadi and Visnagar blocks of Mehsana district.

1. The mean data of three demonstrations revealed that Hy. Castor + Lucerne (Fodder and then seed production) broad casting gave 18.77% higher yield than only sole castor crop.

2. The mean data of two demonstrations viz. sunhamp as green manure than sowing of hy.castor gave 18.01% higher yieldthan only sowing of hybrid castor without green manuring.

3. The mean data of three demonstrations revealed that groundnut + Hybrid castor as relay crop gave 168% higher yield than sole crop of groundnut, where as 44.13% higher yieldwas obtained in Bt cotton + Hybrid castor (relay) than only Bt cotton.

In the above four crop addition in main crop, the highest yield obtain in case of groundnut + Hybrid castor main reason behind this is the difference in the height and nature of both crop so less competition face from each other. At jeolikote 15.35% increase in yield recorded over the farmer practice in mustard due to introduction of improved variety like “Rohini” with optimum spacing 30 x 15 and weed control through herbicides (Penda methylene) instead of hand weeding. On an average, 51.0% and 47.7% increase in yield was observed in case of mustard and sunflower under improved variety at Purnea centre.

In case of mustard 22.38 & 143.49% increase in yield over farmer practices were recorded due to (improved variety + nutrient management) & (reduced seed rate + nutrient management) at Kanpur Dehat and Pakur centre respectively. At Seethampeta due to improved variety 149.0% and 61.0% increase in yield was observed in case of sunflower and sesame. Improved package of practices in Gobhisarson (45 X 10 spacing maintain by thinning) and (100-30-0 NPK through Urea and SSP)) at Amritsar 32.47% increase in yield was observed. An yield increase of 54.52% was observed in Gobhisarson with Improved variety HPN-3, at Kangra (Himachal Pradesh). In case of sunflower improved verity (KBSH-41 & KBSH-53) and balanced application of nutrient along with B & S recorded 9.0% increase in yield over the farmer practices at Kakdwip, West Bengal. A significant 34.86% yield increase was reported at Thiruvalla in sesame due to introduction of Tilak variety with improved practices in place of Kayamkulam1. Significant improvement in yield of other crops grown in the system such as rice and maize was also observed under improved package. The increase was found to be 8.34 and 54.74% in rice and maize respectively.

Gross and Net returns (Table 7.4.8)

Gross and Net returns were higher in improved package for all the crops at all locations due to increase in yield. During the year 2014-15 total 12 demonstrations on Hybrid castor were conducted at Jagudancenter result revealed that

1. The mean data of three demonstrations revealed that hybrid castor + Lucerne (Fodder and then seed production) broad casting gave

FLD demonstration at Jagudan (Gujarat) (A) Groundnut Sole (B) Relay Cropping of Groundnut+Castor (C) Small Castor after harvesting of groundnut (D) Young Hybrid Castor after harvesting of Groundnut

FLD demonstration at Jagudan (Gujarat) (A) Castor Sole (B) Inter Cropping of Castor+Lucerne (C) Sole Hybrid castor (D) relay Cropping BtCotton+HybridCastor

Table 7.4.7. Influence of farmers and improved practices on grain or pod yield (kg/ha) of various crops under FLD (2014-15)

Agro Eco system / Centre	Cropping system		No. of demonstrations	Farmers Practice (FP)		Improved Practice (IP)		% increase over FP	
	Kharif	*Rabi*		*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1. Arid									
Jagudan (Gujarat)	Hy castor	-	5	2652	-	3150	-	18.77	-
	Hy castor	-	2	2470	-	2915	-	18.01	-
	Hy castor	-	3	2623	-	6072	-	131.50	-
	Hy castor	-	2	3160	-	4620	-	46.20	-
2. Semi Arid									
Amritsar (Punjab)	-	Gobhi Sarson	12	-	1086	-	1252	-	15.35
Seethampeta (Andhra Pradesh)	-	Sunflower	5	-	210	-	525	-	149.00
	Sesame	-	5	340	-	485	-	61.00	-
Kanpur Dehat (UP)	-	Mustard	10	-	1002	-	1227	-	22.38
3. Sub Humid									
Purnea (Bihar)	-	Mustard	7	-	680	-	1030	-	51.00
	Sunflower	-	3	850	-	1220	-	47.70	-
Jeolikote (Uttarakhand)	-	Mustard	3	-	2500	-	2770	-	15.35
Kangra (HP)	Maize	GobhiSarson	6	1888	785	2921	1213	54.74	54.52
Pakur	-	Mustard	5	-	277	-	674	-	143.49
4. Humid									
Kakdwip (West Bengal)	Rice	Sunflower	45	4186	1540	4535	1675	8.34	9.00
5. Coastal									
Thiruvalla, (kerala)	Sesame*(summer)		10	-	385	-	519	-	34.86

Table 7.4.8. Influence of farmers and improved practices on gross returns (Rs/ha) of various crops under FLD (2014-15)

Agro Eco system / Centre	Cropping system		No. of demonstrations	Farmers Practice (FP)		Improved Practice (IP)		% increase over FP	
	Kharif	*Rabi*		*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1. Arid									
Jagudan (Gujarat)	Hy castor	-	5	101468	-	142124	-	40.07	-
	Hy castor	-	2	93860	-	110770	-	18.02	-
	Hy castor	-	3	115086	-	231548	-	101.19	-
	Hy castor	-	2	152350	-	195480	-	28.31	-
2. Semi Arid									
Amritsar (Punjab)	-	Gobhi Sarson	12	-	34747	-	40080	-	15.35
Seethampeta (Andhra Pradesh)	-	Sunflower	5	-	6100	-	16500	-	170.49
	Sesame	-	5	37400	-	53350	-	-	42.65
Kanpur Dehat (UP)	-	Mustard	10	-	36947	-	45329.4	-	22.69
3. Sub Humid									
Purnea (Bihar)	-	Mustard	7	-	-	-	-	-	-
	Sunflower	-	3	-	-	-	-	-	-
Jeolikote (Uttarakhand)	-	Mustard	3	-	80525	-	89017	-	10.54
Kangra (HP)	Maize	GobhiSarson	6	-	-	-	-	-	-
Pakur	-	Mustard	5	-	-	-	-	-	-
4. Humid									
Kakdwip (West Bengal)	Rice	Sunflower	45	61268	61297	69805	66674	13.93	8.77
5. Coastal									
Thiruvalla, (kerala)	Sesame*(summer)		10	-	71206	-	95978	-	34.79

Table 7.4.9. Influence of farmers and improved practices on net returns (Rs/ha) of various crops under FLD (2014-15)

Agro Eco system / Centre	Cropping system		No. of demonstrations	Farmers Practice (FP)		Improved Practice (IP)		% increase over FP	
	Kharif	*Rabi*		*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
1. Arid									
Jagudan (Gujarat)	Hy castor	-	5	61464	-	92404	-	50.53	-
	Hy castor	-	2	60175	-	72260	-	20.58	-
	Hy castor	-	3	64776	-	173931	-	168.00	-
	Hy castor	-	2	90120	-	130280	-	44.56	-
2. Semi Arid									
Amritsar (Punjab)	-	Gobhi Sarson	12	-	22415	-	28337	-	26.42
Seethampeta (Andhra Pradesh)	-	Sunflower	5	-	3240	-	15980	-	393.20
	Sesame	-	5	28800	-	44046	-	52.93	-
Kanpur Dehat (UP)	-	Mustard	10	-	19682	-	26129.4	-	32.67
3. Sub Humid									
Purnea (Bihar)	-	Mustard	7	-	-	-	-	-	-
	Sunflower	-	3	-	-	-	-	-	-
Jeolikote (Uttarakhand)	-	Mustard	3	-	45658	-	53517	-	17.21
Kangra (HP)	Maize	GobhiSarson	6	-	-	-	-	-	-
Pakur	-	Mustard	5	-	-	-	-	-	-
4. Humid									
Kakdwip (West Bengal)	Rice	Sunflower	45	18859	20760	27951	25981	48.21	25.00
5. Coastal									
Thiruvalla, (kerala)	Sesame*(summer)		10	-	22386	-	44550	-	99.01

40.07 and 50.34% higher gross and net return than only sole castor crop.

2. The mean data of two demonstrations viz. sunhamp as green manure than sowing of hybrid castor gave 18.02 and 20.58% higher gross and net monetary return than only sowing of hybrid castor without green manuring.

3. The mean data of three demonstrations revealed that groundnut + Hybrid castor as relay crop gave 101.19 and 168%higher gross and net return than sole crop of groundnut, whereas 28.31 and 44.13% higher gross and net monetary return was obtained in Bt cotton + hybrid castor (relay) than only Bt cotton.

In the above four crop addition in main crop, the highest monetary return obtain in case of groundnut + Hybrid castor main reason behind this is the difference in the height and nature of both crop so less competition face from each other. Higher gross return of sunflower due improved practices was realized atSeethampeta (Rs 165000 ha^{-1}) followed by Kakdwip (Rs 66674 ha^{-1}). At Jeolikote due to introduction of improved variety like "Rohini" with optimum spacing 30 x 15 and weed control through herbicides (Penda methylene) recorded gross return Rs 61950 ha^{-1}. On an average, Gobhisarson recorded gross income of Rs 40080 $ha^{-1}$with improved package of practices (45 X 10 spacing maintain by thinning) and (100-30-0 NPK through Urea and SSP) at Amritsar. At Kanpur Dehat in case of mustard reduced seed rate along with nutrient management recorded gross return of Rs 45329 ha^{-1}. Other crops grown in the system such as rice was also recorded positively increase in gross return Rs 69805 ha^{-1} respectively.

In terms of net returns, 26.42% increase was observed at Amritsar in Gobhisarson with improved package. In mustard, improved package led to 17.21 & 32.67% increase in net return at Jeolikote and Kanpur Dehat centre over farmers practice. In case of sunflower improved practices recorded 25.0% increase in net return over the farmer practices at Kakdwip, West Bengal. On an average, 393.2and 52.93% increase in net return was observed in case of sunflower and sesame under improved variety at Seethampeta centre.In case of sesame improved practices recorded 99.01% increase in net return over the farmer practices at Thiruvalla, Kerala, which same pattern we getting in previous year trial also. The other crops such as rice evaluated in the system gave 48.21% increase in net returns with improved package compared to farmers practice.

Results for large scale exploitation

The cropping systems involving oilseeds promise to increase the production of oilseeds on the one hand and improve the profitability for farmers on the other hand. In all the FLDs, it was proved that yield and net returns can be increased by adopting improved package in place of farmers practice. The gist of the practices for various crops is given below for large scale adoption.

Sl. No.	Crop	Location (ecosystem)	Improved Package	Increase in yield (%)	Increase in net returns (%)
1.	Mustard	Jeolikote (Uttara-khand)	Rohini variety with wider spacing 30 x 15 in place of 30 x 10 with weed control by Penda methylene instead of hand weeding	51.00	17.21
		Purnia (Sub humid)	Improved variety of "R-Sufalam"	51.00	-
		Kanpur Dehat (Semi-arid)	Reduced seed rate + Nutrient management	22.38	32.67
		Pakur (Sub-humid)	Improved variety with Nutrient management	143.49	-

Sl. No.	Crop	Location (ecosystem)	Improved Package	Increase in yield (%)	Increase in net returns (%)
2.	Hybrid Castor	Junagadh Arid	Intercropping with lucerne	18.77	50.53
			Green manuring	18.01	20.58
			Relay cropping with groundnut	131.50	168.00
			Relay cropping with Bt cotton	46.20	44.56
3.	Sesame	Thiruvalla (Coastal)	Tilak variety	34.86	99.01
		Seethampeta (AP)	YLM-66 variety	61.00	52.93
4.	Sunflower	Purnia (Sub-humid)	Leader(SF)	47.70	-
		Seethampeta (AP)	Improved variety with Nutrient management	149.00	393.20
		Kakdwip (West Bengal)	KBSH-41 & KBSH-53 variety, Balanced application S & B	9.00	25.00
5.	Gobhi sarson	Amritsar (Punjab)	After germination 45 X 10 spacing maintained by thinning, NPK 100-30-0 supplied by urea & SSP	15.35	26.42
		Kangra (HP)	HPN-3 variety	54.52	-
6.	Rice	Kakdwip (WB)	Improved variety	8.34	48.21
7.	Maize	Kangra (HP)	Kanchan Hybrid	54.74	-

Training on new technologies and development in oilseeds cultivation

As per new guideline of NMOOP, all the four OFR centre has to conducted training programme for update the knowledge of extension/agricultural officers and inputs dealers who are directly associated with farmers and selling seeds/ pesticides/agricultural machinery etc. Under this total 90 participant are get benefited 28 from Thiruvalla, 22 from Mehsana and 20 participant each from Kakdwip and Kanpur dehat centre. These training were successfully conducted and knowledge regarding new technologies of oilseeds cultivation through improved package of practices for different oilseeds crops and basic principles in agriculture for higher crop production was imparted through lectures and practically by field visit.

Training on new technologies and development in oilseeds cultivation organised atThiruvalla (Kerala)

8. GENERAL/MISCELLANEOUS

8. GENERAL/MISCELLANEOUS

8.1 LIST OF PUBLICATIONS

8.1.1 Research Papers

ANGRAU, Rajendranagar (AP)

Sridevi, S. and Venkata Ramana, M. 2014. Productivity, soil fertility and sustainability of continuous rice system under long-term substitution of through organics Research on Crops (An International Journal) 15 (1) : 22-26

Sekhar, K., Venkata Ramana, M. and Sridevi, S. 2013. Response of Bt cotton to plant geometry and canopy nanagement. The Andhra Agricultural Journal 60(2):245-249

Vani Anusha, S., Prabhu Prasadini, P., Sridevi, S. and Surya Prakasa Rao, K. 2013. Effect of Organic fertilizers on growth, yield and quality of tomato (Lycopercicum esculentum).The Journal of Research ANGRAU 41(2): 126-130

Sekhar, K., Venkata Ramana, M. and Sridevi, S. 2013. Enhancing the productivity of Bt cotton by planting geometry and chloro mepiquat chloride application. Green Farming International Journal 4(1): 40-42

Sekhar, K., Venkata Ramana, M. and Sridevi, S. 2013. Influence of growth regulator application on Bt cotton under varying plant densities. Green farming International Journal 4(3): 355-357

BAU, Sabour (Bihar)

Sharma, R.P., Sushant, Dutta, S.K. and Ghosh, Mainak. 2014. Diversification of rice (*Oryza sativa*)-wheat (*Triticum aestivum*) cropping system for sustainable production in south Bihar alluvial plain. Indian Journal of Agronomy Vol.59 (2):191-199.

Das Anupam, Sharma, R.P., Chattopadhyaya, N. and Rakshit, R. 2014.Yield trends and nutrient budgeting under a long-term (28years) nutrient management in rice-wheat cropping system under subtropical climatic condition. Plant Soil Environment Vol.60, 2014, No.8:351-357.

IGKVV Raipur (Chatisgarh)

Chitale, S., Pali, G.P., Tiwari, A., Urkurkar, J.S., Kumar, Vinod and Singh, P. 2013. Effect of organic nutrient management in high value rice *(Oryza sativa L.)*-onion (Allium cepa) cropping system in Chhatishgarh.Journal of Farming System research and Development 19(1):12-19.

NAU, Navsari

Meena, S.K., Desai, L.J., Saukat, Ali, Shivran, A. and Bijarniya, A.L. 2013. Study on influence of weed control methods on yield, quality, and economics in dill seed (Anethum graviolence L). Crop Research, 46(1,2&3):234-237.

Meena, S.K., Desai, L.J., Saukat Ali, and Shivprakash, Nagar. 2013. Effect of weed management on yield, quality and weed parameters in dill seed (Anethum graviolence L).International Journal of Agricultural Science, 9(2):723-727.

Desai, L.J., Patel, M.M.,Chaudhary, P.P., Saukat, Ali, and Patel, J.K. 2013. Influence of integrated nitrogen management on nutrient content and uptake of grain amaranth (Amaranthus hypochondriacusL.) Journal of Soil and Cerops, 231):53.

Desai, L.J., Thanki, J.D., Nitin, Gudadhe and Dugarani, R.A. 2014. Study on rice (*Oryza sativa L.*) based cropping system under south Gujrat condition. Bioinfolet, 11(2C), 658-662, 2014.

Desai, L.J., Thanki, J.D., Nitin, Gudadhe and Dugarani, R.A. 2014. Effect of cropping systems on crop productivity and profitability under South Gujrat condition. Indian J ecology 41(2):240-242:2014.

CCS HAU, Hisar (Haryana)

Jat, R.D. and Nanwal, R.K. 2013. Growth, nutrient uptake and profitability of Bt cotton (Gossypium hirsutum) influenced by spacing and nutrient levels. *Crop Res.* 45(1, 2 & 3):248-252.

Neelam, Nanwal, R.K. and Kumar, Pawan. 2013. Productivity and quality of mungbean-wheat cropping system as influenced by organic and inorganic sources of nutrients in semi arid environment. *Res. on Crops* 14(3): 786-791.

Neelam, Nanwal, R.K. and Kumar, Pawan. 2014. Nutrient management in pulse-wheat cropping system: A Review. *Annals of Agri. Bio. Res*. 19(1):61-66.

Kumar, Pawan, Yadav, S.K., Kumar, Manoj and Hasija, R.C. 2014. Cropping systems involving pulses, oilseeds and vegetable for livelihood improvement of farmers in semi-arid region. *Annals of Biology* 30(1): 123-126

CSK HPKVV, Palampur (H.P.)

Negi, S.C., J., Shekhar, Mankotia, B.S. and Singh, Gurudev. 2013. Fertilizer schedule under limited irrigation with zero tilled wheat *(Triticum aestivum)* after rice *(Oryza sativa)* in north-west Himalyas. Indian Journal of Agronomy. 58(2):187-191.

Ramesh, Rana, S.S., Negi, S.C., Suresh, Kumar and Subehia, S.K. 2014. Effect of resource-conserving and planting techniques on productivity of maize (Zea Mays)-wheat *(Triticum aestivum)* cropping system. Indian Journal of Agronomy.59 (1); 34-40.

Sharma, S.K., Negi, S.C., Subehia, S.K. and Rana, S.S. 2013. On-farm evaluation of management practices of Rice and wheat in sub-mantane sub-tropical lowhills zone of Himachal Pradesh. Journal of Krishi Vigyan 2(1):41-44.

Subehia, S.K., Swapana, Sepehya, Negi, S.C., Rana, S.S. and Sharma, S.K. 2013. Long term effects of organic and inorganic fertizers on rice *(Oryza sativa L.)*-wheat (Triticum aestivum L.) yield and

chemical properties of an acidic soil in the Western Himalayas.Exp.agri.49 (3):382-394, Canbridge University Press.

Sharma, S.K., Negi, S.C., Subehia, S.K. and Rana, SS. 2013. On farm evaluation of management practices of rice and wheat in sub montane subtropical low hills Zone of Himachal Pradesh. Journal of Krishi Vigyan 2(1):41-44.

Ramesh, Rana, S.S. and Kumar, Suresh. 2014. Weed dynamics and productivity of maize-wheat cropping system as influenced by tillage/planting techniques. International Journal of Science, environment and Technology 3(3):1059-1070.

Sharma, Upender and Subehia, S.K. 2014. Effect of long-term integrated nutrient management on rice (Oryza sativaL.)-wheat (Triticum aestivumL.) Productivity and Soil Properties in North western Himalaya. Journal of Indian Society of Soil Science.62(3):248-254.

Sharma, Upender and Subehia, S.K. 2014. Chemical fractions of zinc and their contribution towards its availability under long-term integrated nutrient management in rice-wheat sequence in an acid alfisol. Communications in Soil Science and Plant analysis.45:2898-2910.

SKUAT, Jammu (J&K)

Sharma, Rohit, Kachroo, Dileep, Thakur, N.P., Gupta, A.K., Bharat, Rajeev, Sharma, Vishal and Arya, Vivek. 2013. Efect of puddling, irrigation and nutrient sources on yield nutrient uptake by rice and soil moisture status under sub-tropical condition of Jammu.Annals of plant and soil research.15 (2):93-96.

Kachroo, Dileep, Thakur, N.P., Kour, Manpreet, Sharma, Rohit and Khajuria, Vijay. 2013. Diversification of rice based cropping system.Indian Journal of agronomy 58(4): 58-62.

Kour, Manpreet, Singh, K.N., Singh, Mahendra, Thakur, N.P., Kachroo, Dileep and Sharma, Rohit. 2013. Assesment of climate change and its impact on growth and yield of wheat under temperate and sub-tropical condition through DSSAT 4.0. Journal of Agrometrology.15(2): 142-146.

JNKVV, Jabalpur (M.P.)

Verma, Nidhi, Vishwakarma, S.K., Shrivastava, Deepak and Shah, M.S. 2013. “Studies on weed flora and weed control efficiency under diversification and intensification of rice based cropping systems” *Crop Res*. **46** (12 &3): 16-21

Shrivastava, D. and Vishwakarma, S.K., Nidhi, Verma and Shah, M.S. 2013. “Bio-efficacy and phytotoxicity of clodinofop-propargyl (15%) on weed control in wheat crop.” *Journal of Weed Science 47 (2:)305-307*

Shukla, V.K., Jain, Vikas and Vishwakarma, S.K. 2013. “Growth, seed yield and seed quality of Chinese cabbage (Brassica napus L.) as affected by different fertility levels and row spacing.” *J. Soils and Crops* 23 (1) : 30-35.

RVSKVV, Indore

Joshi, Arun, Gupta, J.K., Choudhary, S.K. and Paliwal, D.K. Efficacy of different nitrogen sources doses and split application on growth and yield of maize (Zeamays L.) in the malwa region of M.P. IOSR Journal of Agriculture and Veterinary science Volume-2 ver-1 page 39-42.

PAU, Ludhiana (Punjab)

Aulakh, C.S., Gill, M.S., Walia, S.S., Mahey, R.K. and Walia, U.S. 2014. Performance of diversified cropping systems under organic, Integrated and chemical farming in Punjab. Indian J.Ecology 40(2): 258-263.

Aulakh, C.S., Gill, M.S.,Walia, S.S., Singh, Surjit and Kour, Kanwalpreet. 2013. Evaluation of cropping systems for green fodder productivity at farmers, Field in Punjab.Current advances in Agricultural Science 5(2):221-224.

Aulakh, C.S., Singh, Hargopal, Walia, S.S., Phutela, R.P. and Singh, Gurminder. 2013. Characterization and evaluation of microbial culture for field crops. *Indian Journal of Agronomy* 58(2):182-186.

Gill, J.S. and Walia, S.S. 2013. Effect of establishment methods and nitrogen levels on basmati rice (Oryza sativa L.). *Indian Journal of Agronomy* 58(4):506-511.

Gill, J.S. and Walia, S.S. 2014. Effect of foliar application of iron, zinc and manganese on direct seeded aromatic rice (Oryza sativa L.). *Indian Journal of Agronomy* 59(1):80-85.

Gill, J.S., Walia, S.S. and Gill, R.S. 2014. Effect of establishment methods and nitrogen levels on uptake of micronutrients in basmati rice. *J soils and Crops 24(1):1-12.*

Walia, M.K., Walia, S.S. and Dhaliwal, S.S. 2014. Long term impact of chemical fertilizers and organic manures on weed dynamics of rice in rice-wheat system. *International J Science, Environment and Technology 3(3):1260-1267.*

Walia, S.S. and Kaur, N. 2013. Integrated farming system-An eco-friendly approach for sustainable agriculture environment-A review. *Greener J of agroforestry and Horticulture* 1(1):1-11.

Walia, S.S., Dhaliwal, S.S., Brar, A.S., Singh, Satpal, Singh, Roopinder, Aulakh,C.S. and Kaur, Navdeep. 2013. Stability, efficiency and soil fertility parameters of different cropping systems in Western Himalayan region *J soils and Crops 23(2):253-258.*

Walia, S.S., Singh, Satpal and Singh, Roopinder. 2013. Role of women in decision making in agricultural activities in Punjab. *J Res PAU 50 (3&4):172-174*.

Walia, S.S., Singh, Satpal, Dhaliwal, S.S., Singh, Roopinder, Aulakh, C.S. and Kaur, Navdeep. 2014.Yield maximization of rice-wheat cropping system through balanced nutrition in North-west India. *Indian Journal of Fertilizers 10(2):52-55.*

Walia, U.S., Walia, S.S., Sidhu, A.S. and Nayyar, S. 2014. Productivity of direct seeded rice in relation to different dates of sowing and varieties in Central Punjab. *Journal of Crop and weed* 10(1):126-129.

Walia, U.S., Walia, S.S., Sidhu, Amandeep, Singh and Nayyar, Shelly. 2012. Bio-efficacy of pre and post emergence herbicides in direct seeded rice in Central Punjab.Indian Journal of Weed Science 44(1):30-33.

PDKV, Akola

Ganvir, S.S., Ghanbhadhur, Mangla and Kharagkharate, V.K. 2014. Effect of high density planting, nutrient management and land configuration on economics and nutrient uptake of *hirsutum* cotton. Green farming : 5(1):92-94.

SKNAU, Durgapura (Rajasthan)

Singh,Ranveer, Ram, T., Choudhary, G.L. and Gupta, A.K. 2013. Effect of integrated nitrogen management on nutrient uptake. Quality, economics and soil fertility of peal millet under rainfed conditions. Elixir Agriculture, 54(2013): 12373-12375.

Singh, Ranveer, Gupta, A.K., Ram, T., Choudhary, G.L. and Sheoran, A.C. 2013. Effect of integrated nitrogen management on transplanted pealmillet (*Pennisetum glaucum*)under rainfed condition. Indian Journal of Agronomy, 58(1):81-85.

Gothwal, D.K., Gupta, A.K. and Kumhar, B.L. 2013. Comparative performance of genotypes evaluated by certain quantitative traits under heat stress in bread wheat (Triticum aestivum L.em.Thell). Environment & Ecology, 31 (2B):934-937.

OUA&T Bhubaneswar (Odisha)

Mishra, K.N., Jena, D. and Samanta, T.K. 2014. Soil moisture regime based land use in Knchinala micro-watershed of Odisha. Journal of Research, OUAT 31(1&2):5-7.

Panigrahi, T., Garnayak, L.M., Ghosh, M., Bastia, D.K. and Ghosh, D.C. 2014. Productivity and profitability of Basmati rice varieties under SRI. International Journnal of Bio-resource and Stress Management 5(3):333-339.

Samanta, K. and Mishra, K.N. 2014. Efficacy of post-emergence herbicide quizalofop ethyl for controlling grassy weeds in groundnut. Indian Journal of Agricultural Research 48(6):488-492.

Mohanty, Ayesha and Mishra, K.N. 2014. Influence of conservation agriculture production system on available soil nitrogen, phosphorus, potassium and maize equivalent yield on a Fluventic Haplustepts in the north central plateau zone of Odisha. Trends in Biosciences7(23):3962-3967.

TNAU, Coimbatore (T.N.)

Sangeetha, S.P., Balakrishnan, A. and Devasenapathy. 2013. Influence of organic manure on yield and quality of rice (oryza sativa L.) and blackgram (vigna mungo L.) in rice-Blackgram cropping sequence. American Journal of Plant Science.4: 1151-1157.

CSAUAT, Kanpur (U.P.)

Singh, Sanjive Kumar, Khan, Naushad and Dutta, S.D. 2013. Standardization of package of practices for Zamikand (*Amorphallus campanulatus Blume.*) cultivation *HortFlora Research Spectrum, 2(2): 182-183 (April-June 2013).*

GBPUAT, Pantnagar (UT)

Singh, D.K. and Kumar, P. 2014. Influence of diversification of rice (Oryza sativa L.)-wheat (Triticum aestivum) system on productivity, energetic and profitability under on-farm conditions. Indian Journal of Agronomy. 59(2):24-27.

Singh, D.K., Kumar, P. and Bhardwaj, A.K. 2014. Evaluation of Agronomic management practices on farmers' fields under rice-wheat cropping system in Northern India. International Journal of Agronomy. Volume 2014. Article ID 740656, 5pages, http://dx.doi.org/10.1155/2014/740656.

Kumar, P. and Singh, D.K. 2013. Performance of promising urdbean genotypes under organic mode in Garhwal Himalayas. Pantnagar Journal of Research. 11(2):309-311.

Chandra, H., Aditay, J.P. and Singh, D.K. 2013. Evaluation of wheat genotypes for diffent morpho-physiological traits at different planting dates in Himalayan foothills.Progressive Research 8(special):64-68.

Kumar, A. and Singh, D.K. 2013. Studies on seed rate, row spacing and varieties in chickpea under late planting conditions. Progressive Research 8(special):215-216.

Kumar, A. and Singh, D.K. 2013. Effect of seed rate, row spacing and variety on growth, yield and nutrient uptake of late sown chickpea. Progressive Research 8(special):21-24.

Jaipaul, Singh, V.P., Kumar, P. and Singh, A.P. 2013. Effect of organic manure and inorganic fertilizers along with biofertilizers on yield and economics of brinjal(Solanum melongena L.) under high hill conditions of Uttarakhand. Progressive Research journal, 8(2):232-236.

BHU, Varanasi

Pandey, Divya, Agrawal, Madhoolika and Bohra, J.S. 2013. Impact of four tillage permutations in rice-wheat system on GHG performance of wheat cultivation through carbon footprinting. Ecological Engineering 60:261-270.

Rakesh, Kumar and Bohra, J.S. 2014. Effect of NPKS and Zn application on growth,yield,economics and quality of baby corn. Archives of Agronomy and Soil Science 60(9):1193-1206.

Singh, Ravikant, Bohra, J.S., Nath, Triyugi and Srivastav, Rajeev Kumar. 2014. Effect of varying level of diversification and intensification of rice-wheat cropping system on the production potential and nutrient balance of soil in Indo-Gangetic Plain of India. Agricultura 9: No 1-2, 9-16(2013).

Pandey, Divya, Agrawal, Madhoolika and Bohra, J.S. 2014. Effects of Conventional tillage and no tillage permutations on extracellular soil enzyme activities and microbial biomass under rice cultivation. Soil and Tillage Research 136:51-60.

Singh, D.N., Bohra, J.S. and Singh, J.K. 2013. Influence of NPK, S and variety on grouth, yield and quality of irrigated linseed (Linum usitatissimum). Indian Journal of Agricultural Sciences 83 (4):456-8.

Meena, V.S., Maurya, B.R., Bohra, J.S., Verma, R. and Meena, M.D. 2013. Effect of concentrate manure and nutrient levels on enzymatic activities and microbial population under submerged rice in alluvium soil of Varanasi. Crop Research 45(1,2&3):6-12 (2013).

DBSKV, Dapoli, Karjat

Pahiwale, P.H., Chavan, L.S., Jagtap, D.N., Mahadkar, U.V. and Gawade, M.B. 2013. Effect of establishment methods and nutrient management on yield attributes and yield of finger millet (Elusine coracana G.).Crop res.45 (1, 2&3):141-145.

Nevse, G.P., Chavan, L.S. and Jagtap, D.N. 2013. Performance of finger-millets (Eleusine coracana L.) to age of seedlings. FYM and fertilizer levels. J. Indian Soc.Coastal agric.Res.31(2):64-70.

Gorade, V.N., Chavan, L.S., Jagtap, D.N. and Kolekar, A.B. 2014. Response of green gram (Vigna radiate L.) varieties to integrated nutrient management in summer season. Agric. Sci.Digest.34(1):36-40.

Patil, A.B., Chavan, L.S. and Jagtap, D.N. 2014. Response of groundnut (Arachis hypogaea L.) varieties to nutrient management in Rabi-hot weather season. Legume Res.37 (4): 395-401.

Patil, K.D., Vaidya, K.P., Borse, D.K., Gangan, S.G. and Chavan, L.S. 2014. Reclamation, management and production potential of coastal saline soils of Maharastra. J.Indian Soc. Coastal agric.Res.32(1) 7-10.

Sutar, V.K., Chavan, L.S. and Game, V.N. 2014. Response of Cowpea (Vigna unguiculata L.) varieties to different sowing dates and effect on yield,quality and soil fertility. J.Indian Soc.Coastal agric.Res.32(1)16-20.

Karamana

Jacob, J. 2013. Soil Fertility Management in the Homesteads of Kerala. In: Proceedings of the Workshop on Managing Soil for Food Security and Climate Change Adaption (Ed.P.N.Premachandran), pp.133-142.

Jacob, J. 2013. Tuber crops in homestead and periurban farming systems. In: Empowering VHSE Agripreneures (Eds.Anilkumar, A.S. Govindan, M., Nehru, S.M. and Anilkumar, A), pp.73-79. College of Agriculture, Padannakkad, Kerala Agricultural University.

Jacob, J., Rajasekharan, P. and Rajasree, G. 2013. Yield gap and technology adoption in cassava in homesteads under different agro ecological units of Kerala. In: Abstract of Papers, International Conference on Tropical Roots and Tubers for Sustainable Livelihood under Changing Agro-Climate, p.266, Indian Society of Root Crops and CTCRI, Thiruvananthapuram, Kerala.

Jacob, John, Rani, B., Varughese, K. and Babu, M. 2013. Performance of cassava (Manihot esculenta Crantz.), sweet potato (Ipomoea batatas (L.) Lam.) and Chinese potato (Plectranthus rotundifolius (Poir) J.K. Morton) in rice based cropping sequence of southern Kerala. In: Abstract of Papers,

International Conference on Tropical Roots and Tubers for Sustainable Livelihood under Changing Agro-Climate, p.109-110, Indian Society of Root Crops and CTCRI, Thiruvananthapuram, Kerala.

Jinsy, V.S., Shalini, P. and Jacob, J. 2014. Aerobic rice: An option to improve the water productivity of rice. In: Proceedings of the International Symposium on Integrated Water Resources Management Vol II (Eds.Prasad, N.B.N., Harikumar, P.S., Joseph, E.J., Gopinath, G., Surendran, U. and Ambili, G.K.), pp.976-981, CWRDM, Kozhikode, Kerala.

ICAR-CIARI, Andman & Nicobar Islands

Velmurugan, A. and Swarnam, T.P. 2013. Nitrogen release pattern from organic manures applied to an acid soil. Journal of Agricultural Science, 5(6):174-184.

8.2 PAPER PRESENTED IN SEMINAR/SYMPOSIA

ANGRAU, Rajendranagar (AP)

Rao, K., Upendra Rao, A., Sekhar, D. and Venugopal, Rao. 2014. Sustainable Farming systems for north coastal Andra Pradesh. ISSP South Zonal Seminar on “Physiological and Molecular Interventions for Improving Crop productivity”, Agricultural College, Bapatla, pp.42.

Rajendra Prasad, V., Tejeswara Rao, K. and Chinnam Naidu, D. 2013. Identification of predominant farming systems in high altitude and (HAT) zone of Andhra Pradesh. National conference on agro biodiversity management for sustainable Rural Development, NAARM, Hyd.pp.17.

Tejeswara Rao, K., Sagar, T.V. and Ethno, T.B. 2013. Medicinal Plants as natural remedies in vizianagaram district of Andra Pradesh. National Seminar on biodiversity and conservation of medicinal plants, govt. degree college (men), Srikakulam, Andhra Pradesh, pp.41.

SDAU, SK Nagar (Gujarat)

Patel, P.K., Patel, B.S., Patel, S.M., Patel, J.K. and Ali, Shaukat. 2013. “Long-Term effect of integrated nutrient management in pearlmillet-wheat sequence on soil fertility status and bulk density at different depth of soil profile in loamy sand soils.” Poster presented in National seminar on “Developments in soil science” held at CAZRI, Jodhpur organized by ISSS during October 23-26, 2013.

Patel, S.K., Patel, B.S., Patel, P.K., Patel, S.M., Patel, R.R., Ali, Shaukat and Singh, Jitendra. 2013. Intensification and / or diversification of the cropping system by fennel on farmer’s field. Poster presented in National Seminar on Production, Productivity and Quality of spices held at Panchayati Raj Bhawan, Jaipur (Rajasthan) on February 02-03, and 2013.Pp128.

Patel, B.S., Patel, S.M., Patel, P.K., Ali, Shaukat, Bhatt, P.K. and Yadav, B.L. 2013. Development of organic farming package for system based high value crops of green manuring-potato-summer groundnut sequence. Paper orally presented in National Seminar on Role of Organic Farming in Climate Resilient and Sustainable Agriculture held at NAU, Navsari (Gujrat) on January 09-10,2014 Pp 184.

Singh, Jitendra, Patel, B.S. and Rathore, B.S. 2014. Feasibility of inter/mixed cropping systems of mustard with Lucerne.Poster presented in 2nd National Brassica Conference, held at PAU, Ludhiana (Punjab) on February 14-16,2014.Pp 105.

JAU, Junagarh (Gujarat)

Dabhi, A.B., Dabhi, B.M., Sagarka, B.K. and Mathukia, R.K. 2014. Organic farming package for high value groundnut (kharif)-onion (Rabi) cropping system for saurastra region. A paper presented in International Congress on "Agriculture, Food Engineering and environment Scence-Sustainable Approaches" during 29-30 March, 2014 at New Delhi.

Dabhi, B.M., Mathukia, R.K. and Sagarka, B.K. 2014. Tillage and sowing method for Bt cotton. A paper presented in International Congress on "Agriculture, Food Engineering and environment Scence-Sustainable Approaches" during 29-30 March, 2014 at New Delhi.

NAV, Navsari (Gujarat)

Desai, L.J., Thanki, J.D. and Gudadhe. 2014. "Development of organic farming package for high value crop sequence (kharif paddy-summer groundnut)" in national seminar on Role of organic farming in climate resilient and sustainable farming organized by ASPEE college of Horticulture and Forestry, Navsari and Navsari Agricultural University Navsari on 9-10 January 2014.pp:189 at Navsari.

Gudadhe, N.N., Thanki, J.D., Patel, T.U., Pankhaniya, R.M. and Desai, L.J. 2013. Use of resourse conservation technology for global warming resilience in national training programme on crop micrometeorology 4th to 24th December, 2013 sponsored by Indian council of Agricultural research, New delhi organized by CAFT in agricultural Meteorology, Mahatma Phule Krishi Vidyapeeth.

CCS HAU, Hisar (Haryana)

Kumar, Pawan, Nanwal, R.K. and Yadav, S.K. 2014. Integrated Cropping System Model for Small and Marginal Farming Situations of Haryana. Paper presented in National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, Jan., 6-7, 2014 at CCS HAU, Hisar.Pp.164.

Nanwal, R.K. and Pawan, Kumar. 2014. Integrated Farming System Model for irrigated as well as rainfed farming situations for Haryana. Paper presented in National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, Jan., 6-7, 2014 at CCS HAU, Hisar.Pp.167.

Sharma, Manoj, Kumar, Yadav, S.K., Pawan, Kumar and Nanwal, R.K. 2014. Integrated Nutrient Management for better soil fertility and nutrient uptake. Paper presented in National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, Jan., 6-7, 2014 at CCS HAU, Hisar.Pp.142.

Kumar, Pawan, Manoj, Kumar, Yadav, S.K. and Nanwal, R.K. 2014. Integrated nutrient management in pearlmillet-wheat cropping system for sustained production. In: 101st Indian Science Congress Vol. II pp. 69-79 held at Jammu University, Jammu (3-7 Feb, 2014.

SKUAT, Jammu (J&K)

Rohit, Sharma. 2014. Profitability, productivity and sustainability of organic farming practices in crop diversification, Paper presented in 3rd J&K Science Congress "on organic research and technology" held on May,12-14,2014 at SKUAST-K,Srinagar,J&K.

JNKVV, Jabalpur (M.P.)

Vishwakarma, S.K., Shukla, V.K., Dubey, Lokesh and Khamparia, N.K. "Productivity, economic and soil fertility as affected by organic inorganic and integrated nutrient management in scented rice (Oryza sativa) – potato (Solanum tuberosum) high value cropping system in Kymore Plateau and Satpura Hills zone of Madhya Pradesh." Paper presented in National Seminar on "Relevance of Organic Farming Indian Agriculture" organized by National Institute of Advanced studies, Indian Institutes of Sciences Campus, Banglore held from February 3-4, 2014 at Banglore Karnataka.

Shukla, V.K., Vishwakarma, S.K., Dubey, Lokesh and Khamparia, N.K. "Production Potential, Water Productivity and Economics of Rice Based Cropping System under Different Nutrient Management at Kymore Plateau and Satpura Hill Zones of Madhya Pradesh." Paper presented in National Seminar on "Relevance of Organic Farming Indian Agriculture" organized by National Institute of Advanced studies, Indian Institutes of Sciences Campus, Banglore held from February 3-4, 2014 at Banglore Karnataka.

Shah, M.S., Kewat, M.L., Rai, R.K., Vishwakarma, S.K. and Verma, Nidhi. "Evaluation of Odyssey 70% Wg against weeds of soyabean in Niwar region"Paper presented in Biennial Conference of Indian Society of Weed Science on "Emerging Challenges in Weed Management" February 15-17, 2014 at Directorate of weed Science Research Jabalpur, Madhya.Pradesh.

Bhaghat, Shradha, Vishwakarma, S.K., Singh, Asha and Kewat, M.L. "Efficacy of Chlorimuron ethyl against weeds in soyabean". Paper presented in Biennial Conference of Indian Society of Weed Science on "Emerging Challenges in Weed Management" February 15-17, 2014 at Directorate of weed Science Research Jabalpur, Madhya.Pradesh.

Akola

Paper presented in National seminar on 'soil fertility, degradation and contaminants'. "Impact of tillage practices and cropping sequence on soil nutrient status in soybean based cropping sequence" Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli 8-9 May 2013

OUAT, Bhubaneswar (Odisha)

Garnayak, L.M., Swain, S.K., Mishra, K.N. and Patra, A.K. 2014. Fine tuning of integrated farming systems for livelihood security of small and marginal holders in Odisha- issues and strategies. Souvenir, National Symposium on management options for enhancing farm productivity and livelihood security under changing climate at OUAT, Bhubaneswar during October 29-31, 2014:80-86.

Patra, A.K. and Behra, B.B. 2014. Role of Agroforestry in adapting and mitigating climate change, Souvenir, Agroforestry options for climate resilient farming, Annual Group Meet of AICRP on Agroforestry July 26-28,2014 at OUAT,Bhubaneswar.

PAU, Ludhiana (Punjab)

Gill, J.S. and Walia, S.S. 2014. Effect of different establishment methods on milling quality of aromatic rice. Proc. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp82-83.

Gill, J.S. and Walia, S.S. 2014. Effect of different establishment methods and nitrogen levels on organic carbon content in soil.International Conference on Crop productivity & sustainability shaping the Future. Organized by Baba Fard College, Bathainda during March 20-21.pp.

Gill, J.S. and Walia, S.S. 2014. Effect of different establishment methods and nitrogen levels on micronutrient uptake in aromatic rice. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 43-44.

Gill, J.S. and Walia, S.S. 2014. Grain yield of aromatic rice as influence by different establishment methods, Proc. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp 78.

Gill, J.S. and Walia, S.S. 2014. Micronutrient uptake in grains as influence by foliar application of micronutrients on direct seeded aromatic rice. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 35-36.

Gill, J.S. and Walia, S.S. 2014. Milling quality of direct seeded aromatic as influenced foliar application of micronutrients.International Conference on Crop productivity & sustainability shaping the Future. Organized by Baba Fard College, Bathainda during March 20-21.pp.

Kumar, Navpreet and Walia, S.S. 2014. Influence of basmati rice cultivar and nitrogen levels under direct seeding on quality parameters. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp 101.

Kumar, Navpreet and Walia, S.S. 2014. Response of different basmati rice cultivars to nitrogen levels under direct seeding Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 45.

Rajni and Walia, S.S. 2014. Economic impact of front line demonstrations on gobhi sarson in Amritsar district.2nd National Brassica Conference on Brassica for addressing edible oil and nutritional security held at Punjab Agricultural University, Ludhiana During 14-16 February.pp 97.

Rajni and Walia, S.S. 2014. On-farm evaluation of farming system modules in Amritsar district of Punjab. Proc. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp 161-162.

Rani, Navita and Walia, S.S. 2014. Effect of cropping systems and fertilizer application on growth, yield and yield attributes of potato. Proc. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp 199.

Rani, Navita and Walia, S.S. 2014. Effect of cropping systems and fertilizer application on soil properties of potato crop. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 45-46.

Singh, Parmindar, Walia, S.S. and Chaudhary, A. 2014. Vegetable based integrated farming system-A profitable alternative. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 66-67.

Singh, Parmindar, Walia, S.S. and Chaudhary, A. 2014. Diversification-A golden alternative.Proc. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp198.

Walia, S.S., Aulakh, C.S. and Gill, R.S. 2014. Groundnut-kharif onion-onion-A Vegetable based cropping system. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp198.

Walia, S.S., Aulakh, C.S. and Gill, R.S. 2014. The economic sustainability of Maize-kharif onion-onion cropping system. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 43-44.

Walia, S.S., Gill, R.S. and Aulakh, C.S. 2014. Turmeric-onion: A profitable cropping system. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 44.

Walia, S.S., Gill, R.S. and Aulakh, C.S. 2014. Turmeric-wheat: A Turmeric based cropping system. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp164-165.

Walia, S.S., Saini, K.S. and Mahal, S.S. 2014. Practical crop production-learning by doing. Proc.17th Punjab Science congress on Science and Technology for Sustainable Growth organized by Punjab Technical University, Jalandhar from 14-16February.pp 46.

Walia, S.S., Saini, K.S. and Mahal, S.S. 2014. Practical crop production by students. National Seminar on Reorientation of Agricultural Research to Ensure National Food Security organized at CCS Harynana Agricultural University, hisar from January 6-7.Pp 318.

Walia,S.S., Brar, A.S., Singh, Satpal, Gill, R.S., Aulakh, C.S. and Kaur, Navdeep. 2013. Feasibility of different cropping systems under irrigated conditions of Punjab. Proc. 16th Punjab science Congress, BFUHS, Faridkot during 7-9 February.pp105-106.

Saini, K.S., Walia, S.S. and Mahal. 2013. Earn while you learn. Proc. 16th Punjab science Congress, BFUHS,Faridkot during 7-9 February.pp107-108.

Walia, S.S., Gill, M.S., Aulakh, C.S. and Sandhu, Parminder Singh. 2013. Yield maximization of rice-wheat system through site specific nutrient management approach. Proc. 16th Punjab science Congress, BFUHS,Faridkot during 7-9 February.pp108-109.

TNAU, Coimbatore

Siddeswaran, K., Sangeetha, S.P. and Shanmugam, P.M. 2013. Integrated farming system for small farmers of irrigated upland. Organic rice production. In: Agriculture. All India Tamil Conference 2013 held at Perur, Coimbatore during 09.02.2013 to 10.02.2013.pp. 203-206.

Siddeswaran, K., Sangeetha, S.P., Shanmugam, P.M. and Thiyageswari, S. 2013. Integrated farming system for small farmers of irrigated upland..In: Agriculture. All India Tamil Conference 2013 held at Perur, Coimbatore during 09.02.2013 to 10.02.2013.pp. 197-198.

Gangadharan, S., Ramamoorthy, K., Vaiyapuri, K. and Stalin, P. 2013. Role of micronutrient in silk production (Tamil) In: Agriculture. All India Tamil Conference 2013 held vat Perur, Coimbatore during 09.02.2013 to 10.02.2013. pp. 266-267.

Jagathjothi, N. and K., Ramamoorthy. 2013. INM for rainfed ragi. (Tamil) In: Agriculture. All India Tamil Conference 2013 held at Perur, Coimbatore during 09-02-2013 to 10.02-2013.pp21-23.

Jagathjothi, N., Sathya Priya, R. and Ayyadurai, P. 2013. Medicinal plants are gifts to agriculture. (Tamil) In: Agriculture. All India Tamil Conference 2013 held at Perur, Coimbatore during 09.02.2013 to 10.02.2013.pp. 120-121.

Kathirvelan, P., Balasubramaniyam, P. and Siddeswaran, K. Crop Diversification: Enhancing the system productivity and profitability through On farm Research. Extended Summaries Vol 2: 3rd International Agronomy Congees on “Agriculture Diversification, Climate change, Management and Lively hoods” organized by Indian Society of Agronomy held at New Delhi from 26-30 November 2012.

NDUAT, Faizabad

Singh, N.B., Kumar, Alok and Yadav, R.A. 2013. Long term impact of organic management practices on high value crops. Souvenir cum compendium of Agriculture Science Congress, N.D.U.A.T., Kumarganj, Faizabad.17-19, August, 2013. Pp.115.

Kumar, Alok, Singh, N.B. and Yadav, R.A. 2013. Influence of organic management on basmati rice-mustard-greengram cropping system, Souvenir cum compendium of Agriculture Science Congress, N.D.U.A.T., Kumarganj, Faizabad.17-19, August, 2013. Pp. 324.

Singh, Chandan and Kumar, Alok. 2013. Effect of long termfertilizer application on soil fertility and productivity of rice under rice-wheat cropping system. Souvenir cum compendium of Agriculture Science Congress, N.D.U.A.T., Kumarganj, Faizabad.17-19, August, 2013. Pp. 324.

CSAUAT, Kanpur (UP)

Khan, N., Yadav, M.P., Tiwari, U.S. and Md. Aslam. 2013. *“Intensification of different cropping system under irrigated condition in Central Plain Zone of U.P.”.* National Seminar on “Social Dimensions of

Extension Education in Holistic Development of Rural Livelihood" organized at C. B. Gupta Agriculture P.G. College, Bakshai ka Talab, Lucknow, U.P., April 26-27, 2013, pp-11.

R.A., Yadav, Naushad, Khan, M.Z. Siddiqui and Rajveer, Singh. 2013. Bio-efficacy of pinoxaden 5EC in combination with broad leaf herbicides against complex weed flora in wheat, Highlights of wheat & Barley research 2013 pp 84-87. Published during All India Wheat and Barley Workshop held during 1-4 September, 2013 at CSAUA&T, Kanpur

RBS College, Bichpuri, Agra (U.P.)

S.B., Singh. 2013. Impact of Integrated Farming Systems (IFS) on agriculture and rural development for small and marginal farmers. National seminar on impact of population growth on agriculture and rural development held at Balawant Vidyapeeth Rural institute Bichpuri, Agra (U.P.) on 09-10 Feb., 2013 pp-31.

GBPUAT, Pantnagar (UT)

Yadav, Subhash, Singh, Rohitashav, Rampal, Singh, Virpal and Rawat, Anand Singh. 2013. Evaluation of Fenoxaprop-p-ethyl9EC for control of grassy weed in onion. In National seminar on "Technical interventions for sustainable hill development.June 17-19, 2013.28pp.

Singh, Rohitashav, Yadav, Subhash, Rampal, Singh, Virpal and Rawat, Anand Singh. 2013. Bio-efficacy of Ethoxysulfuron(Sunrise 15 WG) for the control of Cyperus rotundus in Sugarcane. In National seminar on "Technical interventions for sustainable hill development.June 17-19, 2013.29pp

KAU, Karmana (Kerla)

Anilkumar, A.S., Jacob, J. and Govindan, M. 2013. *Watershed Development and Management for Sustainable Utilization of Natural Resources*. College of Agriculture, Kerala Agricultural University, Padannakkad, Kasaragod.

Jacob, J., Veena V., Anju, C., Varughese, K. and Rani, B. 2012. Terrace gardens for food security in urban households-an integrated, eco-friendly and sustainable model from Kerala, India. In: Extended Summaries Vol 2, Third International Agronomy Congress on "*Agriculture Diversification, Climate Change Management and Livelihoods*", pp.517-518, Indian Society of Agronomy, New Delhi.

Jacob, John. 2013. Tuber crops in homestead and periurban farming systems. In: *Empowering VHSE Agripreneures* (Eds.Anilkumar, A.S. Govindan, M., Nehru, S.M. and Anilkumar, A), pp.73-79. College of Agriculture, Padannakkad, Kerala Agricultural University.

8.2.1 Popular Articles

ANGRAU, Rajendranagar (AP)

Sridevi, S., Venkata Ramana, M. and M. Goverdhan, Aahara bhadratha mariyu aardhika susthirathaku margam Misrama vyavasayam. Vyavasayam, June 2013: 21-24.

Sridevi, S., Venkata Ramana, M. and M. Goverdhan, Aahara bhadratha mariyu aardhika susthirathaku margam Misrama vyavasayam Part 2. Vyavasayam, July 2013: 21-24.

BAU, Sabour

शर्मा, आर.पी., पाठक, एस.के. और चौधरी, एस.आर. 2014. धान पर आधारित फसल प्रणाली। कृषक संदेश, बी. ए.यू., साबौर, बिहार 3(4): 3–5.

पाठक, एस.के., शर्मा, आर.पी. और चौधरी, एस.आर. 2014. रोपानी धान के उत्पादन तकनीक। कृषक संदेश, बी. ए.यू., साबौर, बिहार 3(4): 6–11.

सुशांत और शर्मा, आर.पी. 2014. ज़ीरो टिल तकनीक बिना जुताई गेहूँ की बुवाई। कृषक संदेश, बी.ए.यू., साबौर, बिहार 3(4): 17–18.

गुप्ता, संजीव कुमार, हक, एम., सुशांत और पाठक, एस.के. 2014. बरसीम की वैज्ञानिक खेती–पोषक हरा चारा। कृषक संदेश, बी.ए.यू., साबौर, बिहार 3(4): 33–35.

गुप्ता, संजीव कुमार, सुशांत, पंवार, जी.एस. और शर्मा, आर.पी. 2014. खरीफ मौसम में चारा उत्पादन तकनीक।

Sharma, R.P., Pathak, S.K. and Chaudhary, S.R. 2014. Dhan per aadharit phasal pranali. Krashak Sandesh BAU, Sabour, Bihar 3(4) :3-5.

Pathak, S.K., Sharma, R.P. and Sushant. 2014. Ropani dhan ke utpadan takanike. Krashak Sandesh BAU, Sabour, Bihar 3(4) :6-11.

Sushant and Sharma, R.P. 2014. Zero till taknik se bina jutai gaihu ki buvai. Krashak Sandesh BAU, Sabour, Bihar 3(4) :17-18.

Gupta, Sanjeev Kumar, M., Haque, Sushant and Pathak, S.K. 2014. Barseem ki vaigyanic kheti-Postik evam hara chara. Krashak Sandesh BAU, Sabour, Bihar 3(4) :33-35.

Gupta, Sanjeev Kumar, Sushant, Panwar, G.S. and Sharma, R.P. 2014.Kharif mausam mein chara utpadan takniki. Krashak Sandesh BAU, Sabour, Bihar 3(4) :18-22.

Gupta, Sanjeev Kumar, Sushant, Panwar, G.S., Chaudhary, S.R. and Mahdi, S. Sheraz. 2014. Jalvaaue parivartan ke peripechya mein chara faslo ki kheti. Smarika Kisan Mela-2014, BAU,Sabour, Bihar.pp36-40.

Tyagi, Shashank, Sharma, R.P. and Singh, M.K. Jalvaaue parivartan ke peripechya mein fhaslo mein vividhta. Smarika Kisan Mela-2014, BAU, Sabour, Bihar.pp12-17.

Gupta, Sanjeev Kumar, Mahdi, S.S., Chaudhary, S.R., Singh, M.K. and Sushant. 2013. Jalvaaue parivartan or Chara Sankakchhan. Krashak Sandesh BAU, Sabour, Bihar 3(2) :47-50.

CSK HPKVV, Palampur (H.P.)

कुमार, सुरेश और राणा, सुरेन्द्र सिंह. 2013. जलवायु परिवर्तन का खरपतवार पर प्रभाव प्रबन्धन। पर्वतीय खेतीबाड़ी 32(3): 5–6.

IGKVV, Raipur (Chatisgarh)

Dubey, A., Sarawgi, S.K., Chitale, S., Tiwari, A., Manuel, S., Bhoi, S. and Dhurandhar, T. 2012. Javik ki jad Pashudhan. Krishak Jagat weekly.2-8 April, 2012 pp7.

Bhoi, S., Chitale, S. and Tiwari, A. 2012. Javik Dhan ki Utpadan Taknik *Chattisgarh kheti* an IGKVV Publication 19(2):10-13.

Dubey, A., Chitale, S., Tiwari, A., Dhurandhar, T. and Manuel, S. 2012. Samanwit Krishi Pranali mein Matsya palan ka Yogdaan. *Chattisgarh kheti* an IGKVV Publication 19(2):39.

Chitale, S., Savu, R.M., Tiwari, A. and Pali, G.P. 2013. Rabi Fasalon me Samanvit kharpatwar parbandhan *Chattisgarh kheti* an IGKVV Publication 20(1):35-37.

HAU, Hisar (Haryana)

नीलम, कुमार, पवन और ननवाल, राजेंदर कुमार. 2013. टिकाउ उत्पादन के लिए कारगर है जैविक खेती। हरियाणा 45(12): 133–137.

नीलम, ननवाल, राजेंदर कुमार, और कुमार, पवन. 2014. केचुआँ खाद तैयार करने की विधि। हरियाणा खेती दिस. 2014: 27–28.

नीलम, ननवाल, राजेंदर कुमार, और कुमार, पवन. 2014. केचुआँ खाद का कृषि में महत्व। हरियाणा खेती दिस. 2014: 5.

कुमार, पवन, ननवाल, राजेंदर कुमार, और सत्यजीत. 2014. रबी में तिलहन उत्पादन। खाद पत्रिका 55(9): 12–15.

RVSKVV, Indore

सवरुप, इंदु, रानाडे, दीपक हरि, चौधरी, सरद और मुंजाले, संतोष. प्रमाणिक फसलों से अधिक उपज. सरद चौधरी प्रकाशित कृषि मंत्र. मासिक पत्रिका दिस. 2013: 39–40.

OUA&T, Bhubaneswar (Odisha)

Patra, A.K. 2013. Agroforestry-a noval approach to climate change adaptation and mitigation in agriculture. Science Horizon 3(9):25-28.

Patra, A.K. 2013. Alley cropping. Science Horizon 3(11):6-10.

Patra, A.K. 2014. Agroforestry improves soil. 4(3):21-23.

Patra, A.K. and Behera, B.B. 2014. Role of agroforestry in adapting and mitigating climate change, Souvenir, Agroforestry options for climate resilient farming, Annual Group Meet of AICRP on Agroforestry july 26-28,2014at OUAT,Bhubaneswar.

Misra, N., Pati, S.R. and Patra, A.K. 2014. Pakasala bagichare samannita krushi Padhati. Chasira samsara,OUAT 49(2 & 3) August 2014.

Patra, A.K. 2014. Hopmegarden –a sustainable land use system, Science Horizon 4(11):17-21.

Mishra, N. and Garnayak, L.M. 2014. Byabasayika Bhitire salad matar chasa. In “Chasira Sansara” Directorate of Extn., OUAT.

Garnayak, L.M., Mishra, N. and Pati, S. 2014. Kharif ruture chinabadam chasa. In In “Chasira Sansara” Directorate of Extn., OUAT.

Garnayak, L.M. and Pati, S. 2014. Kukuda chianra udara phula roga. In In “Chasira Sansara” Directorate of Extn., OUAT.

GBPUAT, Pantnagar (UT)

सिंह, आर., कुमार, जे. और कुमार, पी. 2012. खरीफ व जायद की फसलों में खरपतवार नियन्त्रण। किसान भारती 43(7): 17–19.

रामपाल और सिंह, आर. 2012. मक्का की फसल में खरपतवार पर कैसे पाये काबू?। किसान भारती 43(9): 25–26.

सिंह, आर., कुमार, जे., रामपाल और सिंह, डी. 2012. गन्ने की फसल में खरपतवारों का नियन्त्रण। खेती 65(4): 28–29.

सिंह, आर., कुमार, जे., रामपाल और सिंह, एम. 2012. धान की फसल में खरपतवार नियन्त्रण। किसान भारती 43(11): 17–18.

रामपाल, सिंह, आर. और कुमार, जे. 2012. आलू की फसल में उचित खरपतवार नियन्त्रण। किसान भारती 43(12): 12–13.

रामपाल, सिंह, आर., सिंह, वी.पी. और सिंह, एस. 2012. गेहूँ की फसल में उचित खरपतवार नियन्त्रण। किसान भारती 44(1): 12–13.

सिंह, आर., रामपाल, प्रताप, टी., कुमार, पी. और सिंह, वी.पी. 2012. गन्ने की फसल के लिए खरपतवार प्रबंधन। खेती 44(3): 17–19.

सिंह, आर., कुमार, जे., कुमार, पी. और रामपाल. 2012. रबी की फसलों में खरपतवार नियन्त्रण। किसान भारती 44(1): 27–29.

रामपाल, सिंह, आर. और सिंह, वी.पी. 2013. गेहूँ की फसल में खरपतवार नियन्त्रण। खेती 10–11.

रामपाल, सिंह, आर., सिंह, वी.पी. और यादव, एस. 2013. उन्नत उत्पादन तकनीक से जायद मूंग एवं उर्द की लबालब फसल। किसान भारती 15–16.

KAU, Karmana (Kerala)

Purayida Krishi-Oru susthira krishi samprudhayam Kalpadhenu **33(**3) p.20-25 (2012)

Theetapullu Krishi Purayidangalilum *Mangofest Madhuram 2012 Souvenir* p.104-105

NDUAT, Faizabad

Yadav, R.S., Singh, N.B. and Singh, C.P. 2014. Problem of Phalaris minor in Wheat and its remedy. Krishi Amrit 11:3.

Yadav, R.S., Singh, N.B. and Singh, C.P. 2014. Rabi maize-Double production. Krishi Amrit 6:7.

CSAUAT, Kanpur (UP)

Khan, Naushad, Yadav, M.P., Tiwari, U.S., A.P., Dubey and Dubey, Mayank. 2013. Ekikrat krishi pranali evam uski nirantarta, Krishak Bharti (Rabi Visheshank, 2013)

R.A., Yadav, Tarun, Gopal and Khan, Naushad. 2013. Moong ki Fasal me kharpatwar prabandhan, Krishak Bharti (Kharif Visheshank) CSAUT, Kanpur, pp-37-38.

Khan, Naushad, Yadav, M.P. and Dubey, Mayank. 2014. Mrida surrikaran (Hindi) Krishak Bharti (Zaid Visheshank) CSAUT,Kanpur,pp-56-57.

BHU, Varanasi

Singh, R.P., Singh, R.K., Singh, S.P., Srivastava, Vartika and Bohra, J.S. 2014. Organic Farming: A need of sustainable agriculture. Indian Farming 63(10): 38-40.

Karjat

Chavan, S.A. and Chavan, L.S. “Bhat lagwadichya vividha paddhati” Agril.Research Station, shirgoan, Ratnagiri shatak mahostavi varsha smarnika (2013)45-50.

Kunkerkar, R.L. and Chavan, L.S. “Sudharit trantatun vadhel bhat utpadan”Agrowon 4th June,2014:11.

8.2.2 Books/Book chapter

ANGRAU, Rajendranagar (AP)

Dr. M. Goverdhan, authored a book “Crop Production” published for first year vocational course of Board of Intermediate, Govt. of Andhra Pradesh.

CCS HAU, Hisar (Haryana)

Question Bank on Agriculture by R.K. Nanwal, Published by Agri-Biovet Press, N. Delhi.

Text book on Farming Systems by R.K. Nanwal and Pawan Kumar (In press)

Book Chapter

Enhancing pulses production: Haryana, by Pawan Kumar, Manoj Kumar and S.K. Yadav. In: Enhancing pulses production, by Gangwar and Singh, pp 141-160.

RVSKVV, Indore

Thakur, S.S., Choudhary, S.K. and Jain, M.P. Krishi vikas Ka Adhar Krishi parnaliya.

Thakur, S.S. and Choudhary, S.K. Mosam Adharit aksimik krishi karye yojna

PAU, Ludhiana

Walia, S.S. and Gill, R.S. 2014. Farming system for improveing livelihood of Punjab farmers. In: research in Farming(Ed Gangwar, B. Singh, J.P., Prusty, AK. and Kamta Prasad). Today and Tommorrow's Priniers and Publishers, New Delhi.pp251-267

Walia, S.S. and Gill, R.S. 2014.Pulse production in Punjab Chapter 18.In: Enhancing Pulses production Technologies and Strategies. (Ed Gangwar, B.and Singh.A.K). New India Publishing Agency, New Delhi.

SDAU, SK Nagar (Gujarat)

Patel, B.S. and Patel, P.M. 2013. Uttar Gujaratna Pakoni pak paddhatio ane tano krishi ma mahatv. Chapter in Uttar Gujaratna agatyana chomasu pakoni vaignanik kheti paddhati. Published by T&V Yojna, S.D.A.U., Sardarkrushinagar.pp58-65.

TNAU, Coimbatore (T.N.)

Gangwar, B., Ravisankar, N., Vijayabaskaran, S. and A.P., Viswanath. 2014. On farm nutrient response of crops and cropping systems. Project Directorate of Farming System Research, Modipuram,Meerut,India.

Kathirvelan, P., C., Swaminathan, E., Somasundaram, B., Ganwar and N., Ravisankar. 2013. Conservation agriculture and integrated farming system under changing climate (ISBN No.978-81-903355-9-1)

Kathirvelan, P., C., Swaminathan, K., Velayudam, P., Kannan and Parasivam. 2013. Technology package of direct seeded rice (ISBN No.978-81-906168-7-4)

OUA&T, Bhubaneswar (Odisha)

A.K., Patra. 2013. Agroforestry: Principles and Practices. New India Publishing Agency, New Delhi.pp.248. (ISBN 978-93-81450-76-5)

A.K., Patra. 2014. Agroforestry: A Sustainable Land-use System for Climate Change Adaptation, Rural Livelihood and Food Security. (In) "Sustainable agriculture in 21st century: Strategic Approaches and Practices' (eds., N H Zaidi & MM Khan). Regal Publication, New Delhi. Pp.174-190. (ISBN978-81-8484-408-5)

KAU, Karmana (Kerala)

Books

Anilkumar, A.S., Jacob, J. and Govindan, M. 2013. Samrudhiyude Vilabhoomiyayi Marunna Nammude Veetuvalappukal. College of Agriculture, Kerala Agricultural University. Padannakkad, Kasaragod. (A Malayalam book for farmers on Homestead Farming).

Anilkumar, A.S., Jacob, J. and Govindan, M. 2013. Watershed Development and Management for Sustainable Utilization of Natural Resources. College of Agriculture, Kerala Agricultural University, Padannakkad, Kasaragod.

Anilkumar, A.S., Jacob, J., Govindan, M., Ambika, P., Suchithra, B.S. and Anusha, A.N. 2013. Sustainability pathway to Higher Crop Productivity in Kasaragod District. College of Agriculture, Kerala Agricultural University, Padannakkad, Kasaragod.

Anusha, A.N., Anilkumar, A.S., Govindan, M. and Jacob, J. 2013. Multiple Cropping and Microsite Enrichment in Vetiver. Kerala Agricultural University. Padannakkad, Kasaragod.

Jacob, J., Rajasree, G., Rajasekheran, P. and Bindu, P. 2013. Cropping systems in different agro ecological units of Kerala. In: Integrated Farming System-Towards a Strategy for Agriculture Development in Kerala, pp.26-116, Kerala State Planning Board, Thiruvananthapuram, Kerala.

R.L., Kunkerkar, U.B., Apte, M.H., Keluskar and L.S., Chavan. 2013. *Bhat pikanchaya jati ani tyanchi vaishishetye* in Dr. BSKKV book entitled "*Bijotpadan Tantradynan*" published by DBSKKV, Dapoli.

R.L., Kunkerkar, M.P., Gawai and L.S., Chavan. 2013. "*Sankarit bhat bijotpadan*" in Dr. BSKKV book entitled "*Bijotpadan Tantradynan*" published by DBSKKV, Dapoli.

CSAU&T, Kanpur

Singh, Rajeev, Tripathi, A.K. and Khan, Naushad. 2013. "Wheat Agronomy"Chapter in book "Highlights of wheat and Barley Research"Published by C.S.A. University and DWR (ICAR).pp-19-35.

Yadav, R.A., Siddiqi, M.Z. and Khan, Naushad. 2013. Advance weed management practices in Rice-Wheat Cropping system"chapter in book participatory approaches to enhance farm productivity of salt effected soil published by CSSRI,Regional Research station, Lucknow pp-136-152.

Yadav, R.A., Khan, Naushad, Siddiqi, M.Z. and Singh, Rajveer. 2013. Effect of "Bio-efficacy of pinoxaden 5EC in combination with broad leaf herbicides againstcomplex weed flora in wheat"Chapter in book "Highlights of wheat and barley Research"Published during All India Wheat and Barley Workshop held at CSAUA&T, Kanpur during September 1-4,2013.pp:84-87.

DBSKV, Dapoli, Karjat

September Bhat pikavaril kid va rog vyasthapa. 2014. Published by Vinayak Jalgaonkar,Mohan Dalvi,Vaishali Sawant Laxman Chavan and Anand Narangalkr.

Book chapter for "Organic farming technologies and strategies"by L.S. Chavan, D.G. Jondhale, A.S. Dalvi and U.V. Mahadkar submitted to the Diretor, IIFSR, Modipuram, Meerut.

ICAR-CIARI, Andman & Nicobar Islands

Swarnam, T.P. and Velmurugan, A. 2014. Integrated fish farming systems for higher income and production. In: compendium of aquacultute technologies for fish farmers of North East India. (Eds. Kiruba sankar, R., P.Krishnan, Grinson George, S.Monalisa Devi, Chandan Debnath, Benny Varghese,Bipul Chandra Ray,T.Ravi kumar, and S.Dam Roy. Central Agricultural Research Institute, Port Blair.

8.3 GROUP MEETING / WORKSHOPS ORGANIZED

XXXI Biennial Workshop of AICRP on Integrated Farming Systems organized during 22-24 December 2016 at Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)

XXXI biennial workshop of AICRP on Integrated Farming Systems was organized by ICAR-IIFSR, Modipuram in collaboration with Tamil Nadu Agricultural University at Coimbatore during 22-24 December 2014. The workshop was inaugurated by Dr K. Ramasami, Vice Chancellor as Chief guest and presided over by Dr B. Gangwar, Director, ICAR-IIFSR. Dr K. Ramasami, in inaugural address highlighted that the achievements of agricultural research is very important for development of the nation and called for transformation of agricultural scientists to specialists in agri-business. He also informed that one cow-one acre system will prevail but we need to make them profitable by way of integrating tradition and science. He also asked the 'AICRP on IFS' group to develop tools and techniques for agricultural disaster management as IFS gives scope for flexible management of resources within the farm.

Address of Dr B. Gangwar, Director, ICAR-IIFSR, Modipuram

Dr B. Gangwar, Director, IIFSR in his opening remarks highlighted achievements of the project during last one year including the strengthening of inter-institutional linkages and progress on on-station and on-farm IFS model development at various locations which could result in 82 success stories within the period of two years. He said, as our on-farm research reveals, 59% of marginal households are having two or less components for integration in their system; they need to be diversified for augmenting the income. Further, though we have achieved net income up to Rs. 3.75 lakhs/ha/annum, but we should target for Rs. 6 lakhs/annum in the coming years by appropriately mixing the profitable activities such as protected cultivation of high value crops, boundary plantations etc.

Address of K Ramaswami, Vice Chancellor, TNAU, Coimbatore

Dr M. Maheswaran, Director Research and Dr K. Velayutham, Director Crop Management highlighted the achievements of the University in

Release of CD on Tribal Sub Plan programme under AICRP on IFS

farming systems. Dignitaries also released the several publications including a book on Research in Farming Systems and CD on Tribal Sub Plan activities in farming systems perspective carried out by TNAU under AICRP on IFS. Dr N. Asoka Raja, Head, Department of Agronomy welcomed the delegates while Dr E. Somasundaram, Chief Agronomist proposed the vote of thanks.

During the three days' workshop, the on-going activities of 75 on-station and on-farm centers of AICRP on IFS were reviewed and suggestions were given for improvement. The new programmes were also discussed and finalized. Several recommendations of practical importance were also brought out during the workshop. Synthesis of bankable IFS models, modelling and capacity building of stake holders were identified as future thrust areas for the project.

The following recommendations were finalized after discussions

Recommendations

A. Strengthening inter-institutional linkage

1. All the centres should regularly interact with partner institutions of ICAR and carryout the work plan as per the deliverables given in the proceedings of regional workshops.

2. A review meeting should be convened by ICAR-IIFSR with partner institutions and AICRP on IFS centres in the end of 2015 to appraise the status of partnership work plan deliverables and fixing the gaps.

3. The AICRP centres whosoever is indenting for materials (seeds/livestock etc) from ICAR institutions/AICRP centres should place the indent well in advance. The copy of the indent should be sent to ICAR-IIFSR also to pursue the case and avoid no supply/delay.

4. Newly appointed scientists at ICAR-IASRI for looking after OFR data analysis should visit ICAR-IIFSR, Modipuram to get the first hand information on on-farm experiments.

5. In view of the approval of ICAR-IASRI as a voluntary centre of AICRP on IFS, scientists of ICAR-IASRI and ICAR-IIFSR should jointly discuss and formulate a strategy for developing the user-friendly interactive data base for both on-station and on-farm experiments of the project.

B. On-station research

6. Permission /approval may be sought from ICAR-IIFSR, Modipuram for concluding any experiment and initiation of new study at on-station.

7. The number of dairy animals including young ones should not exceed 4 in the on-station IFS model of 1 ha area.

C. On-Farm Research

8. ICAR-IASRI should develop and provide methodology for analysis of unequal number of samples (farm households) as getting uniform number of samples for different farming systems in on-farm farming system experimentation is difficult.

9. For economic analysis of farming systems, either inflation of benchmark income or deflation of income obtained during the year may be done to compare the values of income over the years.

10. The results of TSP clusters should also be synthesized as productivity, income enhancement and other benefits for the entire cluster of villages including non-adopted farm households.

11. All the TSP centres should make a movie of TSP work incorporating photographs/videos taken before and after interventions similar to TNAU, Coimbatore. The videos should be submitted to ICAR-IIFSR within six months.

12. All the TSP centres should facilitate and ensure opening of the bank accounts under Prandhan Mantri Jan dahnyojana for all those tribal

households who are not having the bank accounts.

13. Future course of action proposed for OFR programme which includes no repetition of interventions, undertaking impact assessment of all interventions during 2016-17, identification of new district, villages, households, benchmarking and technical programme preparation in 2016-17 should be ensured by all the centres.

D. General

14. Separate group meet of agricultural economists / OFR agronomists involved in farming systems characterization may be organized at ICAR-IIFSR, Modipuram in April / May, 2015 to discuss and finalize the characterization report.

15. OFR Agronomists should be suitably trained by organizing a hands-on training programme of 3 days duration to play, learn and interpret with OFR data for generating quality publications.

16. The workshop/group meeting should not be of less than four days duration keeping in view of the nature of research activities and large number centres and partners.

17. All the scientists working in the AICRP on IFS project should be invited in the Biennial workshops as is the practice in all other AICRPs. This will also facilitate more interaction during review of results and making recommendations.

Farmer group discussion at Aurangabad (Maharashtra)

Diversification of existing cropping systems at Krishnagiri district (Tamil Nadu)

8.4 RADIO AND TELEVISION TALKS DELIVERED BY PROJECT STAFF

Centre/Date	Title of the talk	Name of Doordarshan/Akaswani Kendra	Name of Staff
Rajendranagar			
10-12-13	Vari Maganullo aaruthadi pantalu	MAHA-TV	Dr. M. Venkataramana
29-01-14	Panta Marpidi aavasyakata aacharianiyamaina pantala saralulu	MAHA-TV	Dr. M. Goverdhan Principal Scientist (Agro)
Jabalpur			
24-03-14	अलसी की उन्नत कृषि कार्यशाला। कार्यक्रम कृषि विश्वविद्यालयों से खेतों तक		
24-03-14	ग्रीष्म कालीन मूंग व उड़द उन्नत की कृषि कार्यशाला। कार्यक्रम कृषि विश्वविद्यालयों से खेतों तक		
Sabour			
28-06-14	Dhan ki unnat kisme	AIR, Bhagalpur	Dr. R.P. Sharma
07-08-14	Kharif dalhani fasal kee dekbhal	AIR, Bhagalpur	Dr. Sushant
SK Nagar			
07-05-13	Crop rotation and its importance	DD, Girnar	Dr. L.J. Dasai
Ludhiana			
09-02-13	*Cultivation of late sown wheat*	AIR, Jalandhar	Dr. S.S. Walia
06-03-14	*Inclusion of leguminous crops in cropping systems*	AIR, Jalandhar	Dr. S.S. Walia
20-05-14	*Javic kheti diyan sambhanawa*	AIR, Jalandhar	Dr. S.S. Walia
21-05-14	*Javic kheti*	AIR, Jalandhar	Dr. S.S. Walia
Karjat			
10-07-13	*Bhat pikasathi ektamik annadravya vyasthapan*	AIR, Mumbai	Dr. L.S. Chavan
12-11-13	*Konkan vibhagat jaminichya aang olitivar vividha pikanchi lagwad*	AIR, Mumbai	Dr. L.S. Chavan
06-06-14	*Bhat lagwadichya vividha paddhat*	AIR, Mumbai	Dr. L.S. Chavan
02-12-13	*Rabi-Unhali Bhuimug lagwad*	AIR, Mumbai	Dr. A.S. Dalvi

Contd..../-

Centre/Date	Title of the talk	Name of Doordarshan/Akaswani Kendra	Name of Staff
22-05-14	*Bhat ropvatika vyasthapan*	AIR, Mumbai	Dr. A.S. Dalvi
01-07-14	*bhat pik ropvatika vyasthapan*	Doordharshan Mumbai	Dr. L.S. Chavan
Coimbatore			
12-06-13	Cropping program for kuruvai season	AIR, Trichy	
02-08-13	Food grain production mission programme	Directorate of Horticulture, Tamil Nadu	
02-08-13	Conservation Agriculture	AIR,Channai	
02-08-13	Integrated farming system	AIR,Channai	
Sirruguppa			
30-06-13	Improved Agronomic practices in Bt.cotton	Door Darshan Kendra, Gulbarga	
02-07-13	Importance of green manuring in paddy cultivation	Door Darshan Kendra, Bangalore	
07-12-13	DSR in paddy	Door Darshan Kendra, Bangalore	
30-07-13	Improved Agronomic practices in Bt.cotton	AIR, Hospet	
30-07-13	Contact farming: Is it beneficial to farming community for KSAMB sponsored programme	AIR, Hospet	
26-12-13	DSR in paddy	AIR, Hospet	
Parbhani			
23-10-12	Rabbi Hangamateel Aanterpeek Pathethi	AIR	Dr. W.N. Narkhede
Ranchi			
11-12-12	Water management in potato crops	TV Talk	Dr. R. Thakur
22-02-13	Cropping system in Jharkhand	TV Talk	Dr. R. Thakur
10-08-12	Farming System	TV Talk	Dr. R.P. Manjhi
08-11-13	Effect of mulching in wheat crop	Radio Programme	Dr. R. Thakur
07-05-12	fertilizers application and weeds control in summer rice	Radio Programme	Dr. R.P. Manjhi
04-09-12	Cultivation of early sowing potato	Radio Programme	Dr. R.P. Manjhi
04-12-12	weeds control in wheat	Radio Programme	Dr. R.P. Manjhi
Raipur			
17-01-13	Aaj ki Salah: Fasalon me Javik Urvarakon ki Awashyakta.	AIR,Raipur	Dr. Srikant Chitale

Contd..../-

Centre/Date	Title of the talk	Name of Doordarshan/Akaswani Kendra	Name of Staff
Palampur			
16-05-12	Diversification of existing cropping system-A way to earn higher profit	Doordarshan Kendra,Shimla	Dr. S.C. Negi
19-12-12	Live Phone-in programme on agriculture under the “Hallo Jagran”	Danik Jagran Daily News	Dr. S.C. Negi
17-06-12	Field based programme, Kisan ki sewa main vermicomposting	Doordarshan Kendra,Shimla	Dr.S.S.Rana
Bichpuri			
	Integrated Nutrient Management in pearlmilet-wheat cropping system	Sea news channel, Agra	Dr. S.B.Singh and Dr Rahul Pundir
Kathalagere			
06-02-14	Integrated farming system (IFS) for Davangere district	AIR, Bhadravathi	Prof.H. Chandrappa
06-02-14	Insect pest management in various crops	AIR,Bhadravathi	Vijay S Danaraddi

9. APPENDICES

APPENDIX I: INITIAL SOIL PARAMETERS FOR ON-STATION EXPERIMENTAL SITES DURING 2013-14

Name of CSR centre	Expernment no	PH	EC (m mhos/cm)	O.C. (%/g/kg)	Available nutrient (kg/ha)		
					N	P	K
Rajendranagar	1(a)	7.72	0.27	0.51	210	32.0	288
	2(a)	8.5	0.24	0.54	-	34.0	224
Maruteru	1(a)	-	-	0.9	-	38.0	314
	2(a)	5.1	0.38	0.9	-	38.0	344
Rudrur	1(a)	6.68	0.55	0.46	-	39.6	305
	2(a)	7.99	0.36	0.56	-	17.5	304
	OF	7.3	0.48	0.46	-	41.0	425
Sabour	1(a)	7.5	0.13	0.63	213	23.6	226
	2(a)	7.4	0.23	0.46	246	23.6	155
	OF	8.1		0.50	153	26.9	122
Hisar	1(a)	7.8	0.21	0.46	170	12.7	292
	2(a)	7.8	0.23	0.43	191	16.4	291
	OF	7.8	0.21	0.49	162	15.5	238
Raipur	1(a)			0.49	248	18.6	262
	2(a)			0.51	234	11.5	232
	OF			0.58	169	17.4	270
Palampur	1(a)	5.6		0.99	293	63.1	11
	2(a)	5.5		0.60	667	21.9	221
	OF	5.7		0.80	505	35.5	186
Jammu	1(a)	8.4		0.55	216	23.0	119
	2(a)	7.1		0.62	456	13.8	154
	OF	8.1		0.51	210	14.7	114
Ranchi	1(a)	6.0		0.38	225	20.0	115
	2(a)	6.5		0.42	260	19.5	195
S.K.Nagar	1(a)			0.33	195	15.9	198
	2(a)			0.30	190	38.0	230
	OF			0.26	195	23.9	261
Junagarh	1(a)			0.68	190	9.5	140
	2(a)			0.77	240	29.9	165
Navsari	1(a)			0.59	194	18.2	153
	2(a)			0.58	297	29.0	317
	CA		0.59	256	21.4	160	219
	OF			0.56	176	16.5	197
Kathalagere	1(a)	6.1	0.20	0.60		22.0	211
	2(a)	6.4	0.13	0.68	277	12.3	348
Siruguppa	1(a)	8.2	0.38	0.65	177	19.3	341
	OF	8.1	0.34	0.59	221	18.1	364
Jabalpur	1(a)	7.7	0.48	0.68	266	9.2	448
	2(a)	7.6	0.55	0.65	240	16.0	370
	OF	7.5	0.50	0.64	210	8.8	NR

Name of CSR centre	Expernment no	PH	EC (m mhos/cm)	O.C. (%/g/kg)	Available nutrient (kg/ha)		
					N	P	K
Powarkheda	1(a)	7.6	0.55	0.66	260	9.0	300
Rewa	1(a)	7.7	0.53	0.65	260	9.0	500
Indore	1(a)	7.5	0.45	0.34	150	8.0	480
Rahuri	1(a)	8.0	0.26	0.62	178	7.0	705
	2(a)	8.2	0.35	0.64	153	14.2	527
Akola	2(a)	7.4	0.20	0.40	209	11.0	306
Karjat	1(a)	7.0	0.30	0.97	217	18.4	245
	2(a)	7.6	0.30	1.25	213	13.0	
Bhubaneswar	1(a)	6.7	0.27	0.69	212	15.7	210
	2(a)	5.1	0.36	0.43	254	20.0	165
	OF	5.8	0.13	0.62	245	18.5	130
	CA	5.5	0.29	0.65	260	14.6	210
Chiplima	1(a)	6.1	0.41	0.58	315	16.0	185
	2(a)	5.4	0.31	0.62	295	10.2	121
	OF	5.9	0.31	0.76	294	10.1	116
	CA	6.8	0.11	0.45	273	10.4	100
Ludhiana	1(a)	7.8	0.40	0.38	242	47.5	101
	2(a)	8.2	0.32	0.31	143	11.2	140
	OF	7.5	0.20	0.39	179	22.3	180
Durgapura	1(a)	8.2	0.28	0.22	NR	38.1	190
	OF	8.1	0.18	0.21	NR	21.9	482
Coimbatore	1(a)			0.60	252	23.9	398
	OF			0.59	249	19.2	528
Kanpur	1(a)	8.1	0.18	0.45	NR	11.5	170
	2(a)	8.1	0.18	0.24	NR	10.4	186
	OF	8.0	0.16	0.40	NR	14.4	203
Faizabad	1(a)	7.3	0.11	0.51	142	18.0	355
	2(a)	8.8	0.50	0.37	102	13.8	113
	OF	8.2	0.40	0.46	127	17.4	NR
Varanasi	1(a)	NR	NR	NR	NR	NR	216
	2(a)	7.9	0.22	0.44	192	12.0	NR
Bichpuri	1(a)	NR	NR	NR	NR	NR	204
	2(a)	NR	NR	0.31	124	10.6	284
	OF	7.8	1.80	0.31	123	10.6	NR
Pantnagar	1(a)	7.8	NR	NR	122	5.6	143
	2(a)	5.5	NR	0.60	NR	20.0	125
	OF	7.8	NR	NR	NR	15.5	NR
Kalyani	1(a)	7.2	0.65	0.65	123.2	11.9	81
	2(a)	7.4	0.59	0.92	110	12.1	93
	OF	7.1	0.46	0.62	129.8	11.9	NR

APPENDIX II A: WEATHER PARAMETERS (MONTHLY AVERAGES) AT DIFFERENT CROPPING SYSTEM CENTERS DURING 2013-14

Name of CSR centre	July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June
Rajendranagar	189.3	158.1	110.6	253.2	31	0	0	0	56.8	72.6	40.1	NR
Sabour	150.8	251.4	197.2	291.6	14.2	0	4.3	36.5	2.8	0	187.2	125.2
Raipur	606.5	445.7	187.6	86.4	0.0	0.0	0.0	84.8	4.4	26.2	32.2	NR
Junagadh	544.6	112.0	335.0	89.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Navsari	367.0	643.0	45.0	0.0	0.0	14.0	0.0	0.0	0.0	0.0	36.0	0.0
Hisar	159.2	288.2	140.4	6.5	9.4	0.0	2.0	12.5	47.0	16.4	56.5	71.6
Palampur	815.2	846.9	376.8	22.2	4.0	34.2	75.4	165.2	119.4	59.6	28.6	NR
Jammu	251.2	496.7	111.2	67.2	12.2	10.8	60.6	23.5	104.6	42.5	15.9	10.0
Kathalagere	250.0	30.0	104.0	22.0	0.0	0.0	0.0	6.0	22.0	0.0	0.0	NR
Karmana	278.4	25.1	187.5	160.5	261.9	17.0	41.7	80.8	2.8	333.3	129.8	NR
Jabalpur	568.0	1139.3	139.0	103.8	0.0	0.0	24.8	87.2	5.2	NR	NR	NR
Powarkheda	588.9	384.9	72.4	66.4	0.0	0.0	27.2	2.0	0.0	NR	NR	NR
Rewa	537.6	460.4	108.8	138.0	0.0	0.0	72.6	88.4	11.0	NR	NR	NR
Indore	737.6	132.7	136.2	107.6	0.0	2.2	55.6	42.2	0.0	NR	NR	NR
Rahuri	129.6	17.0	146.4	99.2	41.8	0.0	0.0	0.6	33.6	3.6	0.0	NR
Bhubneswar	263.2	152.8	345.6	734.3	0.0	0.5	0.0	49.0	26.0	9.4	0.0	NR
Chiplima	454.6	221.3	162.4	143.3	0.0	0.0	0.0	6.0	0.0	0.0	31.0	NR
Akola	228.0	174.9	151.9	86.3	0.0	0.0	0.1	36.7	16.5	NR	NR	NR
Karjat	2125	423.2	293.1	67.4	9.6	2.5	0.0	0.0	0.0	0.0	0.0	0.0
Ludhiana	159.1	205.1	48.7	35.6	4.6	2.8	56.5	24.1	33.2	34.0	NR	NR
Coimbatore	29.3	39.8	26.6	167.6	34.7	21.6	0	0.2	0	17.4	127.2	NR
Thanjavur	8.4	117.4	109	117	47	67.4	0	5.8	0	0	127.4	NR
Kanpur	326.1	179.3	95.8	143.2	0.0	2	105.8	29.8	17.6	4.4	0.0	25.3
Varanasi	238.6	248.6	20.0	144.9	0.0	0.0	59.5	74.4	0.5	8.3	13.4	NR
Bichpuri	371.0	163.0	22.0	24.0	0.0	14.1	38.4	0.0	4.3	6.0	0.0	0.0
Pantnagar	429.6	419.6	77.8	93.2	0.0	10.2	110.8	176.6	15.0	25.2	24.6	NR
PortBlair	624.4	221.4	478.1	271	151.2	108.1	1.3	0	0	0	256.9	509.4

Appendix II B : Maximum and minimum temperature (^{0}C) (July 2013 to June 2014)

Name of CSR centre	Temperature (^{0}C)																							
	Jul		Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		June	
	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
Sabour	33.5	26.9	34.6	26.1	32.3	26.1	28.8	22.6	26.9	15.3	23.4	10.1	20.2	10.4	22.6	10.8	30.1	15.3	37.0	20.1	37.8	24.3	34.2	24.5
Raipur	29.9	24.5	29.9	24.3	31.2	24.8	30.1	21.7	29.5	15.6	28.1	11.5	28.5	13.5	29.1	15.6	33.9	19.7	39.2	23.8	40.9	27.4	NR	NR
Junagadh	29.8	25.1	30.2	24.5	32.3	25.0	33.9	22.9	32.7	17.4	29.4	12.9	28.6	12.1	30.3	14.8	36.0	18.3	39.0	22.4	39.9	24.9	NR	NR
Navsari	29.1	26.0	30.4	26.3	32.7	25.3	33.7	22.6	33.0	22.3	28.3	14.2	28.7	14.2	34.1	18.4	35.4	22.2	32.7	24.6	32.3	26.8	NR	NR
Hisar	36.6	26.9	33.3	25.9	34.4	23.9	31.9	20.1	26.6	10.4	21.8	7.0	18.0	5.6	20.2	7.6	26.3	12.2	34.1	17.1	38.4	22.2	41.0	26.3
Palampur	28.0	20.1	28.0	19.3	26.4	17.5	25.3	12.1	21.1	8.1	18.5	6.2	15.9	3.7	16.4	6.2	22.4	10.0	25.7	13.6	32.1	18.5	NR	NR
Jammu	33.9	25.2	31.8	24.6	32.8	22.8	30.6	18.9	25.3	9.0	19.8	5.6	18.9	4.9	24.1	11.5	30.3	14.7	30.3	14.7	34.6	20.2	39.7	23.4
Kathalagere	24.6	22.4	26.3	21.8	28.3	21.8	28.6	22.0	26.8	16.8	25.5	16.8	29.0	18.8	31.3	20.0	34.0	21.5	35.5	23.3	NR	NR	NR	NR
Karmana	28.8	23.4	29.5	23.6	29.1	24.0	30.5	23.7	30.6	23.5	30.8	22.3	30.5	22.0	28.2	22.6	32.6	23.4	32.3	24.5	31.9	25.7	NR	NR
Jabalpur	30.0	23.9	28.6	23.3	30.6	22.6	29.8	19.5	27.7	10.0	25.7	8.5	22.8	10.0	25.6	11.4	31.9	13.9	NR	NR	NR	NR	NR	NR
Powarkheda	31.1	22.1	30.3	22.7	35.2	22.9	33.8	19.4	31.5	12.9	29.4	10.1	25.7	10.5	30.4	10.9	36.6	15.8	NR	NR	NR	NR	NR	NR
Rewa	31.8	23.8	31.2	23.7	32.7	23.6	30.3	20.5	27.6	11.0	25.1	8.2	21.1	9.0	23.0	9.9	30.8	13.6	NR	NR	NR	NR	NR	NR
Indore	26.6	22.1	26.8	22.0	31.1	22.1	30.3	18.8	27.6	11.6	25.4	8.5	23.4	7.1	25.7	7.8	32.9	13.6	NR	NR	NR	NR	NR	NR
Rahuri	29.1	22.4	30.2	21.5	31.0	21.1	31.5	19.5	31.5	13.4	29.1	11.1	29.1	12.8	30.4	12.6	34.0	17.8	38.1	20.3	38.5	22.9	NR	NR
Bhubneswar	32.2	25.3	32.3	25.2	32.5	24.3	30.6	22.4	29.6	17.9	28.9	14.0	28.9	15.0	32.2	17.8	35.7	21.8	39.7	24.5	39.7	25.7	NR	NR
Chiplima	30.6	23.8	32.3	23.5	34.2	23.0	28.9	19.8	26.3	11.9	26.5	8.6	26.2	10.5	26.7	11.1	34.3	14.8	39.8	18.2	40.0	18.8	NR	NR
Akola	30.4	23.4	29.5	22.8	32.4	22.6	32.8	19.3	31.0	14.2	29.3	10.9	29.5	12.5	31.8	13.1	34.4	17.4	NR	NR	NR	NR	NR	NR
Karjat	28.1	23.0	28.2	23.3	30.5	24.1	33.5	21.8	34.7	17.4	34.2	16.7	32.6	15.5	33.3	16.0	38.2	21.4	40.0	23.7	38.2	26.7	NR	NR
Ludhiana	34.7	27.7	33.1	26.3	33.3	23.7	30.9	19.3	25.8	30.0	20.1	7.4	17.5	7.3	19.9	8.1	25.0	13.0	33.8	18.0	NR	NR	NR	NR
Coimbatore	29.9	23.1	32.0	22.6	30.9	22.6	31.4	21.9	29.6	22.2	29.3	19.6	30.2	20.0	32.7	20.9	35.0	22.1	36.3	25.0	33.9	24.2	NR	NR
Thanjavur	36.9	27.6	35.1	26.8	35.8	26.4	34.0	25.5	29.9	23.3	29.4	24.4	29.4	21.3	31.1	21.8	35.6	24.6	36.5	28.7	37.7	28.8	NR	NR
Kanpur	32.6	23.9	32.2	23.6	33.5	22.5	30.7	18.2	27.3	9.3	23.4	7.2	18.0	7.2	22.1	7.9	29.4	12.3	33.4	19.0	39.6	21.9	41.4	24.8
Varanasi	33.0	26.7	31.3	25.9	32.4	25.8	28.6	21.5	26.8	16.7	23.5	11.5	19.4	10.8	23.2	12.8	30.6	16.6	37.6	21.4	39.3	25.2	NR	NR
Bichpuri	33.8	26.7	33.0	25.6	34.7	24.4	31.8	19.8	27.4	10.2	23.2	7.9	18.3	8.5	22.7	10.6	30.7	14.5	37.1	20.6	41.1	25.1	40.2	28.2
Pantnagar	32.3	25.7	32.1	25.2	32.8	23.8	30.5	20.2	26.9	11.2	22.4	7.3	17.1	8.3	22.2	9.4	28.4	13.4	34.6	16.8	37.7	22.7	NR	NR
PortBlair	29.1	23.9	28.0	22.8	29.3	23.9	31.2	24.2	30.6	25.3	29.9	23.8	29.9	23.8	30.6	22.2	32.3	24.0	34.2	25.2	32.0	25.6	30.6	25.6

APPENDIX III: CENTRE-WISE STAFF POSITION

1. ANGRAU,HYDERABAD (A.P.)

Main Centre, Rajendranagar

Chief Agronomist	Dr. M. Venkata Ramana
Jr. Agronomist	Dr. M. Goverdhan
Jr. Soil Scientist	Dr. S. Sridevi
Technical Asstt.	Vacant
Field assistant	Mr. K. Sugunanandam
Field assistant	Mr. K. Venugopalan
Jr. Steno/UDC	Vacant
Messenger	Mr. G. Saibaba

Sub Centre, Maruteru

Agronomist	Mr. K. Shyam Sunder
Technical Asstt.	Vacant
Field assistant	Mr. K. Viswanadham
Field assistant	Mrs. M. Neelima
LDC/Typist	Mr. Md. Khaja Babu

Sub Centre, Rudrur

Agronomist	Dr. U. Nagabhushanam
Technical Asstt.	Vacant
Field assistant	Mr. Shekar
Field assistant	Mr. Sailu
LDC/Typist	Mr. K. Sanker

On-Farm Centre, Seetampet

Agronomist	Dr. K. Tejeswara Rao
Field assistant	Mr. T. Ramjogi/ Mr. N. Murali Mohan Rao
Field assistant	Mr. B.V.A. Satyanarayana
Field assistant	Mr. A.V. Ramana
Field assistant	Mr. K. Gopi
Field assistant	Mr. K. Jaganmohan Rao
Field assistant	Mr. T.D.M. Murthy
Jr. Stenographer	Vacant
Driver	Vacant
Watchman	Vacant

On-Farm Centre,Warangal

Agronomist	Dr. M. Malla Reddy/ Dr. P. Leela Rani/ Dr. Lateef Pasha
Asst. Jr. Economist	Mr. V. Rajendra Prasad
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Mr. Md. Hafeiz/ Mr. Md. Afsar
Field assistant	Mr. K.V. Subramanyam
Field assistant	Mr. I. Babu Rao/ Mr. Y. Venkaiah
Field assistant	Mr. P. Yadagiri
Jr. Stenographer	Mr. T. Laxmi
Driver	Vacant
Watchman	Vacant

2. AAU JORHAT (ASSAM)

Main Centre, Jorhat

Chief Agronomist	Dr. Ajit Baishya
Jr. Soil Scientist	Dr. B.K. Medhi
Asst. Jr. Economist	Dr. J.P. Hazarika
Technical Asstt.	Mr. B. Dutta
Field assistant	Mr. T. Gogoi
Field assistant	Mr. J.C. Dutta
Jr. Steno/UDC	Mr. A.B. Rajkonwar
Messenger	Mr. B. Kalita

On-Farm Centre, Karimganj

Agronomist	Dr. M.C. Kalita
Asst. Jr. Economist	Dr. J.K. Gogoi
Field assistant	Mr. B. Saikia
Field assistant	Mr. S. Pathak
Field assistant	Vacant
Field assistant	Mr. N.N. Kalita
Field assistant	Mr. H.K. Goswami
Field assistant	Mr. I. Gogoi
Jr. Stenographer	Mrs. Beauti Devi
Driver	Mr. B. Boruah
Watchman	Mr. D.P. Gohani

3. RAU, PUSA (BIHAR)

Main Centre, Sabour

Chief Agronomist	Dr. R.P. Sharma
Jr. Soil Scientist	Dr. N. Chattopadhyaya/ Mr. Anupam Das
Jr. Agronomist	Dr. S. Tyagi

Technical Asstt.	Mr. K.R. Raman
Field assistant	Vacant
Field assistant	Mr. Rajeev Kumar
Jr. Steno/UDC	Mr. A.P. Yadav
Watchman	Mr. Ganesh Ram

On-Farm Centre, Patna

Agronomist	Dr. D.K. Mahto
Technical Asstt.	Vacant
Field assistant	Mr. Gautam Prasad
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Vacant
Driver	Mr. Surendra Kumar
Watchman	Mr. Gajendra Mandal

4. IGKV, RAIPUR (CHHATISSGARH)

Main Centre, Raipur

Chief Agronomist	Dr. G.P. Pali
Jr. Soil Scientist	Dr. Alok Tiwari/ Mr. Anup Kumar Singh
Jr. Agronomist	Dr. Shrikant Chitale
Technical Asstt.	Mr. B.K. Chandrakar
Field assistant	Mr. Dilip Kumar Verma
Field assistant	Mr. G.P. Yadav
Jr. Steno/UDC	Ms. Rubi Majumdar
Messenger	Mrs. S. Mishra

On-Farm Centre, Kawardha

Agronomist	Mr. Sunil Kumar
Technical Asstt.	Vacant
Field assistant	Mr. D.D. Singh
Field assistant	Mr. Amit Ku.Tondar
Field assistant	Mr. S.S. Mali
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Mr. Saiyyad Javed Ali
Driver	Mr. Prasant Kumar Choure
Watchman	Mr. Gaindlal Nirmalkar

5. SDAU, S.K. NAGAR (GUJRAT)

Chief Agronomist	Dr. B.S. Patel
Jr. Soil Scientist	Mr. P.K. Patel
Jr. Agronomist	Mr. S.M. Patel
Technical Asstt.	Vacant
Field assistant	Mr. B.R. Patel
Field assistant	Mr. S.L. Parmar
Jr. Steno/UDC	Mr. R.K. Gadhavi
Watchman	Mr. R.A. Joshi

On-Farm Centre, Deesa

Agronomist	Dr. S.K. Patel
Jr. Sci.(Eco)	Dr. R.R. Patel
Tech. Asstt.	Vacant
Field assistant	Mr. L.S. Chaudhary
Field Assistant	Mr. A.G. Patel
Field Assistant	Mr. Tusar Patel
Field Assistant	Mr. D.P. Parekh
Field Assistant	Mr. J.H. Chaudhary
Field Assistant	Mr. S.S. Patel
Jr. Stenographer	Mr. P.B. Joshi
Driver	Vacant
Watchman	Mr. G.K. Chaudhary

6. JAU, JUNAGADH (GUJARAT)

Sub Centre, Junagadh

Agronomist	Dr. B.M. Dabhi
Technical Asstt.	Mr. K.M. Joshi
Field assistant	Mr. C.T. Dalwadi
Field assistant	Mr. K.G. Rabadia
Jr. Steno/UDC	Mr. J.B. Sodha

7. NAU, NAVSARI (GUJRAT)

Sub Centre, Navsari

Agronomist	Dr. L.J. Desai
Technical Asstt.	Vacant
Field assistant	Mr. B.V. Patel
Field assistant	Mr. M.B. Solanki
Jr. Steno/UDC	Vacant

8. AAU, ANAND (GUJRAT)

On-Farm Centre, Thasra

Agronomist	Dr. V.V. Sonani

Field assistant	Mr. R.S. Rana
Field assistant	Mr. M.M. Mori
Field assistant	Mr. S.S. Rathava
Field assistant	Mr. K.B. Raval
Field assistant	Mr. D.J. Gohil
Field assistant	Mr. V.H. Rathva
Jr. Stenographer	Vacant
Driver	Vacant
Watchman	Vacant

9. CCS HAU, HISAR (HARYANA)

Main Centre, Hisar

Chief Agronomist	Dr. R.K.Narwal
Jr. Soil Scientist	Dr. Manoj Kumar Sharma
Jr. Agronomist	Dr. Pawan Kumar
Technical Asstt.	Vacant
Technical Asstt.	Vacant
Field assistant	Mr. Tara Chand
Field assistant	Vacant
Jr. Steno/UDC	Mrs. Veena Kakkar
Watchman	Vacant

On-Farm Centre, Kurukshetra

Agronomist	Dr. Anil Mehta
Jr. Agronomist	Vacant
Field assistant	Mr. Sube Singh
Field assistant	Mr. Santosh Kumar
Field assistant	Mr. Mohinder Singh
Field assistant	Mr. Harikesh
Field assistant	Mr. Sat Narain
Field assistant	Vacant
Jr. Steno/UDC	Mrs. Meenu Kumari
Driver	Vacant
Watchman	Vacant

10. CSK HPKVV, PALAMPUR (H.P.)

Main Centre, Palampur

Chief Agronomist	Dr. S.C. Negi
Jr. Soil Scientist	Dr. S.K. Subehia
Jr. Agronomist	Dr. S.S. Rana
Technical Asstt.	Mr. R.K. Sharma
Field assistant	Mr. Pradeep Kumar
Field assistant	Mr. Vikram Singh
Jr. Steno/UDC	Mr. Mehar Chand
Watchman	Mr. Surjeet Kumar

On-Farm Centre, Kangra

Agronomist	Dr. S.K.Sharma
Technical Asstt.	Mrs. Anuradha
Field assistant	Mr. Rakesh Kumar
Field assistant	Mr. Pratap Chand
Field assistant	Mr. Bihari Lal
Field assistant	Mr. Anirudh
Field assistant	Mr. Amarjit Singh
Field assistant	Mr. Gyan Chand
Jr. Steno/UDC	Mr. Saran Das
Driver	Mr. Santosh Kumar
Messenger	Vacant

11. SKUAST, Jammu (J &K)

Main Centre, Chatta, Jammu

Chief Agronomist	Prof. Dileep Kachroo
Jr. Soil Scientist	Dr. N.P. Thakur
Jr. Agronomist	Dr. Vijay Khajuria
Technical Asstt.	Mr. Mahesh Kumar
Technical Asstt.	Mr. Parshotam Kumar
Field assistant	Mr. Bishan Lal
Field assistant	Mr. Romesh Lal
Jr. Steno/UDC	Mrs. Rajni Bharti
Messenger	Mr. Tarsem Singh

OFR Centre, Jammu

Agronomist	Dr. A.K.Gupta
Field assistant	Mr. Khazan Singh
Field assistant	Mr. Babu Ram
Field assistant	Mr. A.W. Katoch
Field assistant	Mr. Ashwani Sharma
Field assistant	Mr. Ghulam Mohd.
Field assistant	Mr. Jai Krishan
Jr. Steno/UDC	Mrs. Pardeep Kour
Driver	Mohd. Saleem
Watchman	Mohd. Yaqoob

12. BAU, RANCHI (JHARKHAND)

Main Centre,Ranchi

Chief Agronomist	Dr. R. Thakur
Jr. Soil Scientist	Mr. A.N. Puran
Jr. Agronomist	Mr. R.P. Manjhi
Technical Asstt.	Mr. Rakesh Mitra
Field assistant	Mr. M. Munda
Field assistant	Mr. Raju Gari

Jr. Steno/UDC	Mr. S.S. Jha
Messenger	Mrs. Deomani Devi

On-Farm Centre, Pakur

Agronomist	Mr. W. Aind
Technical Asstt.	Mr. Rakesh Kumar Sinha
Field assistant	Mr. S.N. Baitha
Field assistant	Mr. Rajesh Kujur
Field assistant	Mr. Anand Kumar Mandal
Field assistant	Mr. Arvind Kumar
Field assistant	Mr. Parwej Alam
Field assistant	Mr. Jayant Kumar
Jr. Stenographer	Mr. Dinesh Toppo
Driver	Mr. Krishun Kujur
Watchman	Mr. Sarif Ansari

13. UAS, Banglore (KARNATAKA)

Main Centre, Kathalelgere

Chief Agronomist	Dr. H. Chandrappa
Jr. Soil Scientist	Dr. P. Chandravanshi
Jr. Agronomist	Vacant
Technical Asstt.	Mr. Nagaraja Kusugur
Field assistant	Vacant
Field assistant	Mr. P. Maheshwarappa
Jr. Steno/UDC	Vacant
Messenger	Mr. K.M. Chandrakala

On-Farm Centre, Banglore

Agronomist	Dr. A.P. Viswanath
Jr. Soil Scientist	Dr. M.N. Venkatamana
Technical Asstt.	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Vacant
Driver	Vacant
Watchman	Vacant

14. UAS, Raichur (KARNATAKA)

Main Centre, Siruguppa

Chief Agronomist	Dr. Basavarajappa M.A
Jr. Soil Scientist	Dr. Ashok Kumar Gaddi
Jr. Economist	Dr. Prabhuling Tewari
Technical Asstt.	Mr. Erappa Yankannvar
Technical Asstt.	Mr. Bhimanna Hugar
Field assistant	Mr. Somanagouda H
Field assistant	Mr. Gangadhar Swami S.
Jr. Steno/UDC	Vacant

15. UAS, Dharwad (KARNATAKA)

On-Farm Centre, Gadag

Agronomist	Dr. M.H. Hosmani
Field assistant	Mr. G.C. Kallur
Field assistant	Mr. V.H. Jamadar
Field assistant	Mr. S.A. Savalagi
Field assistant	Mr. M.S. Talakeri
Field assistant	Mr. V.D. Kalawad
Field assistant	Mr. R.S. Rathod
Jr. Steno/UDC	Mr. R.N. Vagole
Driver	Mr. S.R. Kondaguli
Watchman	Mr. A.M. Harinath

16. KAU, THRISSUR (KERALA)

Main Centre, Karmana (Thiruvandrum)

Chief Agronomist	Dr. P. Sukumari
Jr. Soil Scientist	Dr. B. Rani
Jr. Agronomist	Dr. B. Jacob john
Technical Asstt.	Mr. Hirosh Kumar
Technical Asstt.	Mr. K. Jayakumaran
Field assistant	Mr. Tomy Abraham
Field assistant	Mrs. K.S.Sujatha
Jr. Steno/UDC	Mrs. P.S.Sindhu
Messenger	Mr. K. Maniyan

On-Farm Centre, Thiruvella

Agronomist	Dr. Thomas Mathew
Jr. Soil Scientist	Dr. D.Jocob
Field assistant	Mrs. S. Naseema
Field assistant	Mr. P.S. Sanal Kumar
Field assistant	Mr. K.O. Shahul Hamed
Field assistant	Vacant
Field assistant	Mr. A.R. Venu
Field assistant	Mr. Mathew Thomas. C
Jr. Steno/UDC	Mr. Aneesh Kumar. M
Driver	Vacant
Messenger	Mr. K.G. Pushpakumari

17. JNKVV, Jabalpur (M.P.)

Main Centre, Jabalpur

Chief Agronomist	Dr. V.K. Shukla
Jr. Soil Scientist	Vacant
Jr. Soil Scientist	Dr. N.K. Khamparia
Jr. Agronomist	Vacant
Technical Asstt.	Dr. S.K. Vishwakarma
Field assistant	Vacant
Field assistant	Mr. A.N. Goutam
Jr. Steno/UDC	Vacant
Messenger	Mr. N.L. Bhumiya

Sub Centre, Rewa

Agronomist	Dr. B.M. Mouya
Tech.Assistant	Mr. P.S. Yadav
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Mr. S.K. Upadhyay

Sub Centre, Powerkheda

Agronomist	Dr. R.S. Lidder
Tech.Assistant	Vacant
Field assistant	Vacant
Field assistant	Mr. Sudhir Dubey
Jr. Steno/UDC	Mrs. Sushila Jhariya

On Farm Centre, Dindori

Agronomist	Mr. D.N. Shriniwas
Jr. Economist	Vacant
Field assistant	Mr. V.R. Ghorke
Field assistant	Mrs. Jaya Kori
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Vacant
Driver	Vacant
Watchman	Vacant

On Farm Centre, Katni

Agronomist	Dr. R.P. Sahu
Technical Asstt.	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Mr. R.D. Mahor
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Vacant
Driver	Vacant
Watchman	Vacant

18. RMVR, SUA&T, GWALIOR

Sub Centre, Indore

Agronomist	Dr. S.K. Choudhary
Tech. Assistant	Mr. N.K. Sinha
Field assistant	Mr. R.K. Tamere
Field assistant	Mr. G.S. Yadav
Jr. Steno/UDC	Mr. N.K. Bangre

19. MPKV, RAHURI (MAHARASHTRA)

Main Centre, Rahuri

Chief Agronomist	Dr. B.S. Raskar
Jr. Agronomist	Dr. S.M. Shete
Jr. Soil Scientist	Dr. V.S. Patil
Tech. Assistant	Mr. A.B. Dhage
Field Assistant	Mr. B.K. Jadhav
Field Assistant	Mr. J.A. Rajnur
Jr. Stenographer	Mr. A.M. Chavan
Messenger	Mr. P.L. Dolas

On Farm Centre, Chas (Ahmednagar)

Agronomist	Prof. M.M. Desai
Jr. Economist	Prof. Y.C. Sale
Tech. Assistant	Vacant
Field Assistant	Mr. S.P. Kahar
Field Assistant	Mr. R.P. Gangurde
Field Assistant	Mr. N.S. Kudal
Field Assistant	Mr. R.H. Rathod
Field Assistant	Mr. A.B. Nikrad
Field Assistant	Vacant
Jr. Stenographer	Mr. A.M. Chavan
Driver	Mr. E.R. Jadhav
Watchman	Vacant

20. DPDKV, AKOLA (MAHARASHTRA)

Main Centre, Akola

Chief Agronomist	Dr. (Mrs.) Mangala Ghanbahadur

Jr. Agronomist	Mr. B.S. Morwal
Jr. Soil Scientist	Dr. O.S.Rakhode
Tech. Assistant	Mr. M.G. Dikkar
Field Assistant	Mr. M.M. Deshmukh
Field Assistant	Mr. T.L. Pawar
Jr. Stenographer	Mr. B.W. Ahir
Messenger	Mrs. L.P. Ingle

Sub Centre, Hiwara

Agronomist	Mr. B.S. Morwal/ Dr. Varsha V. Tapre
Technical Assistant	Mr. F.F. Khan
Field Assistant	Mr. R.G. Langewar
Field Assistant	Mr. S.D. Kadam
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
Jr. Stenographer	Vacant
Watchman	Mr. Y.S. Ghonmode

21. MAU, PARBHANI (MAHARASHTRA)

Main Centre, Parbhani

Chief Agronomist	Dr. W.N. Narkhede
Jr. Economist	Vacant
Jr. Soil Scientist	Mr. R.N. Khandare
Jr. Stenographer	Vacant
Tech. Assistant	Vacant
Field Assistant	Mr. G.Y. Sonwane
Field Assistant	Vacant
Messenger	Vacant

On Farm Centre, Aurangabad

Agronomist	Prof. S. B. Pawar (Additional charge)
Tech. Assistant	Dr. D.P. Deshpande
Field Assistant	Vacant
Field Assistant	Mr. S.K. Choudhari
Field Assistant	Mr. B.N. Ambad
Field Assistant	Mr. R.P. Kerai
Field Assistant	Mr. B.S. Kakade
Field Assistant	Mr. S.S. Mundhe
Jr. Stenographer	Vacant

22. DBS KKV, DAPOLI (MAHARASHTRA)

Main Centre, Karjat

Chief Agronomist	Dr. L.S. Chavan
Jr. Soil Scientist	Dr. D.G. Jondhale
Jr. Agronomist	Mr. A.S. Dalvi
Technical Asstt.	Mr. A.B. Gaikwad
Technical Asstt.	Mr. S.A. Diwate
Field assistant	Mr. A.C. Sarpotdar
Field assistant	Mr. J.P. Hambir
Jr. Steno/UDC	Mr. R.L. Biwalkar/ Mrs. V.R. Rewale
Messenger	Mr. L.N. Hambir

On Farm Centre, Palghar

Agronomist	Dr. S.B. Bhagat
Field Assistant	Mr. S.V. Kamble
Field Assistant	Mr. B.L. Shanwar
Field Assistant	Mr. S.R. Iware
Field Assistant	Mr. S.D. Phale
Field Assistant	Mr. V.S. Daphal
Field Assistant	Mr. N.H. Paradhi
Jr. Stenographer	Mr. K.P. Malche
Driver	Vacant
Messenger	Mr. V.D. Zagade

23. OUAT, BHUBNESWAR (ORISSA)

Main Centre, Bhubaneswar

Chief Agronomist	Dr. L.M. Garnayak
Jr. Agronomist	Mr. A.K. Patra
Jr. Soil Scientist	Dr. Kshitiendra Narayan Mishra
Tech. Assistant	Mrs. Somanath Sahu
Tech. Assistant	Mr. D.K. Raut
Field Assistant	Mr. Trinath Routray
Field Assistant	Mr. B.Biswal
Jr. Stenographer	Mr. Sameer Kumar Mallick
Messenger	Mr. G. Mahabhoi

Sub Centre, Chiplima

Agronomist	Mr. J. Haldar
Tech. Assistant	Mr. Prafulla Kumar Mohanty

Field Assistant	Mr. J.K. Behera
Field Assistant	Mr. Bhakta Danta
Jr. Stenographer	Vacant

On Farm Centre, Angul

Agronomist	Vacant
Jr. Economist	Vacant
Field Assistant	Mr. S. Baral
Field Assistant	Mr. Kasinath Mallick
Field Assistant	Mr. Basanta Kumar Dash
Field Assistant	Mr. Biranchi Pradhan
Field Assistant	Vacant
Field Assistant	Vacant
Jr. Stenographer	Mr. Fulendu Kumar Behra
Driver	Mr. B. Behra
Watchman	Vacant

On Farm Centre, Kendrapara

Agronomist	Dr. Susant Kumar Swain
Field Assistant	Mr. T. Sahoo
Field Assistant	Mr. Pravat Kumar Mohanty
Field Assistant	Mr. Rama Chandra Singh
Field Assistant	Mr. Madhusudan Nayak
Field Assistant	Mr. Ananda Chandra Sahu
Field Assistant	Vacant
Jr. Stenographer	Mr. Basant Kumar Nayak
Driver	Mr. K.C. Mallick
Watchman	Mr. S. Munda

24. PAU, LUDHIANA (PUNJAB)

Main Centre, Ludhiana

Chief Agronomist	Dr. Sohan Singh Walia
Agronomist	Dr. C.S. Aulakh
Jr. Soil Scientist	Dr. Roopinder Singh
Tech. Assistant	Mr. Surender Kumar Sharma
Field Assistant	Mr. Balbir Singh
Field Assistant	Mr. Baljit Singh
Field Assistant	Mr. Prem Prakash
Jr. Stenographer	Mr. Ram Ji Dass
Watchman	Mr. Jagmohan Singh

On Farm Centre, Amritsar

Agronomist	Dr. Harpreet Singh
Field Assistant	Mr. Amrik Singh
Field assistant	Mr. Tarseem Dass
Field assistant	Mr. Gurdip Singh
Field assistant	Mr. Sukhdev Singh
Field assistant	Vacant
Field assistant	Mr. Harjit Singh
Jr. Stenographer	Mrs. Sukhdeep Kaur
Driver	Mr. Avtar Singh
Watchman	Mr. Danial

25. MPUAT, Udaipur (RAJASTHAN)

Sub Centre, Kota

Agronomist	Dr. G.S. Bhatnagar
Tech. Assistant	Dr. H.P. Meghwal
Field Assistant	Mr. Bhagwan Singh
Field Assistant	Vacant
Jr. Stenographer	Vacant

On Farm Centre, Udaipur

Agronomist	Dr. S.K. Sharma
Jr. Economist	Mr. Hari Singh
Field Assistant	Mr. N.S. Jhala
Field Assistant	Mr. Ramji Lal
Field Assistant	Mr. Madan Lal
Field Assistant	Mr. A.S. Rathore
Field Assistant	Vacant
Field Assistant	Vacant
Jr. Stenographer	Mr. Vishal Ajmera
Driver	Mr. Yogesh Chandra Damami
Watchman	Mr. Shanker Lal Nagda

26. RAU, Bikaner (RAJASTHAN)

Main Centre, Durgapura

Chief Agronomist	Dr. Rakesh Summauria
Jr. Soil Scientist	Vacant
Jr. Agronomist	Vacant
Technical Asstt.	Mr. Mangal Ram Sharma
Field assistant	Mr. Nonand Singh

Field assistant	Mr. M.L. Kumawat
Jr. Steno/UDC	Vacant
Messenger	Mr. Kana Ram

On-Farm Centre, Hanumangarh

Agronomist	Dr. Harphool Singh
Technical Asstt.	Vacant
Field assistant	Mr. Banwari Lal
Field assistant	Mr. Chaju Ram Jat
Field assistant	Mr. Iswar Singh
Field assistant	Mr. Hanuman Lal
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant
Jr. Steno/UDC	Vacant
Watchman	Mr. Panna Lal

27. TNAU, COIMBATORE (TN)

Main Centre, Coimbatore

Chief Agronomist	Dr. K. Siddeswaran/ Dr. E. Somasundaram
Jr. Soil Scientist	Dr. K. Sathiya Bama
Jr. Agronomist	Dr. P.M. Shanmugam
Jr. Economist	Dr. V. Sarvanakumar
Tech. Assistant	Vacant
Field Assistant	Mr. A. Gowthaman
Field Assistant	Vacant
Jr. Stenographer	Mrs. K. Suguna
Messenger	Mrs. M. Vijayalakshmi

Sub Centre,Thanjavur

Agronomist	Dr. R. Marimuthu
Tech. Assistant	Vacant
Field Assistant	Ms. S.Chitra Devi
Field Assistant	M. Palanisamy
Jr. Stenographer	Mr. Mahalingam

On farm, Chettinad

Agronomist	Mr. P. Kathirvelan
Tech. Assistant	Vacant
Field Assistant	Mr. M. Baskarapandian
Field Assistant	Mr. P. Sakthivel
Field Assistant	Mrs. M. Punitha
Field Assistant	Mr. M. Periyasamy
Field Assistant	Mr. A.R. Sivamani
Field Assistant	Mr. M.K. Rajendran
Jr. Stenographer	Mr. S. Nagarajan
Driver	Mr. M. Radha
Messenger	Vacant

On Farm, Paiyur

Agronomist	Dr. S. Vijayabaskaran
Tech. Assistant	Vacant
Field Assistant	Mr. A. Murugan
Field Assistant	Mr. D. Gnanandurai
Field Assistant	Mr. K. Mohandass
Field Assistant	Mr. R. Solai
Field Assistant	Mr. A. Ravichandran
Field Assistant	Mr. G. Mahalingam
Jr. Stenographer	Mr. R. Chitra
Driver	Mr. K. Murugesan
Messenger	Mr. C. Murugesan

28. CSAUAT, KANPUR (U.P.)

Main Centre, Kanpur

Chief Agronomist	Dr. M.P. Yadav
Jr. Soil Scientist	Dr. U.S. Tiwari
Jr. Agronomist	Dr. Naushad Khan
Technical Asstt.	Mr. U.S. Yadav
Field assistant	Mr. R.P. Dubey
Field assistant	Mr. Anil Kumar Singh
Jr. Steno/UDC	Mr. S.T. Siddiqui
Messenger	Mr. Vijay Bahadur

On Farm Centre, Daleep Nagar

Agronomist	Vacant
Technical Asstt.	Vacant
Field Assistant	Mr. Sudhir Pratap Singh
Field Assistant	Mr. Jagdish Chandra
Field Assistant	Mr. R.B. Yadav
Field Assistant	Mr. Virendra Singh
Field Assistant	Vacant
Field Assistant	Vacant
Jr. Stenographer	Vacant
Driver	Mr. Mahendra Singh
Watchman	Mr. Ashok Kumar

29. NDUAT, FAIZABAD (UP)

Main Centre, Faizabad

Chief Agronomist	Dr. N.B. Singh
Jr. Soil Scientist	Dr. Alok Kumar

Jr. Agronomist	Dr. R. A. Yadav
Technical Asstt.	Mr. Ishwar Nath
Technical Asstt.	Dr. R. P. Dwivedi
Field assistant	Mr. A. P. Singh
Field assistant	Mr. R. A. Pandey
Jr. Steno/UDC	Mr. S. A.R. Zaidi
Messenger	Mr. Jag Jeevan

On Farm Centre, Ambedkar Nagar

Agronomist	Vacant
Field Assistant	Mr. A.N. Pandey
Field Assistant	Mr. P.C. Tripathi
Field Assistant	Mr. Tilak Ram
Field Assistant	Mr. V.B. Singh
Field Assistant	Vacant
Field Assistant	Vacant
Jr. Stenographer	Mr. Ram Lal
Driver	Mr. J.P. Yadav
Watchman	Mr. S.P. Singh

30. BHU, VARANASI (UP)

Sub Centre, Varanasi

Agronomist	Dr. J.S. Bohra
Tech. Assistant	Mr. Manoj Kumar Singh
Field Assistant	Vacant
Field Assistant	Vacant
Jr. Stenographer	Mr. Mohan Ram

31. RBS COLLEGE, BICHPURI (AGRA)

Agronomist	Dr. S.B. Singh
Tech. Assistant	Dr. Rahul Pundir
Field Assistant	Vacant
Field Assistant	Dr. Susheel Kumar Singh
Jr. Stenographer	Dr. Bhumi Raj Singh

32. GBPUAT, PANTNAGAR (UTTARAKHAND)

Main Centre, Pantnagar

Chief Agronomist	Dr. Rohitashav Singh
Jr. Soil Scientist	Dr. Ajeet Pratap Singh
Jr. Agronomist	Dr. Sumit Chaturvedi
Tech. Assistant	Mr. Y.S. Khokar
Field Assistant	Mr. A.K. Tiwari
Field Assistant	Mr. M.P. Singh
Jr. Stenographer	Vacant
Messenger	Mr. Lalloo Singh

On Farm Centre, Jeolikot (Nainital)

Agronomist	Dr. D.K. Singh
Field Assistant	Mr. Y.P. Gangwar
Field Assistant	Mr. S.K. Verma
Field Assistant	Mr. Gulsher Ahmed
Field Assistant	Mr. Virendra Singh
Field Assistant	Vacant
Field Assistant	Vacant
Jr. Stenographer	Vacant
Driver	Vacant
Messenger	Mr. Panjabi Mahato

33. BCKV, Kalyani

Main Centre, Kalyani

Chief Agronomist	Dr. Mahadev Pramanick
Jr. Soil Scientist	Vacant
Jr. Economist	Dr. S.Chatterjee
Technical Asstt.	Dr. Dilip Saha
Technical Asstt.	Mr. Basudev Datta
Field assistant	Mr. Bipul Chandra Pal
Field assistant	Mr. Amar Chakrabarty
Jr. Steno/UDC	Vacant
Messenger	Vacant

On-Farm Centre, Kakdwip

Agronomist	Dr. Manabendra Ray
Field assistant	Mr. A.K. Bhaumik
Field assistant	Mr. K. Maiti
Field assistant	Mr. N. Das
Field assistant	Mr. Samir Kumar Chatterjee
Field assistant	Mr. Chiranjit Mandal
Field assistant	Mr. Uttam Mandal
Jr. Steno/UDC	Mr. Nilanjan Mukherjee
Driver	Mr. Laxman Chandra Das
Watchman	Vacant

APPENDIX IV: SOIL FERTILITY STATUS AND NUTRIENT UPTAKE

Table A : Soil fertility Status-Organic carbon (%) and available N,P and K (kg/ha) after *Kharif/Rabi*/summer season in Exp. No. 1(a)

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
Rajendra nagar	*Kharif*	OC%	0.51	0.60	0.56	0.56	0.57	0.57	0.59	0.59							
		N	210	186.3	172.6	196.3	181	192.9	197	205.9							
		P	32	30.9	27.6	35.7	38	30.5	41	35.2							
		K	288	322.2	277.2	296.4	208	333.8	299	333							
	Rabi	OC%	0.64	0.59	0.66	0.63	0.61	0.53	0.68	0.61							
		N	146	153	146	151	132	157	136	136							
		P	33	34.8	32.4	38.6	32	34.6	35	35.1							
		K	344	345	296	359	317	372	367	366							
Sabour	Summer	OC%	0.57	0.59	0.61	0.56	0.6	0.58	0.59	0.60	0.62	0.58	0.57	0.59			
		N	203	197	217	190	199	185	192	206	218	204	189	201			
		P	26.9	27.8	31.5	27.1	29.7	27.4	30.8	31.7	32.3	31	29.6	31.1			
		K	172	146	179	159	170	141	163	170	178	172	171	172			
Raipur	Summer	OC%	0.53	0.56	0.52	0.57	0.56	0.54	0.57	0.54							
		N	265	264	258	264	270	264	273	266							
		P	21.0	22.4	21.4	21.8	21.7	20.3	21.9	20.0							
		K	290	301	268	280	293	292	300	297							
Navsari	Summer	OC%	0.70	0.66	0.70	0.67	0.67	0.66	0.71	0.67	0.69	0.71					
		N	258	259	264	257	255	253	276	252	255	273					
		P	37.8	34.4	34.4	31.8	41.1	37.6	43.1	33.4	36.8	36.7					
		K	233	222	209	193	213	238	278	228	203	281					
Hisar	*Kharif*	OC%	0.47	0.44	0.46	0.48	0.43	0.45	0.42								
		N	158	145	156	158	144	147	138								
		P	18.0	16.5	17.5	19.3	16.0	17.0	13.5								
		K	219	235	235	290	257	228	232								
	Rabi	OC%	0.45	0.44	0.46	0.47	0.46	0.45	0.45								
		N	165	170	175	177	159	165	168								
		P	13.0	14.5	13.0	15.0	14.0	15.0	14.0								
		K	271	274	270	268	281	272	73								
	Summer	OC%	NR	NR	0.5	0.5	NR	0.5	NR								
		N	NR	NR	173	179	NR	170.3	NR								
		P	NR	NR	11.3	14.0	NR	13.3	NR								
		K	NR	NR	263	265	NR	273.0	NR								

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
Palampur	*Kharif*	OC%	0.99	1.15	1.00	1.12	1.11	1.12	1.14	1.09							
		N	298	292	326	306	327	309	316	312							
		P	53.0	81.4	67.9	79.2	80.6	72.4	61.2	67.2							
		K	92	103	100	115	98	134	124	99							
	Rabi	OC%	1.03	1.14	1.01	1.19	1.18	1.08	1.13	1.22							
		N	295	288	328	397	415	427	355	383							
		P	54.5	72.4	74.7	79.1	80.6	69.4	69.4	66.5							
		K	96	108	106	119	111	130	135	106							
Jammu	Summer	OC%	0.56	0.62	0.58	0.61	0.63	0.56	0.61	0.63	0.58	0.64					
		N	206	235	206	201	234	214	205	218	220	213					
		P	20.4	24.2	20.7	20.1	21.8	21.5	20.8	20.3	21.6	21.2					
		K	109	118	118	124	122	122	125	121	115	122					
Kathalagere	Summer	OC%	0.57	0.59	0.59	0.59	0.55	0.67	0.64	0.69	0.6	0.58	0.61	0.63			
		P	20.9	21.1	20.1	18.7	18.6	20.0	17.2	18.5	18.9	18.1	17.7	18.8			
		K	154	169	183	167	180	190	180	178	184	176	177	172			
Siruguppa	*Kharif*	OC%	0.65	0.62	0.71	0.65	0.65	0.67	0.73	0.73	0.68	0.62					
		N	168	170	172	168	175	157	192	192	183	187					
		P	23.0	24.0	23.0	23.0	19.0	22.0	25.0	25.0	25.0	22.0					
		K	356	360	370	357	376	366	375	365	362	362					
		S	25	24	28	25	26	27	30	29	25	24					
Karmana	*Kharif*	OC%	0.71	0.74	0.94	0.68	0.63	0.36	0.60								
		N	169	159	186	176	161	151	161								
		P	14.3	17.4	11.2	16.2	15.1	14.1	16.5								
		K	114	111	112	94	90	120	89								
	Rabi	OC%	0.41	0.55	0.38	0.46	0.68	0.43	0.64								
		N	125	105	136	102	117	113	138								
		P	20.5	18.4	15.4	19.1	22.5	18.0	17.5								
		K	92	98	109	110	100	104	110								
	Summer	OC%	0.73	0.91	1.11	1.23	0.76	1.13	1.11								
		N	230	224	245	245	249	259	282								
		P	20.0	23.3	18.9	21.5	19.8	18.8	22.3								
		K	89	100	96	93	127	99	103								
Jabalpur	*Rabi*	OC%	0.66	0.68	0.69	0.69	0.71	0.70	0.69	0.70	0.70	0.68	0.66	0.69	0.68		
		N	238	224	260	224	270	260	230	251	230	251	234	270	266		
		P	8.5	8.5	9	8.4	9.2	8.8	8.5	9.0	8.5	8.5	8.6	9.6	9.2		
		K	285	285	288	285	298	295	290	293	290	290	293	298	300		

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
Indore	*Rabi*	OC%	0.40	0.37	0.33	0.40	0.39	0.42	0.45	0.48	0.51	0.41					
		N	180	174	176	180	178	184	190	196	202	182					
		P	11.2	8.0	9.6	9.6	8.0	13.6	13.6	15.6	13.6	9.6					
		K	480	360	440	400	440	560	520	640	600	440					
Powarkheda	*Rabi*	OC%	0.65	0.67	0.68	0.67	0.68	0.67	0.67	0.67	0.68	0.68					
		N	232	218	266	257	257	244	218	232	244	244					
		P	8.19	8.19	9.75	9.36	8.97	8.97	8.19	8.97	8.58	8.58					
		K	304	300	330	306	320	324	300	312	312	304					
Rewa	*Rabi*	OC%	0.60	0.65	0.65	0.65	0.64	0.64	0.66	0.65	0.66	0.65					
		N	238	221	218	251	244	238	218	238	230	230					
		P	8.50	8.50	8.80	9.10	9.10	8.90	8.90	9.00	9.00	8.70					
		K	284	272	278	296	292	285	283	288	285	280					
Rahuri	*Kharif*	OC%	0.59	0.58	0.59	0.58	0.59	0.62	0.63	0.63	0.63	0.63	0.61	0.62	0.62	0.61	0.61
		N	188	196	193	195	190	205	200	202	199	201	198	198	195	196	195
		P	15.0	15.0	16.0	17.0	16.0	20.0	19.0	20.0	21.0	17.0	19.0	18.0	19.0	15.0	16.0
		K	587	590	589	592	591	603	596	602	600	598	590	596	591	593	595
	Rabi	OC%	0.59	0.61	0.61	0.63	0.60	0.60	0.62	0.62	0.64	0.62	0.60	0.61	0.62	0.64	0.62
		N	183	192	195	200	189	198	193	196	202	190	188	194	193	202	195
		P	17.0	16.0	17.0	19.0	18.0	19.0	19.0	19.0	20.0	18.0	19.0	19.0	19.0	16.0	17.0
		K	593	594	597	592	593	600	595	600	595	595	593	598	592	596	597
Akola	*Kharif*	OC%	0.48	0.48	0.47	0.47	0.48	0.48	0.48	0.48							
		N	154	156	152	156	153	156	153	154							
		P	10.6	10.6	10.5	10.6	10.6	10.6	10.5	10.6							
		K	284	282	285	287	287	287	286	285							
		Zn	0.48	0.48	0.47	0.47	0.48	0.47	0.46	0.47							
		Fe	5.59	5.58	5.58	5.57	5.57	5.59	5.59	5.58							
		Mn	11.44	11.45	11.44	11.45	11.45	11.43	11.45	11.43							
		Cu	2.62	2.60	2.61	2.63	2.61	2.63	2.60	2.60							
	Rabi	OC%	0.47	0.47	0.47	0.48	0.47	0.48	0.48	0.48							
		N	159	156	154	165	156	157	157	163							
		P	10.9	11.2	11.3	12.1	11.6	11.7	11.7	13.8							
		K	283	281	283	281	283	287	284	295							
		Zn	0.48	0.50	0.51	0.53	0.51	0.53	0.52	0.54							
		Fe	5.66	5.68	5.70	5.82	5.60	5.64	5.62	5.88							
		Mn	11.45	11.46	11.45	11.47	11.46	11.45	11.44	11.50							
		Cu	2.62	2.64	2.63	2.65	2.63	2.64	2.64	2.68							

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
	Summer	OC%	0.47	0.48	0.47	0.48	0.48	0.48	0.48	0.48							
		N	164	158	155	166	157	168	167	165							
		P	11.3	11.4	11.3	11.7	11.3	11.8	11.7	12.0							
		K	286	289	288	284	287	290	291	289							
		Zn	0.53	0.52	0.53	0.52	0.51	0.54	0.53	0.55							
		Fe	5.69	5.71	5.72	5.75	5.64	5.68	5.66	5.78							
		Mn	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5							
		Cu	2.64	2.65	2.64	2.67	2.64	2.66	2.64	2.70							
Karjat	*Kharif*	OC%	1.28	1.26	1.19	1.19	1.20	1.21	1.27	1.28	1.27	1.19	1.19				
		N	217	212	213	208	209	194	217	214	210	212	205				
		P	27.0	25.0	25.4	23.0	25.5	23.3	26.6	26.6	25.1	26.5	24.8				
		K	225	227	235	231	239	228	225	236	219	236	235				
	Rabi	OC%	1.42	1.34	1.23	1.19	1.21	1.15	1.39	1.36	1.33	1.21	1.15				
		N	275	251	238	224	235	225	273	252	249	228	223				
		P	23.9	23.4	21.7	22.7	25.0	22.8	23.5	26.4	22.8	22.7	23.9				
		K	230	240	252	251	277	251	228	261	226	255	253				
Coimbatore	Summer	OC%	0.61	0.64	0.6	0.65	0.62	0.61	0.66	0.62	0.64						
		N	251	288	260	281	275	252	275	250	277						
		P	20.1	20.8	19.8	22.0	19.8	19.3	20.6	19.1	20.3						
		K	531	602	575	539	590	508	536	533	525						
Kanpur	*Rabi*	OC%	0.5	0.51	0.58	0.52	0.5	0.56	0.53	0.55	0.57	0.51					
		P	13	13.6	13.9	13.3	13.1	13.5	13.4	13.6	13.8	13.1					
		K	210	213	217	209	211	215	212	214	216	211					
Faizabad	Summer	OC%	0.46	0.50	0.48	0.52	0.53	0.50	0.52	0.44							
		N	158	166	153	169	173	169	164	170							
		P	18.4	20.1	18.0	19.6	19.3	19.8	20.4	18.0							
		K	252	258	250	261	248	254	258	248							
Pantnagar	*Rabi*	OC%	0.82	0.89	0.83	0.89	0.92	0.89	0.93	0.91	0.99						
		N	257	257	260	261	264	263	267	265	268						
		P	17.9	16.6	17.3	18.5	17.9	19.0	18.6	19.1	19.2						
		K	177	179	183	189	188	189	190	192	193						
Ludhiana	*Rabi*	OC%	0.39	0.47	0.41	0.47	0.4	0.42	0.42	0.47	0.37	0.38	0.42	0.43			
		N	231	240	245	218	236	245	252	255	224	237	242	239			
		P	47.1	50.2	43.9	48.6	43.0	47.8	47.1	48.7	47.7	42.9	47.0	47.5			
		K	89	104	95	96	90	93	102	104	92	94	102	98			
Bhubaneswar		Rabi	OC%	0.75	0.77	0.65	0.64	0.76	0.70	0.72	0.73	0.78	0.78				
		N	302	330	295	290	327	305	324	320	334	337					
		P	14.0	14.4	14.1	13.7	15.1	14.5	14.6	15.0	14.7	15.0					
		K	132	140	134	130	134	132	134	132	137	139					
Chiplima	*Rabi*	OC%	0.71	0.77	0.73	0.71	0.84	0.72	0.78	0.75	0.82	0.79					
		N	289	333	299	304	313	303	318	310	317	321					
		P	13.2	13.7	14.6	13.5	13.9	13.6	13.8	13.7	14.1	14.3					
		K	145	137	156	142	134	136	143	139	147	148					

Table B : Nutrient uptake N P and K kg/ha in exp no1(a)

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
Rajendra nagar	*Kharif*	N	92.7	92	92.3	99.3	108	105.8	110.3	98.2							
		P	28.9	29.9	32.7	32.2	12.9	12.1	12.8	11.3							
		K	103.8	93.1	96.8	121.3	40.8	38.6	39.5	34.8							
	Rabi	N	154.7	161.1	154.8	137.04	278.18	213.26	221.53	209.8							
		P	37.2	42.7	45.2	39.85	50.71	29.89	27.4	28.52							
		K	132.2	147.0	136.1	163.26	206.02	105.6	88.12	86.91							
Sabour	*Kharif*	N	95.3	93.5	81.1	76.4	78.6	117.0	119.3	116.8	111.4	110.3	107.2	109.3			
		P	28.6	28.2	24.6	23.1	24.0	32.2	36.2	35.2	33.4	33.1	32.1	32.8			
		K	110.3	108.2	96.5	90.7	93.3	140.2	143.3	140.4	130.3	128.7	125.4	128.0			
	Rabi	N	105.2	193.2	113.0	136.9	185.2	180.2	172.7	60.9	102.3	150.3	133.0	71.8			
		P	27.8	61.3	28.4	48.8	62.6	59.6	45.5	28.7	25.1	40.1	26.0	11.1			
		K	114.5	193.6	112.7	143.7	163.6	194.9	113.6	600.4	109.4	110.5	91.7	32.5			
	Summer	N	NR	62.0	150.5	77.9	57.3	85.6	60.8	108.8	119.2	32.4	117.1	102.8			
		P	NR	12.0	48.2	20.1	19.5	24.9	13.1	28.8	31.5	7.6	27.1	27.7			
		K	NR	43.1	75.8	114.3	64.5	71.1	47.5	82.9	72.2	20.2	69.5	78.6			
Junagadh	*Kharif*	N	97.6	91.9	92.5	88.5	51.8	71.6	74.4	43.1	0.0	0.0					
		P	126.3	68.0	70.1	27.9	0.0	116.3	90.7	66.4	64.3	65.4					
		K	0.0	70.5	46.0	19.3	80.7	41.4	73.7	69.6	50.9	83.4					
	Rabi	N	9.4	8.8	9.0	26.0	17.3	10.4	10.9	13.6	0.0	0.0					
		P	23.2	17.2	7.9	3.5	0.0	22.3	7.9	7.1	9.9	11.3					
		K	0.0	0.0	13.4	5.3	15.0	8.5	0.0	0.0	6.6	21.5					
	Summer	N	30.0	29.5	29.9	78.4	81.4	32.6	32.5	34.6	0.0	0.0					
		P	107.9	47.6	70.0	19.2	0.0	100.0	29.7	52.4	22.8	28.2					
		K	0.0	0.0	34.7	21.2	54.0	28.2	0.0	0.0	26.8	69.7					
Navsari	*Kharif*	N	62.1	57.1	64.6	62.1	62.5	61.5	63.4	62.5	63.3	71.7					
		P	13.0	11.2	12.7	13.8	13.8	14.3	12.4	13.0	14.4	14.4					
		K	79.9	67.8	80.0	76.4	88.8	94.5	80.6	79.0	77.9	89.0					
	Rabi	N	13.6	58.3	64.0	48.2	64.6	61.4	0.0	32.0	32.6	67.8					
		P	1.4	12.9	10.8	4.7	7.4	20.7	0.0	5.7	7.7	10.8					
		K	3.1	106.0	35.0	7.3	12.9	83.7	0.0	44.5	37.5	78.8					
	Summer	N	0.0	35.8	42.3	31.5	0.0	0.0	80.7	51.3	68.1	14.4					
		P	0.0	6.0	5.5	4.2	0.0	0.0	10.1	6.8	7.9	2.3					
		K	0.0	26.5	22.2	41.3	0.0	0.0	28.0	27.1	52.2	11.3					

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
Akola	*Kharif*	N	136.8	134.1	140.2	138.8	135.6	137.5	141.7	133.2							
		P	13.5	11.8	12.9	12.8	12.8	11.7	13.1	13.8							
		K	62.6	65.3	63.9	63.7	61.0	62.4	62.2	65.2							
	Summer	N	40.9	41.0	43.3	45.0	41.0	45.6	44.4	42.6							
		P	5.88	5.88	5.92	5.94	5.94	5.15	6.08	6.06							
		K	34.2	34.9	36.1	36.2	34.5	36.8	35.3	38.1							
Kathalagere	*Kharif*	N	140	76	188	179	175	162	168	170	96	207	184	79			
		P	26.0	15.9	37.1	33.8	34.5	32.4	23.5	25.3	31.2	38.7	21.1	18.8			
		K	137	85	161	168	188	160	157	167	88	165	148	58			
	Summer	N	146	120	135	129	461	483	108	122	124	116	109	111			
		P	33	23	29	21	149	188	18	22	23	26	23	16			
		K	135	118	117	133	255	312	121	130	139	126	125	48			
Siruguppa	*Kharif*	N	117.0	134.0	135.0	140.0	128.0	114.0	114.0	123.0	124.0	120.0					
		P	26.0	29.0	30.0	30.0	27.0	26.0	27.0	32.0	31.0	29.0					
		K	150.0	160.0	164.0	165.0	153.0	146.0	140.0	153.0	138.0	143					
Karmana	*Kharif*	N	26.5	92.0	48.3	91.8	43.6	83.0	46.9								
		P	15.1	41.1	22.3	44.5	25.4	37.3	19.6								
		K	49.4	136.5	76.0	121.6	80.3	129.5	66.4								
	Rabi	N	19.4	39.9	26.1	52.2	24.8	35.9	23.1								
		P	10.9	24.0	14.5	25.4	14.2	21.5	14.1								
		K	24.9	50.2	30.3	57.3	31.2	39.0	28.3								
	Summer	N	NR	14.5	8.0	12.7	3.8	41.5	39.0								
		P	NR	2.4	1.8	2.9	1.2	6.8	7.1								
		K	NR	4.4	2.2	1.8	0.3	9.3	8.7								
Jabalpur	*KH+Rb*	N	228	220	295	215	191	206	239	296	308	246	313	317			
		P	34.0	27.9	48.0	28.3	27.8	26.0	32.4	46.0	44.7	51.5	49.0	48.7			
		K	285	303	309	287	230	285	198	304	371	374	326	302			
Powarkheda	*KH+Rb*	N	250	221	308	210	203	220	208	203	291	308					
		P	26.3	22.3	40.2	20.5	21.9	28.4	19.6	36.8	47.7	51.2					
		K	256	242	417	304	237	311	289	301	318	338					
Rewa	*KH+Rb*	N	245	218	341	307	316	304	264	296	256	264					
		P	31.6	25.5	46.44	55.6	47.1	31.6	42.2	37.7	31.4	34.8					
		K	297	371	330	284	304	306	244	318	292	318					
Palampur	*Rabi*	N	167.4	121.8	111.3	138.4	147	96.5	89.7	73.5							
		P	37.7	24.4	22.1	23.9	46.7	15.9	17.3	17.3							
		K	100.7	104.9	72.5	135.3	112.5	97.5	91.3	76.1							

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
Rahuri	*Kharif*	N	123.3	144.2	124.1	113.4	132.6	177.8	210.5	206.0	192.6	203.9	111.4	134.2	117.4	109.7	132.1
		P	20.51	27.08	20.61	18.65	23.15	26.13	31.08	28.77	28.18	31.11	19.49	22.33	19.09	18.5	22.85
		K	221.0	270.8	228.7	205.9	244.9	61.9	76.5	72.3	67.8	71.4	160.1	194.6	172.0	178.1	201.1
	Rabi	N	65.6	54.3	159.7	162.9	123.2	70.9	57.3	201.5	192.5	146.4	69.6	54.3	175.2	170.6	142.1
		P	14.7	20.4	34.5	24.6	32.7	14.9	22.8	41.7	29.5	38.6	15.1	22.2	35.2	25.9	35.5
		K	49.5	65.8	30.5	100.3	131.0	51.0	74.6	39.0	115.2	146.4	53.4	68.4	31.9	104.8	146.5
Varanasi	*Kharif*	N	79.1	90.1	89.2	85	83.9	85.2	78.7	80.4	85.5	90.2					
		P	15.7	17.1	19.1	17.8	17.5	16.9	15.6	17.1	16.2	18.4					
		K	105	116.8	111.1	118.1	105.9	102.9	101.2	99.8	99.6	114.2					
	Rabi	N	90.0	93.3	103.6	94.0	96.3	70.4	46.0	25.8	86.2	72.3					
		P	13.0	12.9	14.0	12.9	14.0	8.2	5.4	4.2	11.6	11.4					
		K	80.0	77.0	80.4	62.9	70.6	41.8	23.8	21.5	98.0	74.0					
	Summer	N	0.0	43.8	0.0	63.9	18.4	51.5	34.4	34.7	60.0	55.2					
		P	0.0	4.3	0.0	6.3	1.8	5.4	3.3	3.2	6.6	5.8					
		K	13.2	9.6	0.0	8.5	7.7	10.7	25.5	25.7	33.5	12.6					
Ludhiana	*Kharif*	N	142.5	91.8	96.8	159.5	122.6	124.7	120.2	82.1	75.8	51.7	191.4				
		P	37.69	27.97	28.07	43.69	32.89	31.39	37.47	30.07	26.64	16.23	45.56				
		K	125.49	93.24	98.42	173.15	134.96	138.49	139.07	68.64	70.27	41.07	119.69				
	Rabi	N	111.6	88	105	280.96	77.02	83.49	86.2	112.7	75.68	85.28	17.18	103.57			
		P	33.3	36.5	23.5	28.3	27.7	29.0	28.3	36.1	25.0	32.5	7.5	42.6			
		K	103.6	148.6	295.3	334.6	79.1	93.2	85.6	105.1	89.8	94.5	21.0	87.7			
	Summer	N	NR	59.77	156.51	161.78	NR	NR	55.14	NR	NR	NR	35.02	68.59			
		P	NR	21.78	49.16	51.67	NR	NR	21.13	NR	NR	NR	12.73	NR			
		K	NR	47.51	184.89	202.07	NR	NR	55.08	NR	NR	NR	40.79	18.31			
Coimbatore	*Kharif*	N	56.0	73.0	56.0	170.0	172.0	134.0	56.0	91.0	149.0						
		P	19.5	34.3	31.4	41.2	41.4	46.2	31.4	34.6	54.7						
		K	61.0	101.0	41.0	149.0	145.0	154.0	41.0	90.0	151.0						
	Rabi	N	121.0	126.0	125.0	51.0	80.0	51.0	150.0	72.0	158.0						
		P	49.0	49.0	47.1	25.1	30.7	17.1	40.6	25.3	45.5						
		K	119.0	126.0	122.0	50.0	77.0	51.0	136.0	65.0	145.0						
	Summer	N	90.0	115.0	166.0	111.0	54.0	166.0	87.0	132.0	87.0						
		P	33.0	46.3	39.6	19.5	25.7	39.6	33.0	31.2	33.0						
		K	83.0	64.0	141.0	118.0	50.0	141.0	83.0	77.0	83.0						
Hisar	*Kharif*	N	84.5	95.1	98.8	64.6	94.3	105.5	94.3								
		P	21.7	17.6	23.1	10.7	14.8	24.8	21.7								
		K	174.9	165.3	183.8	89.1	67.3	194.0	169.0								

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}
	Rabi	N	132.2	142.3	79.6	127.3	112.1	75.6	130.9								
		P	24.5	25.94	16.42	15.89	27.62	12.54	24.05								
		K	162.6	161.8	151.9	196.3	126.1	114.8	163.8								
	Summer	N	NR	NR	25.54	57.28	NR	37.91	NR								
		P	NR	NR	4.25	13.36	NR	3.91	NR								
		K	NR	NR	33.54	42.25	NR	36.81	NR								
Bhubaneswar	*KH+Rb*	N	143.7	184.8	325.0	212.3	271.9	131.1	298.8	465.4	722.7	296.4					
		P	26.7	34.3	40.4	48.7	42.3	31.6	39.0	61.1	86.9	37.2					
		K	90.3	110.8	118.0	207.4	207.0	146.2	179.2	362.4	435.7	129.0					
Chiplima	*KH+Rb*	N	153.6	221.7	328.9	559.1	283.7	149.1	261.8	411.8	187.7	119.1					
		P	29.6	67.6	165.8	149.2	60.5	47.1	152.2	86.7	66.0	35.4					
		K	101.9	166.1	194.1	498.1	178.5	148.5	220.5	452.9	234.7	125.2					

Table C : Soil fertility Status (kg/ha) of different crop sequence in Exp. No 2 (a)

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
Rajendra nagar	*Kharif*	OC%	0.51	0.6	0.56	0.56	0.57	0.57	0.59	0.59	0.56					
		N	210	186.3	172.6	196.3	180.5	192.9	196.8	205.9	189.6					
		P	32.0	30.9	27.6	35.7	38.4	30.5	41.1	35.2	28.9					
		K	288	322.2	277.2	296.4	208.3	333.8	299	333	269.5					
	Rabi	OC%	0.64	0.59	0.66	0.63	0.61	0.53	0.68	0.61						
		N	146	153	146	151	132	157	136	136						
		P	33.0	34.8	32.4	38.6	32.1	34.6	35.4	35.1						
		K	344	345	296	359	317	372	367	366						
Sabour	*Rabi*	OC%	118.60	143.30	157.40	165.85	172.85	228.45	213.50	222.00	201.05	226.10	209.35	145.40		
		N	14.0	20.9	33.2	37.1	41.0	49.5	44.1	46.5	42.4	48.6	44.7	27.0		
		P	108.8	116.0	122.5	125.8	131.6	168.4	148.6	192.2	172.8	170.2	150.6	119.8		
		K	11.5	12.3	12.6	13.1	13.9	26.7	19.5	19.3	15.4	21.2	16.2	10.8		
Raipur	*Rabi*	OC%	0.50	0.54	0.58	0.60	0.71	0.69	0.66	0.62	0.60	0.70	0.69	0.61		
		N	173.0	218.0	243.0	261.0	277.0	275.0	264.0	259.0	257.0	283.0	275.0	241.0		
		P	9.8	18.5	17.6	19.1	28.1	24.1	24.6	21.2	19.1	26.5	23.8	20.2		
		K	176.0	248.0	256.0	263.0	291.0	299.0	313.0	291.0	277.0	311.0	306.0	271.0		
Navsari	Summer	OC%	0.52	0.60	0.60	0.59	0.59	0.71	0.65	0.71	0.65	0.70	0.63	0.62		
		N	174.7	240.0	236.0	242.3	251.7	278.0	264.7	273.7	259.7	267.3	260.0	234.0		
		P	18.7	19.7	19.4	19.6	19.2	29.4	24.0	25.8	19.7	23.4	20.8	21.1		
		K	182.0	206.0	210.3	210.0	220.3	251.3	225.0	260.7	225.0	238.7	211.0	237.0		
Hisar	*Kharif*	OC%	0.33	0.36	0.38	0.41	0.44	0.47	0.42	0.39	0.39	0.43	0.40	0.37		
		N	127.8	145.3	164.5	173.3	190.8	196.0	178.5	164.5	169.8	180.3	171.5	162.8		
		P	14.0	15.0	16.0	19.0	20.5	21.5	20.0	16.0	17.0	20.5	18.5	17.0		
		K	231.5	241.3	252.4	270.6	299.7	306.5	294.6	255.7	257.9	295.5	262.3	244.2		
	Rabi	OC%	0.34	0.39	0.40	0.39	0.48	0.48	0.49	0.47	0.44	0.46	0.44	0.38		
		N	136.4	161.0	171.5	185.5	206.5	220.5	210.0	196.0	195.5	197.8	208.3	190.8		
		P	13.5	15.0	16.0	17.5	18.5	19.8	17.0	18.0	17.0	18.0	17.0	18.0		
		K	205.5	219.8	252.7	258.4	295.5	298.1	290.2	291.8	294.7	286.1	280.4	284.0		
Palampur	*Kharif*	OC%	0.59	0.58	0.62	0.59	0.66	1.24	0.80	0.72	0.65	0.73	0.64	0.66		
		N	210.7	230.8	232.7	235.5	268.1	292.3	231.8	248.4	238.3	250.9	243.7	257.5		
		P	15.7	29.7	50.4	52.6	56.6	71.7	59.9	54.9	50.1	55.4	53.2	51.5		
		K	111.6	120.7	120.4	123.2	127.5	135.0	123.4	121.4	114.9	130.2	122.2	121.5		
	Rabi	OC%	0.70	0.74	0.85	0.82	0.89	1.01	0.92	0.93	0.86	0.91	0.82	0.74		
		N	202.6	219.5	235.5	249.0	248.7	294.5	279.4	286.3	286.3	282.6	272.5	239.9		
		P	17.9	33.6	58.2	50.4	61.6	82.9	59.9	58.8	49.3	61.6	57.1	54.9		
		K	110.8	115.8	119.2	120.4	123.0	136.2	122.1	125.8	122.3	130.9	124.7	126.2		

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
Jammu	*Rabi*	OC%	0.54	0.56	0.64	0.54	0.59	0.86	0.67	0.80	0.66	0.55	0.56	0.52		
		N	144.0	197.4	173.8	208.4	200.8	249.1	185.1	200.5	228.7	247.1	185.2	194.3		
		P	8.2	12.3	15.8	17.2	24.5	36.4	28.2	22.6	25.4	23.3	19.2	13.4		
		K	90.2	105.9	110.9	97.5	116.5	123.5	117.3	128.4	111.3	108.2	105.9	99.7		
Jabalpur	*Rabi*	OC%	0.60	0.64	0.63	0.64	0.66	0.75	0.73	0.74	0.73	0.77	0.76	0.68		
		N	234	247	260	264	267	282	277	279	274	287	284	264		
		P	8.7	9.0	9.4	10.7	13.5	15.4	15.9	15.9	16.5	17.2	16.6	15		
		K	288	325	366	368	426	450	447	470	462	475	466	425		
Rahuri	*Kharif*	OC%	0.40	0.60	0.60	0.62	0.64	0.70	0.66	0.64	0.63	0.68	0.65	0.58		
		N	122.0	168.0	178.0	187.0	191.0	198.0	186.0	188.0	187.0	198.0	193.0	160.0		
		P	7.0	16.0	17.0	17.0	18.0	20.0	18.0	18.0	17.0	19.0	18.0	12.0		
		K	538.0	641.0	644.0	649.0	671.0	680.0	668.0	653.0	651.0	672.0	650.0	617.0		
	Rabi	OC%	0.43	0.60	0.60	0.64	0.64	0.68	0.66	0.66	0.65	0.68	0.64	0.57		
		N	120.0	164.0	188.0	184.0	195.0	200.0	188.0	188.0	183.0	194.0	191.0	158.0		
		P	7.0	17.0	18.0	18.0	20.0	21.0	19.0	18.0	19.0	20.0	19.0	13.0		
		K	533.0	621.0	643.0	645.0	673.0	684.0	672.0	651.0	645.0	673.0	651.0	624.0		
Akola	*Kharif*	OC%	0.38	0.44	0.45	0.47	0.46	0.57	0.51	0.51	0.48	0.52	0.52	0.4		
		N	174	210	220	213	228	244	224	241	216	234	216	201		
		P	4.4	12.7	13.3	14.7	20.0	24.7	18.4	20.1	14.3	18.7	17.4	12.7		
		K	242	265	284	278	304	381	363	342	297	314	291	268		
		Zn	0.44	0.51	0.57	0.58	0.61	0.75	0.66	0.71	0.68	0.68	0.64	0.49		
		Fe	6.50	9.96	10.13	10.34	11.15	12.10	10.64	11.18	10.94	10.70	10.38	8.96		
		Mn	12.34	14.72	14.92	15.10	15.99	20.35	17.86	18.90	16.80	18.13	17.42	13.87		
		Cu	2.65	3.17	3.21	3.24	3.33	3.88	3.52	3.62	3.46	3.55	3.37	3.17		
	Rabi	OC%	0.37	0.45	0.47	0.47	0.53	0.61	0.55	0.58	0.55	0.57	0.54	0.44		
		N	166	205	211	209	220	235	212	219	204	222	221	199		
		P	4.2	13.1	13.8	14.7	17.2	22.1	19.4	16.0	17.5	16.9	16.4	10.8		
		K	235	277	288	273	325	370	345	345	349	317	287	255		
		Zn	0.43	0.48	0.58	0.59	0.65	0.82	0.70	0.76	0.68	0.72	0.66	0.46		
		Fe	7.43	9.80	10.08	10.14	10.47	13.38	10.96	12.51	12.35	12.04	11.45	8.79		
		Mn	14.38	16.03	16.94	17.12	17.55	20.70	18.23	19.51	18.07	19.24	18.00	15.80		
		Cu	2.56	3.25	3.27	3.30	3.48	3.90	3.56	3.70	3.60	3.63	3.52	3.20		
Karjat	*Kharif*	OC%	1.10	1.33	1.35	1.35	1.36	1.41	1.38	1.45	1.39	1.37	1.36	1.30		
		N	175	207	208	210	258	250	228	249	222	228	216	198		
		P	19.0	28.9	30.0	29.0	30.6	30.4	30.0	30.4	29.5	30.2	29.2	29.3		
		K	255	288	291	313	326	319	313	321	320	318	313	285		

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
	Rabi	OC%	1.02	1.25	1.25	1.29	1.29	1.37	1.30	1.31	1.30	1.31	1.30	1.23		
		N	164	215	229	216	247	242	225	232	221	232	222	227		
		P	19.5	29.8	29.9	30.1	33.3	33.0	31.1	33.0	30.6	32.7	30.5	28.6		
		K	255	281	314	284	319	315	309	316	311	315	287	312		
Ludhiana	*Rabi*	OC%	0.37	0.39	0.39	0.36	0.40	0.58	0.56	0.48	0.49	0.57	0.55	0.56	0.45	0.31
		N	146	163.3	167.6	177.2	185.0	230.0	226.0	208.0	215.0	242.0	229.0	207.0	200.0	143.0
		P	11.6	16.5	18.4	20.5	30.4	43.3	36.6	25.9	27.2	31.7	29.5	34.7	33.6	11.2
		K	82	84.0	89.1	104.7	108.2	160.2	153.9	133.8	127.1	141.6	139.1	146.6	137.2	101.0
		Zn	1.36	1.32	1.33	1.38	1.38	1.85	1.67	1.52	1.40	1.70	1.65	1.70	1.50	1.40
		Cu	0.56	0.62	0.65	0.71	0.74	0.80	0.88	0.76	0.72	0.78	0.71	0.82	0.70	0.71
		Fe	15.2	18.2	16.1	18.2	20.1	28.2	23.1	20.5	19.5	27.5	28.0	22.1	21.0	22.4
		Mn	6.10	6.55	6.70	7.10	8.30	8.56	8.78	8.66	8.10	9.12	8.82	8.66	7.42	7.50
Pantnagar	*Rabi*	N	197	223	253	252	275	289	281	274	265	325	307	220		
		P	14.5	20.6	20.0	20.6	23.4	24.5	27.1	25.1	25.9	27.8	26.5	24.8		
		K	170.1	173.1	184.4	184.4	184.1	191.5	186.2	184.6	181.2	186.7	187.5	180.2		
Kanpur	Summer	OC%	0.13	0.37	0.52	0.51	0.62	0.72	0.63	0.53	0.52	0.67	0.62	0.42		
		P	8.5	15.4	18.1	22.4	27.2	25.8	23.8	22.3	23.2	25.3	25.0	19.9		
		K	91.5	139.3	149.3	157.6	176.3	170.2	162.4	166.1	164.8	171.8	170.2	134.0		
Bichpuri	Summer	OC%	0.20	0.24	0.28	0.28	0.30	0.51	0.46	0.43	0.40	0.45	0.42	0.22		
		N	85.0	93.0	112.0	115.0	176.0	235.0	182.0	185.0	177.0	200.0	192.0	91.0		
		P	6.0	9.1	11.8	11.8	13.5	18.3	13.6	15.2	13.4	18.0	17.5	6.2		
		K	138.0	178.0	207.0	192.0	255.0	278.0	240.0	227.0	220.0	243.0	231.0	158.0		
		Fe	8.3	9.1	10.2	10.4	11.0	12.8	11.0	11.6	10.9	12.2	12.2	9.1		
		Mn	6.5	6.5	7.2	8.0	9.2	10.6	9.5	9.6	9.0	9.6	8.7	6.7		
		Cu	0.75	0.91	0.96	0.92	0.93	1.22	1.00	0.97	0.97	0.99	0.93	0.75		
		Zn	1.31	1.58	1.75	1.71	1.81	2.20	1.85	1.84	1.78	1.91	1.81	1.30		
Faizabad	*Rabi*	OC%	0.24	0.36	0.39	0.41	0.44	0.52	0.48	0.46	0.45	0.50	0.47	0.38		
		N	114.0	136.0	159.0	146.0	172.0	184.0	178.0	167.0	170.0	176.0	181.0	156.0		
		P	6.1	14.8	18.2	17.1	25.1	27.2	24.6	23.4	19.1	26.5	25.2	17.6		
		K	188.0	217.0	234.0	229.0	248.0	264.0	256.0	272.0	266.0	259.0	252.0	225.0		
Varanasi	*Rabi*	OC%	0.33	0.38	0.41	0.42	0.48	0.58	0.52	0.54	0.50	0.53	0.51	0.42		
		N	147.2	174.0	176.8	182.7	192.5	217.1	201.1	208.4	193.3	201.5	193.4	183.0		
		P	11.7	15.8	17.1	17.8	19.1	20.8	19.3	19.7	18.7	20.2	18.4	17.2		
		K	157.6	160.4	174.3	166.6	186.1	198.7	194.0	204.4	192.5	193.4	183.5	167.8		
Karmana	*Rabi*	OC%	1.17	1.26	1.23	1.26	1.28	1.29	1.42	1.38	1.40	1.42	1.29	1.35		
		N	194.4	269.7	288.5	277.0	304.2	301.1	312.0	307.3	313.6	305.8	319.0	293.2		
		P	29.7	32.6	32.8	38.8	24.0	35.8	26.2	24.6	25.2	30.1	30.5	29.3		
		K	108.6	117.6	114.7	111.8	134.2	131.3	129.4	135.6	139.2	134.2	158.6	124.8		

Contd..../-

Name of CSR Centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
Kathalgere	Summer	OC%	0.58	0.61	0.63	0.66	0.70	0.70	0.69	0.70	0.70	0.67	0.70	0.67		
		P	12.5	19.5	21.6	17.3	23.3	18.7	21.5	22.3	23.4	22.2	18.8	19.7		
		K	145.8	211.0	192.4	160.4	172.0	208.5	193.0	193.4	215.0	185.5	168.2	168.5		
Bhubaneswar	*Rabi*	OC%	0.55	0.61	0.64	0.61	0.66	0.92	0.74	0.85	0.83	0.75	0.84	0.64		
		N	190.5	216.5	241	226.5	254	323.5	285.8	302	294	353.8	312	237.3		
		P	7.4	9.2	14.8	14.2	14.1	20.0	17.0	20.2	16.9	22.0	17.2	11.3		
		K	72.1	92.2	95.7	96.5	100.8	155.8	143.5	183.4	161.1	168.4	151.1	95.7		
Chiplima	*Rabi*	OC%	0.62	0.72	0.66	0.68	0.70	0.86	0.73	0.81	0.77	0.89	0.76	0.65		
		N	240.7	268.3	264.3	256.7	269.3	302.0	281.0	296.0	286.7	335.3	285.0	248.3		
		P	7.1	8.0	9.0	8.6	9.2	13.7	12.4	13.5	12.5	14.3	12.3	8.3		
		K	79.8	95.9	97.3	98.1	101.5	147.3	136.8	163.9	149.7	154.0	144.3	92.9		

Table D : Nutrient uptake (kg/ha) of different crop sequence in Exp. No 2 (a)

Season	Nut/treat	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
Kharif Rice	N	38.1	64.2	64.3	73.0	80.7	72.9	67.3	64.2	62.2	78.4	85.2	73.5		
	P	9.3	15.6	14.6	17.1	18.7	17.8	18.3	16.7	17.3	17.3	17.0	14.3		
	K	44.3	76.9	72.2	76.6	79.4	85.7	81.9	78.2	72.7	86.5	92.0	69.7		
Rabi Rice	N	30.1	54.7	57.4	88.6	91.6	81.7	72.6	74.0	64.8	85.0	82.3	78.5		
	P	7.1	10.9	12.7	16.7	16.7	18.7	18.9	19.7	20.0	17.4	17.5	16.2		
	K														
Rice	N	17.5	49.0	50.1	63.4	86.2	97.3	89.8	93.5	88.5	95.9	89.6	59.3		
	P	5.2	14.4	15.0	18.7	25.6	28.9	26.6	27.8	26.2	28.6	26.6	17.5		
	K	21.9	59.2	61.0	75.1	99.9	113.4	104.8	108.7	104.3	112.1	104.7	71.6		
Wheat	N	18.1	46.0	93.1	75.4	97.0	107.8	98.9	103.0	97.1	106.5	98.7	67.3		
	P	5.0	12.1	24.4	19.7	26.0	29.1	26.5	27.7	25.9	28.6	26.3	17.8		
	K	20.8	51.7	99.5	81.8	103.6	114.5	105.4	110.4	103.6	113.2	105.2	75.0		
Pearlmillet with K	N	27.8	44.0	45.4	59.1	66.3	87.3	78.8	78.4	70.8	73.6	72.7	55.9		
	P	6.8	10.9	10.9	12.9	17.9	22.5	19.2	19.7	17.2	19.2	17.3	15.4		
	K	31.9	49.0	50.6	54.6	64.2	76.6	69.2	70.1	61.2	63.9	58.5	54.7		
Wheat	N	28.5	60.9	70.2	67.7	80.9	101.6	93.2	87.4	81.1	89.8	85.3	71.3		
	P	5.2	11.9	14.8	14.3	19.3	25.8	22.6	21.8	16.6	20.6	18.8	13.6		
	K	39.2	72.2	87.6	90.0	109.9	135.6	114.0	112.4	115.6	121.3	118.4	82.4		
Pearlmillet	N	19.8	33.7	32.4	39.1	45.6	59.4	53.2	52.2	49.6	51.0	45.3	41.3		
without K	P	3.5	5.6	5.4	7.0	8.3	12.1	10.6	10.8	9.8	10.7	8.9	6.8		
	K	25.1	39.5	38.4	42.5	49.9	62.7	55.9	56.3	53.7	53.3	48.7	44.8		
Wheat	N	23.6	51.6	64.1	63.6	79.7	106.4	94.7	92.3	88.1	94.8	79.0	62.7		
	P	3.3	6.9	9.3	8.7	10.7	15.8	12.4	12.4	12.1	13.2	10.8	7.7		
	K	26.7	50.4	63.3	60.9	72.6	89.5	80.4	81.9	79.1	79.7	74.9	57.3		
Rice	N	30.6	42.3	45.6	50.5	56.0	65.7	58.2	58.5	64.1	58.6	59.8	45.9		
	P	4.2	7.7	8.9	8.0	10.2	12.1	11.7	9.2	9.6	10.8	11.0	8.7		
	K	32.7	60.1	56.8	60.4	69.3	74.5	76.6	72.8	68.0	82.3	79.4	66.6		
Wheat	N	35.5	53.1	61.8	61.3	68.9	71.6	70.0	61.2	59.9	69.8	61.2	57.9		
	P	4.6	8.2	8.7	10.5	10.3	12.5	11.5	9.8	9.7	9.6	9.0	7.3		
	K	25.5	42.6	51.5	45.0	43.6	54.0	53.1	46.9	46.0	47.9	43.5	40.0		
Pearlmillet	N	25.2	43.4	54.2	69.7	81.8	92.8	72.8	62.0	66.3	73.3	75.8	63.6		
	P	4.4	10.2	11.7	15.1	19.6	21.9	16.5	15.4	16.7	18.1	18.1	14.1		
	K	44.7	106.0	116.6	141.3	171.2	172.6	158.8	151.4	158.4	170.0	175.1	145.9		
Wheat	N	23.1	77.0	114.5	102.0	131.9	142.8	109.3	125.1	107.3	130.9	108.8	121.6		
	P	3.8	14.3	20.4	19.1	24.0	25.6	19.4	22.3	19.5	24.0	20.4	20.4		
	K	26.5	81.2	121.6	110.9	133.0	150.3	118.7	125.1	114.1	143.0	122.1	126.1		

Contd..../-

Season	Nut/treat	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
Rice	N	10.4	45.9	52.6	52.9	75.7	77.7	70.2	63.7	63.5	72.9	67.9	37.8		
	P	1.1	7.4	9.5	10.1	18.3	19.5	15.3	14.5	13.9	17.3	15.5	6.6		
	K	11.6	48.6	54.0	53.2	77.7	80.2	74.3	65.1	66.2	75.5	69.9	39.6		
Wheat	N	10.7	65.9	82.4	78.4	111.4	117.4	106.9	103.6	100.7	110.5	106.4	61.3		
	P	1.0	9.7	12.6	12.0	19.9	21.2	17.6	16.5	15.6	19.2	17.3	7.6		
	K	11.6	48.6	54.0	53.2	77.9	80.4	74.3	65.1	66.2	75.5	69.9	39.6		
Rice	N	21.1	58.5	63.4	75.0	90.3	109.1	103.0	84.1	89.5	104.3	101.9			
	P	3.8	10.9	11.6	13.8	17.3	22.5	20.6	16.0	17.4	21.6	20.5			
	K	30.2	78.6	83.4	90.5	103.9	121.4	114.8	104.3	108.4	116.9	110.5			
Wheat	N	9.3	38.1	74.2	58.4	80.9	94.9	84.4	85.2	79.8	95.3	88.4			
	P	1.8	7.4	14.7	11.2	15.9	19.9	16.7	17.5	14.9	19.4	18.1			
	K	11.4	42.7	77.4	60.6	80.8	95.0	85.1	86.9	82.9	93.9	90.1			
Rice	N	35.1	59.9	63.4	67.3	74.8	81.5	78.7	69.5	75.1	79.3	78.4	64.6		
	P	4.5	8.7	9.1	9.7	10.8	12.2	12.0	10.6	11.4	11.9	11.8	9.5		
	K	44.1	68.1	71.1	76.3	83.8	91.3	92.0	80.5	81.7	91.2	88.9	72.4		
Wheat	N	22.8	54.3	70.3	68.9	78.4	86.5	81.2	79.7	74.3	82.7	75.0	64.8		
	P	4.4	11.1	15.0	13.7	16.0	18.1	16.5	16.8	14.8	17.3	15.3	13.0		
	K	27.0	65.5	88.0	80.5	91.8	100.4	94.7	96.2	85.6	96.0	87.8	73.3		
Rice	N	44.6	49.5	57.2	55.5	64.7	72.7	63.6	49.6	53.5	51.8	51.6	69.5		
	P	19.5	19.0	21.7	21.3	24.5	27.2	23.5	21.5	21.3	21.9	20.1	25.6		
	K	50.6	45.4	59.7	52.3	65.2	68.3	68.6	64.4	66.6	56.2	55.1	61.7		
Wheat	N	25.8	48.4	73.1	60.3	75.9	82.4	69.5	68.5	62.5	68.9	59.0	55.5		
	P	4.4	7.1	10.1	9.2	11.6	12.8	10.5	10.1	9.9	11.1	9.0	8.9		
	K	11.9	18.4	26.7	22.3	26.1	38.4	25.7	24.2	22.8	24.9	23.2	20.5		
Kharif Rice	N	140.4	76.1	188.0	179.3	175.3	162.1	168.0	170.0	96.3	206.1	184.3	79.0		
	P	26.1	15.9	44.7	34.2	34.6	32.4	23.6	25.4	31.2	38.7	21.2	18.8		
	K	136.8	82.3	161.0	166.9	186.3	159.9	156.8	167.2	85.6	164.4	146.8	57.7		
Summer Maize	N	66.5	96.8	149.3	119.0	152.2	159.9	172.3	200.0	163.9	174.3	153.4	85.8		
	P	21.4	29.0	36.7	30.0	37.2	43.2	34.0	49.9	54.3	54.0	39.1	20.6		
	K	46.2	63.3	103.7	90.7	100.0	111.8	121.0	131.0	137.8	110.0	98.9	58.7		
Rice	N	37.2	63.8	73.5	91.5	133.1	152.5	151.6	113.3	116.4	158.5	157.7	153.2	134.7	136.5
	P	23.6	12.3	18.4	18.1	23.8	32.8	30.3	23.3	22.2	34.1	29.7	31.0	26.3	28.5
	K	40.2	48.5	66.8	72.4	111.0	124.4	125.6	92.1	104.0	118.4	141.6	120.1	120.2	125.9
Wheat	N	37.0	85.6	107.5	104.3	122.7	132.4	139.2	120.4	111.8	126.1	126.7	136.2	146.9	133.4
	P	42.6	21.1	27.7	21.0	21.8	31.8	31.2	29.0	24.7	30.8	28.8	32.7	26.5	21.7
	K	43.4	81.3	100.2	100.1	110.6	105.1	123.1	106.8	114.1	110.2	105.1	135.1	116.8	111.4

Contd..../-

Season	Nut/treat	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
Sorghum	N	2.3	55.4	62.8	72.2	83.1	95.5	84.3	75.8	79.6	88.0	87.5	38.2		
	P	0.4	9.2	11.5	12.8	16.9	17.6	15.4	12.3	14.2	14.3	14.0	5.6		
	K	2.5	59.8	68.1	75.3	89.2	98.6	92.7	78.1	82.5	84.3	87.1	34.6		
Wheat	N	6.7	60.8	70.1	63.0	79.6	86.8	76.4	66.0	72.2	74.7	73.0	42.3		
	P	1.5	14.0	15.3	13.7	18.3	19.5	17.2	14.7	15.8	15.5	16.4	9.6		
	K	5.7	46.7	54.2	49.6	63.5	68.6	58.5	48.4	55.1	56.4	55.7	32.9		
Sorghum	N	5.8	54.2	56.7	61.7	80.4	78.3	67.5	63.3	65.3	71.6	69.4	47.4		
	P	2.6	15.6	16.5	17.7	23.0	23.2	20.3	19.3	18.8	21.1	20.5	12.7		
	K	11.2	49.9	47.3	62.9	92.3	91.7	77.2	71.6	68.1	83.1	80.8	72.7		
Wheat	N	8.7	42.2	59.5	58.6	76.9	90.3	68.5	75.2	66.3	76.7	68.6	32.7		
	P	1.4	9.0	9.5	8.9	10.8	11.4	10.1	10.3	9.3	10.8	10.2	6.5		
	K	11.4	33.2	38.9	44.7	56.7	61.7	51.4	54.7	50.5	55.5	49.5	27.6		
Rice	N	36.6	47.2	47.2	46.3	50.7	56.7	61.7	56.5	59.1	54.9	53.5	51.0		
	P	33.9	42.2	44.9	44.5	40.6	51.6	52.6	57.1	49.6	49.7	54.3	40.2		
	K	52.6	66.2	81.1	61.8	71.5	75.7	80.9	80.5	78.5	85.3	90.2	65.2		
Rice	N	31.8	40.5	53.3	59.3	53.2	61.4	82.2	64.4	56.3	72.7	84.0	57.4		
	P	12.4	17.7	19.4	20.7	20.5	24.4	25.0	21.9	21.0	21.1	25.6	23.2		
	K	33.5	56.4	56.8	65.1	61.8	68.0	77.1	73.1	65.7	75.9	75.6	62.1		
Rice	N	34.0	42.5	43.0	47.3	56.9	61.3	58.6	57.8	55.4	61.7	57.5	44.8		
	P	10.4	12.9	13.5	14.8	18.3	19.9	18.6	18.5	17.5	20.2	18.8	14.2		
	K	42.4	52.3	52.9	57.3	69.9	74.6	71.3	73.0	69.6	76.0	72.1	57.6		
Rice	N	34.3	46.5	59.6	54.9	63.2	65.0	60.9	62.1	60.1	66.6	63.4	42.8		
	P	10.4	14.7	18.2	16.7	20.2	21.2	19.4	19.7	18.3	22.2	20.4	13.4		
	K	38.3	52.7	65.1	58.0	68.2	71.8	66.4	66.7	63.4	73.2	67.6	47.2		
Rice	N	36.2	53.9	56.4	61.9	70.1	74.1	72.2	71.2	70.3	78.8	71.6	55.8		
	P	11.4	16.3	17.6	18.9	21.5	23.4	22.0	21.7	21.3	25.0	22.4	17.3		
	K	48.6	66.8	70.8	75.3	82.3	87.5	84.8	84.8	84.1	94.2	86.3	70.4		
Rice	N	38.6	63.3	71.8	68.3	75.7	79.5	75.0	76.3	73.0	84.7	72.0	59.0		
	P	12.1	19.7	22.1	21.8	24.6	26.7	24.7	25.3	23.6	28.7	23.8	18.1		
	K	45.5	71.0	79.2	77.0	85.4	89.6	83.0	87.2	84.0	94.7	79.7	64.6		

Table E : Soil fertility Status (kg/ha) in Organic farming

Name of CSR centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Rajendra nagar	*Kharif*	OC%	0.62	0.75	0.77	0.74	0.67	0.78	0.47	0.69
		N	137.4	151.4	108.6	154.3	156.2	178.9	147.4	150.6
		P	57.4	48.6	40.2	55.2	40.3	58.6	34.6	45.6
		K	377.0	374.0	272.0	246.0	383.0	404.0	390.0	380.0
	Rabi	OC%	0.62	0.68	0.65	0.64	0.65	0.65	0.44	0.68
		N	150.5	172.5	165.6	161.8	151.8	168.7	144.3	168.1
		P	59.9	57.2	31.4	62.5	55.8	59.1	43.2	58.9
		K	345.0	330.4	392.6	304.6	253.1	433.4	319.8	404.3
Sabour	Summer	OC%	0.69	0.76	0.78	0.75	0.70	0.76	0.61	
		N	205.0	208.9	199.8	210.1	206.4	218.8	178.2	
		P	44.9	47.2	45.8	48.6	47.4	51.2	41.6	
		K	167.5	173.9	166.1	173.7	169.1	174.3	132.9	
Raipur	*Rabi*	OC%	0.56	0.57	0.57	0.53	0.53	0.55	0.54	
		N	258.0	245.0	267.0	251.0	247.0	264.0	281.0	
		P	19.8	17.5	22.5	18.6	20.7	20.8	24.8	
		K	279.0	273.0	278.0	272.0	265.0	272.0	309.0	
Navsari	*Rabi*	OC%	0.67	0.68	0.67	0.70	0.63	0.60	0.63	
		N	265.0	255.0	257.0	241.0	257.0	248.0	237.0	
		P	28.1	27.5	28.4	26.8	32.5	24.7	26.3	
		K	282.0	284.0	275.0	258.0	288.0	267.0	259.0	
Hisar	*Kharif*	OC%	0.52	0.47	0.45	0.51	0.50	0.50	0.53	
		N	152.6	127.4	135.8	145.6	145.6	142.8	156.8	
		P	21.8	16.0	15.6	21.2	20.4	19.0	22.2	
		K	248.5	244.6	231.4	237.2	238.8	236.0	253.3	
	Rabi	OC%	0.48	0.47	0.47	0.46	0.46	0.47	0.49	
		N	163.8	158.2	159.6	158.2	156.8	159.6	165.2	
		P	14.4	13.6	15.2	15.2	16.4	16.4	16.4	
		K	216.7	212.0	214.7	215.7	207.4	221.0	224.0	
Palampur	*Kharif*	OC%	2.80	2.60	2.70	2.70	2.90	2.30	1.00	2.50
		N	342.5	318.6	363.8	360.0	381.3	324.9	260.9	316.1
		P	322.6	192.6	246.4	215.0	349.4	192.6	94.1	264.3
		K	704.7	552.6	715.0	614.2	702.0	674.9	282.6	558.4
	Rabi	OC%	2.5	2.2	2.5	2.4	2.7	2.2	0.9	2.4
		N	347.5	308.6	377.6	365.0	390.1	312.3	269.7	324.9
		P	291.2	215.0	255.4	215.0	304.6	219.5	107.5	197.1
		K	672.9	594.9	718.8	627.2	687.2	627.4	280.7	641.8
	Summer	OC%	2.5	2.3	2.5	2.2	2.7	2.1	0.8	2.1
		N	312.3	289.8	347.5	317.8	373.8	350.0	274.7	289.8
		P	255.4	197.1	237.4	215.0	268.8	237.4	107.5	197.1
		K	682.3	602.1	781.5	666.4	635.5	711.2	306.9	622.5

Contd..../-

Name of CSR centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Jammu	Summer	OC%	0.6	0.8	0.8	0.8	0.7	0.9	0.6	0.8
		N	257.7	194.9	314.3	201.2	314.3	220.0	276.6	238.6
		P	12.9	13.8	14.7	14.1	16.2	15.5	15.0	14.9
		K	116.2	122.0	118.0	120.0	110.0	117.0	116.0	113.0
Kathalagere	Summer	OC%	0.67	0.70	0.67	0.66	0.70	0.72	0.60	
		P	22.7	17.7	21.0	26.4	28.4	26.4	20.8	
		K	230.9	236.4	240.3	233.4	248.1	247.7	237.7	
Siruguppa	*Kharif*	OC%	0.82	0.93	0.90	0.91	0.80	0.84	0.67	
		N	218	224	224	235	242	212	196	
		P	18.0	22.0	21.0	28.0	20.0	28.0	17.0	
		K	374	354	359	375	365	369	355	
		S	24	29	34	24	20	29	24	
Karmana	Summer	OC%	1.43	1.55	1.18	1.54	1.03	1.60	1.19	
		N	219	253	240	224	222	236	230	
		P	18.9	15.0	21.1	15.3	20.5	21.5	18.9	
		K	123.9	130.0	120.2	133.9	141.9	101.0	103.2	
Jabalpur	*Rabi*	OC%	0.68	0.68	0.68	0.68	0.69	0.68	0.66	
		N	228	225	215	218	215	215	220	
		P	9.3	8.9	8.7	8.7	9.6	8.9	9.6	
		K	342	330	323	323	331	328	362	
Rewa	*Rabi*	OC%	0.60	0.63	0.61	0.61	0.64	0.61	0.58	
		N	227	230	230	227	237	235	242	
		P	8.8	8.6	8.6	8.6	9.2	8.6	8.6	
		K	293	289	290	290	296	295	311	
Powarkheda	*Rabi*	OC%	0.70	0.71	0.71	0.69	0.70	0.71	0.66	
		N	268	256	256	256	260	258	263	
		P	10.3	9.5	9.5	9.5	9.8	9.8	10.6	
		K	296	286	286	286	288	288	297	
Rahuri	*Kharif*	OC%	0.67	0.70	0.71	0.70	0.68	0.72	0.66	
		N	197	196	197	195	181	198	192	158
		P	18.0	17.0	16.0	17.0	17.0	19.0	16.0	8.0
		K	563	561	561	558	551	563	564	433
	Rabi	OC%	0.68	0.69	0.70	0.70	0.67	0.71	0.66	0.49
		N	198	200	200	198	187	200	192	158
		P	18.0	17.0	18.0	17.0	18.0	20.0	18.0	8.0
		K	565	559	561	559	553	565	566	431
Akola	*Kharif*	OC%	0.46	0.45	0.47	0.45	0.46	0.46	0.37	0.36
		N	190	172	186	176	168	181	195	148
		P	16.2	15.1	15.4	15.2	16.1	15.8	16.2	10.2
		K	325	298	318	309	291	301	334	244
	Rabi	OC%	0.47	0.45	0.46	0.45	0.46	0.45	0.37	0.36
		N	194	174	193	178	171	184	199	141
		P	16.2	15.1	15.4	15.3	16.0	15.8	16.3	10.1
		K	319	293	315	305	288	297	327	240

Contd..../-

Name of CSR centre	Season	Nut./Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
	Summer	OC%	0.47	0.45	0.47	0.45	0.46	0.46	0.37	0.36
		N	195	178	195	180	174	183	204	137
		P	16.3	15.2	15.5	15.3	16.2	15.8	16.3	10.2
		K	322	295	317	302	283	294	338	242
Ludhiana	Summer	OC%	0.52	0.56	0.54	0.56	0.54	0.52	0.46	0.58
		N	213	229	233	243	230	240	219	247
		P	24.8	26.4	28.2	31.2	25.8	31.6	28.2	32.4
		K	146	160	165	169	170	158	153	165
		Zn	1.46	1.52	1.42	1.42	1.48	1.36	1.40	1.41
		Cu	0.78	0.88	0.96	0.82	0.84	0.88	0.70	0.72
		Fe	20.10	22.80	24.80	22.20	19.60	25.60	18.20	28.60
		Mn	7.60	8.50	8.60	9.10	8.20	9.40	6.80	9.80
Faizabad	Summer	OC%	0.59	0.65	0.64	0.69	0.57	0.66	0.49	
		N	204	189	186	183	153	191	198	
		P	22.5	23.4	23.9	25.2	20.7	24.7	27.1	
		K	269	273	276	270	242	274	263	
Coimbatore	Summer	OC%	0.61	0.64	0.63	0.60	0.58	0.60	0.57	0.6
		N	280	273	272	257	245	265	268	263
		P	21.9	23.0	21.6	22.2	20.7	23.6	20.6	22.6
		K	459	470	423	429	408	413	427	436
Kanpur	Summer	OC%	0.55	0.64	0.62	0.58	0.62	0.63	0.50	0.62
		P	17.8	17.2	17.1	16.9	17.3	17.4	18.2	17.0
		K	137	133	131	132	133	133	137	130
Bichpuri	Summer	OC%	0.41	0.44	0.44	0.44	0.40	0.43	0.35	
		N	155	150	150	151	126	153	157	
		P	12.5	12.0	11.9	11.9	11.5	12.5	12.5	
		K	299	291	291	285	278	287	300	
Bhuban-ewswar	Summer	OC%	0.82	0.95	0.99	0.93	0.86	1.04	0.59	0.80
		N	302.4	241.6	366.4	334.6	320.2	352.6	224.4	290.6
		P	21.0	21.9	20.6	20.2	20.8	22.3	14.1	18.8
		K	171.4	196.8	190.2	188.6	180.8	206.2	136.6	181.6
Chiplima	Summer	OC%	0.88	0.98	1.07	1.01	0.96	1.04	0.66	0.88
		N	329.6	364.4	372.6	366.6	336.6	363.4	272.2	327.4
		P	12.3	13.2	12.8	13.4	12.4	13.8	8.3	10.6
		K	141.6	153.4	157.4	152.2	144.8	151.8	110.8	149.6

Table F : Nutrient uptake (kg/ha) in Organic Farming

Name of CSR centre	Season	Nut./ Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Rajendra nagar	*Kharif*	N	91.2	90.7	73.1	81.8	72.9	77.0	96.5	79.9
		P	31.3	33.4	27.1	35.0	25.1	27.3	35.3	31.7
		K	67.7	53.3	41.7	60.7	51.5	54.6	55.2	50.4
	Rabi	N	30.3	24.4	17.3	43.2	27.7	21.0	27.7	33.2
		P	6.1	6.8	4.3	5.3	5.2	3.9	4.4	7.2
		K	33.9	32.4	19.3	31.7	24.4	26.5	32.6	38.4
Junagadh	*Kharif*	N	94.8	78.1	84.3	85.5	102.9	85.9	82.4	
		P	9.5	6.8	7.1	7.4	9.0	9.5	9.3	
		K	34.3	28.6	29.7	29.7	34.4	29.9	29.7	
	Rabi	N	147.1	124.1	138.4	132.8	141.1	141.4	139.4	
		P	23.7	16.8	17.9	16.9	20.7	21.8	17.9	
		K	73.7	64.7	60.4	57.1	65.5	65.2	66.6	
Navsari	*Kharif*	N	47.2	40.6	40.2	38.9	31.7	40.9	39.9	
		P	16.0	14.2	12.5	11.8	9.8	14.2	10.7	
		K	83.6	73.7	79.0	70.7	59.3	69.8	74.1	
	Summer	N	100.7	86.5	84.6	90.8	69.4	96.3	88.9	
		P	12.3	10.2	11.5	10.1	8.7	9.6	9.5	
		K	23.1	20.0	20.1	21.4	15.3	21.9	21.6	
Hisar	*Kharif*	N	100.4	77.7	69.5	81.7	43.5	64.1	116.0	
		P	18.0	13.9	12.3	14.8	8.4	11.6	21.2	
		K	56.4	43.7	49.2	46.5	24.9	35.5	65.4	
	Rabi	N	70.5	60.8	61.3	61.2	38.9	62.3	86.5	
		P	13.7	11.8	13.6	12.4	9.4	12.2	17.6	
		K	130.0	119.7	121.0	120.7	84.8	120.9	161.4	
Sabour	*Kharif*	N	82.4	84.3	81.0	84.4	74.7	85.0	82.7	
		P	24.8	25.0	23.9	25.0	21.9	25.0	24.9	
		K	95.3	96.7	92.2	96.8	85.0	96.7	96.6	
	Rabi	N	99.2	98.5	114.9	98.7	80.0	100.6	97.0	
		P	38.8	38.7	43.4	38.8	31.0	39.6	38.2	
		K	131.5	131.4	139.2	131.4	106.9	133.8	129.2	
	Summer	N	41.0	41.7	91.9	41.4	31.8	43.4	45.4	
		P	16.0	16.1	33.2	15.9	11.9	16.9	15.8	
		K	58.0	59.0	103.9	58.8	45.1	61.6	56.8	
Palampur	*Kharif*	N	29.6	23.5	41.9	31.8	31.2	29.6	28.8	25.1
		P	15.3	18.4	24.7	23.2	18.5	20.1	19.6	23.1
		K	44.4	48.4	44.7	39.9	51.2	42.3	42.7	50.6
	Rabi	N	68.7	37.4	41.0	56.6	47.7	57.8	55.0	52.5
		P	6.7	3.7	3.8	5.3	4.4	5.6	4.4	4.9
		K	59.9	28.2	33.4	46.4	35.2	55.1	40.6	48.3

Contd..../-

Name of CSR centre	Season	Nut./ Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
	Summer	N	33.0	16.1	27.9	24.4	37.6	21.8	6.8	23.2
		P	6.7	4.5	7.6	6.6	14.3	6.0	1.8	6.7
		K	40.3	26.3	37.8	39.0	55.7	25.5	7.0	32.4
Ludhiana	*Kharif*	N	179.0	179.1	173.3	170.3	165.8	176.9	176.4	175.3
		P	39.5	37.5	42.6	41.6	43.7	50.8	45.5	36.0
		K	175.1	170.7	165.2	165.9	156.9	177.5	181.1	147.0
	Rabi	N	87.5	86.5	82.6	88.3	65.6	91.2	75.5	80.9
		P	7.16	7.5	6.5	6.75	6.87	7.03	6.17	6.06
		K	87.5	91.6	93.3	89.1	64.8	87.9	77.1	89.3
	Summer	N	96.7	101.3	99.5	109.9	85.2	96.1	91.3	98.0
		P	27.5	25.9	30.2	27.5	25.7	39.4	24.7	27.0
		K	106.0	106.5	112.9	123.1	99.5	123.4	105.5	76.9
Karmana	*Kharif*	N	152.2	91.4	120.2	138.3	100.9	124.3	70.0	
		P	87.2	75.2	52.8	42.1	47.2	57.4	27.8	
		K	116.6	20.4	102.6	106.4	85.4	97.9	81.2	
	Rabi	N	7.9	7.3	7.9	7.7	6.9	8.7	6.6	
		P	4.3	4.0	3.1	4.6	3.2	3.9	2.4	
		K	11.4	8.8	9.7	9.3	8.7	9.7	7.8	
	Summer	N	4.8	4.5	4.8	3.9	4.7	7.1	3.6	
		P	3.9	8.3	3.5	2.9	2.1	4.2	1.4	
		K	10.2	8.3	8.4	8.1	5.1	8.0	4.0	
Rahuri	*Kharif*	N	170.6	190.2	200.2	192.5	129.0	211.3	190.8	83.8
		P	26.2	29.6	30.9	31.3	20.7	33.7	30.6	13.4
		K	63.7	71.3	75.8	74.6	48.5	82.3	73.0	30.6
	Rabi	N	66.6	73.5	75.3	73.4	57.1	89.7	80.5	34.8
		P	23.7	26.0	27.0	28.1	20.9	30.0	30.2	12.1
		K	85.2	89.0	88.2	95.2	70.5	99.2	99.1	49.6
Akola	*Kharif*	N	172.2	150.3	166.2	154.8	148.5	162.3	180.1	105.3
		P	27.2	20.2	24.2	23.2	25.2	22.1	27.2	9.3
		K	14.1	11.1	13.2	12.6	10.8	11.2	15.3	8.1
	Rabi	N	77.8	65.2	73.1	68.1	62.8	70.7	80.2	36.8
		P	15.2	13.0	14.0	14.0	14.3	13.1	16.2	5.9
		K	38.8	34.9	36.1	36.0	34.1	35.5	40.6	20.1
	Summer	N	46.7	38.1	43.1	38.2	37.6	41.4	48.2	30.2
		P	11.2	10.6	11.0	10.8	11.0	10.7	11.7	8.2
		K	44.2	40.7	42.9	42.8	39.9	41.2	45.8	32.2
Kathalagere	*Kharif*	N	144.03	123.0	171.5	161.2	162.0	205.7	222.7	144.0
		P	19.6	21.1	27.7	16.8	24.0	26.1	29.2	19.6
		K	65.2	76.0	91.7	76.6	105.5	105.6	75.7	65.2
Coimbatore	*Kharif*	N	152.0	144.0	143.0	139.0	103.0	148.0	160.0	156.0
		P	56.0	52.0	48.0	46.0	44.0	54.0	61.0	59.0
		K	158.0	148.0	148.0	148.0	120.0	151.0	161.0	153.0

Contd..../-

Name of CSR centre	Season	Nut./ Treat.	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
	Rabi	N	61.0	53.0	52.0	52.0	43.0	58.0	68.0	64.0
		P	29.0	26.0	22.5	20.5	19.5	27.0	31.0	26.0
		K	64.0	52.0	52.0	52.0	40.0	61.0	72.0	61.0
	Summer	N	166.0	160.0	155.0	155.0	126.0	162.0	169.0	165.0
		P	54.0	52.0	49.0	49.0	39.0	53.0	55.0	56.0
		K	155.0	148.0	148.0	148.0	116.0	151.0	161.0	160.0
Jabalpur	*Rabi*	N	162.0	135.0	130.0	132.0	141.0	131.0	182.0	
		P	25.8	18.9	18.0	20.0	21.1	22.0	27.0	
		K	198.0	181.0	183.0	180.0	187.0	197.0	232.0	
Rewa	*Rabi*	N	170.0	120.0	142.0	134.0	127.0	125.0	178.0	
		P	24.8	19.5	21.8	20.6	19.5	20.4	27.2	
		K	200.0	150.0	179.0	173.0	148.0	150.0	211.0	
Powarkheda	*Rabi*	N	174.0	110.0	136.0	147.0	120.0	115.0	202.0	
		P	18.5	12.3	14.6	13.9	13.6	12.5	18.8	
		K	176.0	125.0	161.0	160.0	127.0	118.0	212.0	
Siruguppa	*Kharif*	N	90.0	62.0	59.0	79.0	79.0	95.0	82.0	
		P	21.0	19.0	17.0	21.0	19.0	25.0	27.0	
		K	108.0	81.0	84.0	106.0	95.0	123.0	109.0	
	Rabi	N	31.0	28.0	29.0	28.0	31.0	32.0	28.0	
		P	4.0	4.0	3.0	4.0	5.0	6.0	3.0	
		K	23.0	17.0	20.0	24.0	23.0	27.0	24.0	
Bhuban-eswar	*Kharif*	N	56.0	53.8	56.9	56.3	51.0	58.4	45.8	45.08
		P	15.9	16.0	17.2	16.4	14.7	17.5	13.1	13.08
		K	65.1	63.7	65.4	64.1	59.2	66.9	53.6	52.27
	Rabi	N	169.14	169.62	165.14	168.38	148.3	179.4	167	172.26
		P	14.3	14.8	18.0	15.0	12.7	16.5	14.4	15.08
		K	171.1	171.6	167.0	170.0	149.4	180.7	168.9	173.9
	Summer	N	128.3	131.4	133.2	132.9	118.5	150.7	121.7	124.9
		P	27.3	28.7	30.0	29.5	25.8	34.4	26.5	27.2
		K	173.7	177.6	178.9	179.3	161.1	202.2	164.8	169.4
Chiplima	*Kharif*	N	66.1	65.9	70.7	70.7	59.6	74.1	58.0	58.0
		P	20.1	20.5	22.1	21.8	17.7	23.0	17.4	17.0
		K	82.0	80.8	84.5	84.5	71.3	87.5	69.4	68.8
	Rabi	N	60.1	59.2	59.4	60.7	55.1	64.0	56.6	56.4
		P	6.04	6.31	6.84	6.55	5.81	7.37	5.71	5.74
		K	92.6	91.4	91.2	93.6	85.4	99.2	87.7	87.3
	Summer	N	121.3	119.6	120.8	123.4	118.8	131.9	119.4	127.0
		P	25.7	25.7	26.8	27.5	26.1	29.7	26.0	27.5
		K	163.7	160.9	161.9	166.1	160.9	177.0	161.2	170.6

ANNEXURES

Annexure I

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Onion + turmeric intercropping system at Krishnagiri district (Tamil Nadu)

IFS components of poultry and goat in Udaipur district (Rajasthan)

Annexure-II

BOTANICAL AND HINDI NAMES OF DIFFERENT CROPS BEING GROWN AT AICRP-IFS CENTRES IN DIFFERENT EXPERIMENTS

S.N.	Common name	Botanical name	Hindi Name
1	Ajwain/ Ajowan/ caraway	*Trachyspermum copticum*	Ajwain
2	Ashwagandha/ Indian Ginseng	*Withania somnifera* (L.) Dunal	Ashwagandha
3	Barley	*Hordeum vulgare L.*	Jau
4	Black caraway/ Fennel flower	*Nigella sativa* Sumac	Kalongi
5	Black gram	*Phaseolus mungo* L.	Urd/ Urd bean
6	Bottle gourd	*Lagenaria siceraria (Mol.)/ L. vulgaris* L.	Lauki
7	Brinjal/ Egg plant	*Solanum melongena*L.	Baigan
8	Broccoli	*Brassica oleracea (L.) var.* italica	Hari Phool Gobhi
9	Cabbage	*Brassica oleracea* (L.) var. capitata	Band gobhi/ Patta gobhi
10	Castor	*Ricinus communis* L.	Arandi
11	Cauliflower	*Brassica oleracea* L. var. botrytis	Phool Gobhi
12	Chickpea	*Cicer arietinum* L.	Chana
13	Chickpea/ Bengal gram	*Cicer arietinum* L.	Chana
14	Chicory	*Cichorium intybus* L.	Kasni
15	Chilli	*Capsicum annum* L.	Mirch
16	Cluster bean	*Cyamopsis tetragonoloba* L.Taub.	Guar/ Guar bean
17	Coriander	*Coriandrum sativum L.*	Dhania
18	Cotton	*Gossypium hirsutum* L.	Kapaas
19	Cowpea	*Vigna unguiculata*(L) Walp.	Lobia
20	Cumin	*Cuminum cyminum* L.	Jeera
21	Egyptian clover	*Trifolium alexandrinum* L.	Berseem
22	Fenugreek	*Trigonella foenum-graecum L.*	Methi
23	Finger millet	*Eleusine coracana (L.) Gaertn.*	Ragi/ Mandua
24	Garden Cress/ Water Cress	*Lepidium sativum L.*	Chandrasur
25	Garlic	*Allivum sativum L.*	Lahsun
26	Garlic	*Allium sativum* L.	Lehsun
27	Green gram	*Phaseolus radiatus (L.) Wilczek.*	Moong/ Moong bean
28	Groundnut	*Arachis hypogea* L.	Moongfali
29	Hyacinth bean/ indian bean	*Dolichos lablab* L./ *D. purpureus/ Lablab purpureus*	Seim

S.N.	Common name	Botanical name	Hindi Name
30	Indian Mustard	*Brassica juncea Coss.*	Sarson/ Raya
31	Indian rape	*Brassica campestris* L. var. Toria	Toria
32	Lady's finger/ Okra	*Abelmoschus esculantus*Moench.	Bhindi
33	Lentil	*Lens culinaris*Medikus	masoor
34	Linseed/ Flax/ Flax seed	*Linum usitatissinum L.*	Alsi
35	Maize/ Corn	*Zea mays* L.	Makka
36	Marigold	*Calendula officinalis* L.	Gainda
37	Mustard	*Brassica campestris* L. var. Yellow sarson/ Brown sarson	Sarson
38	Oat	*Avena sativa* L.	Jaee
39	Onion	*Allium cepa* L.	Pyaz
40	Pearl millet	*Pennisetum americanum L.*	Bajra
41	Pea/ Vegetable Pea	*Pisum sativum* L.	Matar
42	Pigeon pea	*Cajanus cajan* (L) Milsp.	Arhar/ Tuar
43	Potato	*Solonum tuberosum* L.	Aloo
44	Psyllium	*Plantago ovata* Forssk.	Isabgol
45	Pumpkin	*Cucurbita pepo* Duch.	Kaddu
46	Radish	*Raphanus sativus* L.	Mooli
47	Rape/ Oilseed rape	*Brassica napus* var. napus	Gobhi Sarson
48	Red/ Purple Amaranth	*Amaranthus cruentus* L.	Chaulai/ Ramdana/ Rajgira
49	Rice/ Paddy	*Oryza sativa* L.	Dhan
50	Ridge gourd/ Sponge gourd	*Lufa acutangula/ L. aegyptica/ L. cylindrica*	Torai
51	Sesame	*Sesamum indicum* L.	Til
52	Sorghum	*Sorghum bicolor (*L.) Moench.	Jowar
53	Soybean	*Glycine max* L. (Merr.)	Soybean
54	Spinach	*Spinacia oleracea* L.	Palak
55	Sugar beet	*Beta vulgaris* L.	Chukander
56	Sugarcane	*Saccharum officinarum* L.	Ganna
57	Sunflower	*Helianthus annus* L.	Surajmukhi
58	Sunhemp	*Crotolaria juncea* L.	Sanai
59	Sweet potato	*Ipomoea batatas (*L.*)* Lam.	Sakarkand
60	Tomato	*Solanum lycopersicum L./ Lycopersicon esculantum/ L. lycopersicum*	Tamatar
61	Turmeric	*Curcuma longa* L.	Haldi
62	Wheat	*Triticum aestivum* L.emend. Fiori & Paol.	Gehun

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IFS model at Pantnagar (Uttarakhand)

Homestead vegetable production system demonstrated at farmers field in South 24 Paranas district (West Bengal)