वार्षिक प्रतिवेदन
ANNUAL REPORT
2016-17







भाकृअनुप
ICAR

भाकृअनुप-कृषि प्रोद्यौगिकी अनुप्रयोग अनुसंधान संस्थान, क्षेत्र-9

ICAR-Agricultural Technology Application Research Institute, Zone IX

जबलपुर, मध्य प्रदेश - 482 004

Jabalpur, Madhya Pradesh - 482 004

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(Division of Agricultural Extension)

Jabalpur, Madhya Pradesh

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सारांश

भारतीय कृषि अनुसंधान परिषद् –कृषि तकनीकी अनुप्रयोग अनुसंधान संस्थान, क्षेत्र–9 अपने कार्य क्षेत्र (मध्यप्रदेश, छत्तीसगढ़, उड़ीसा) के अन्तर्गत 105 कृषि विज्ञान केन्द्रों में निरंतर निरीक्षण एवं तकनीकी ज्ञान को संवर्धन का कार्य करता है।

प्रक्षेत्र परीक्षण के द्वारा तकनीक आंकलन

वर्ष 2016–17 में क्षेत्र– 9 के विभिन्न कृषि विज्ञान केन्द्रों द्वारा 1441 प्रक्षेत्र आंकलन के माध्यम से 42201 परीक्षण किये गये। सर्वाधिक परीक्षण मध्यप्रदेश (725) द्वारा आयोजित किया गया। क्रमशः उड़ीसा (464) एवं छत्तीसगढ़ (252) द्वितीय एवं तृतीय स्थान पर रहे। उक्त प्रक्षेत्र परीक्षण (1441) में से (928) प्रक्षेत्र परीक्षण फसल पर व शेष 513 अन्य उद्यमों पर केन्द्रित रहे।

अंग्रिम पंक्ति प्रदर्शन

दलहन, तिलहन, धन धान्य फसलें, सब्जी फसल, मोटे अनाज की उत्पादन एवं उत्पादकता बढाने हेतु वर्ष 2016–17 के दौरान, 966 अंग्रिम पंक्ति प्रदर्शन विभिन्न फसलों में 7461.02 हे. क्षेत्र और 19665 किसानों के प्रक्षेत्र पर प्रदर्शित किया गया। मुख्य आय सृजन वाले उद्यम की 6230 इकाईयाँ एवं 931.32 हे. क्षेत्र पर भी अंग्रिम पंक्ति प्रदर्शन का आयोजन किया गया जिससे 3295 लाभार्थी लाभांवित हुए।

प्रशिक्षण एवम् क्षमता संवहन

क्षेत्र–9 के वैज्ञानिको द्वारा प्रशिक्षक एवं प्रशिक्षु के क्षमता संवहन पर विशेष ध्यान दिया गया जिसके परिणाम स्वरूप कृषि विज्ञान केन्द्रों द्वारा कुल 7676 प्रशिक्षण कार्यक्रम में 1,92,822 प्रतिभागी (कृषक, महिलायें, ग्रामीण युवक, प्रसार कर्मी) लाभांवित हुए। इसके अतिरिक्त कृषि तकनीक अनुप्रयोग अनुसंधान संस्थान, जबलपुर द्वारा आयोजित 25 क्षमता संवहन कार्यक्रम से मध्यप्रदेश, छत्तीसगढ़ एवं उड़ीसा के कृषि विज्ञान केन्द्रों के 1669 विषय वस्तु विशेषज्ञ भारतीय कृषि अनुसंधान परिषद् के विभिन्न संस्थाओं के सहयोग से लाभान्वित हुए।

बीजोत्पादन, रोपण सामग्री, जैव उत्पाद एवं पशु उपयोगी सामग्री का उत्पादन

कृषि विज्ञान केन्द्रों द्वारा जैव उत्पाद एवं पशु उपयोगी सामग्री के अतिरिक्त 22048.35 क्विंटल बीज, 71.30 लाख रोपण सामग्री (धन–धान्य फसलें, दलहन, तिलहन, सब्जी, औषधीय पौधे, फलदार पौधे) का उत्पादन एवं वितरण किया गया।

मृदा, जल एवं पौधों का परीक्षण

क्षेत्र के कृषि विज्ञान केन्द्रों ने 191232 मृदा एवं 745 जल नमूनों का परीक्षण कर 5607 गांव के 559113 किसानों को लाभान्वित किया।

प्रसार गतिविधियाँ

वर्ष 2016–17 में कुल 140558 प्रसार गतिविधियों (प्रक्षेत्र दिवस, किसान मेला, कृषक सलाहकारी सेवाएं, प्रदर्शनी, लघु चलचित्र आदि) के माध्यम से विभिन्न तकनीक का प्रसार कर 19,03,974 किसान एवं प्रसार कर्मी लाभान्वित हुए।

साहित्य एवं जनसंचार माध्यम के द्वारा तकनीक प्रसार हेतु 2,11,500 कृषि साहित्य मुद्रित प्रतियों से 2,08,058 प्रतियों को वितरित किया गया।

वैज्ञानिक सलाहकार समिति की बैठक

वर्ष 2016–17 में कुल 122 वैज्ञानिक सलाहकार समिति की बैठकों का आयोजन किया गया। इनमें से म.प्र. के 25 कृषि विज्ञान केन्द्र ऐसे थे जिन्होने वर्ष में दो बार उक्त बैठक आयोजित की एवं शेष 19 कृषि विज्ञान केन्द्रों में एक बार उक्त बैठक आयोजित हुई। छत्तीसगढ़ के 20 कृषि विज्ञान केन्द्रों में एक बार उक्त बैठक आयोजित की

गई। उड़ीसा के 33 कृषि विज्ञान केन्द्रो में से 1 ने दो बार एवं शेष 32 गतवर्ष में एक बार उक्त बैठक आयोजित किये।

परियोजना एवं प्रकाशन

प्रतिवेदित वर्ष के दौरान, 7 संस्थागत अनुसंधान परियोजनाएं, 3 तकनीकी प्रस्तुति विभिन्न कॉन्फ्रेंस/सेमीनार, 18 अनुसंधान प्रकाशन, 20 तकनीकी बुलेटिन, 3 पुस्तक अध्याय, इत्यादि में व एक तकनीक प्रसार लेख प्रकाशित हुए।

पुरस्कार एवं सम्मान

कृषि विज्ञान केन्द्र, कांकेर, छत्तीसगढ़ को महिन्द्रा समृद्धि इण्डिया एग्री एवार्ड से अलंकृत किया गया एवं कृषि विज्ञान केन्द्र कांकेर, छत्तीसगढ़ एवं मयुरभंज–1, ओडिशा ने पण्डित दीनदयाल उपाध्याय कृषि विज्ञान प्रोत्साहन पुरस्कार प्राप्त किया। संस्थान के वैज्ञानिक डॉ. ए.ए. राउत को यंग साइंटिस्ट अवार्ड से सम्मानित किया गया।

कृषि विज्ञान केन्द्रों में आगन्तुकों का आगमन

वर्ष 2016–17 जोन–9 के कृषि विज्ञान केन्द्रों में पधारे 1,81,343 आगन्तुको में 1,69,421 किसान, 10,563 अधिकारीगण एवं 1359 गणमान्य एवं विशिष्ट व्यक्ति शामिल है। राज्यवार आंकड़ो के अनुसार मध्यप्रदेश के कृषि विज्ञान केन्द्रों में सर्वाधिक संख्या 1,09,695 (60.5 प्रतिशत), छत्तीसगढ़ में 39,560 (21.81 प्रतिशत) एवं उड़ीसा में 32,088 (17.69 प्रतिशत) रहा।

एटिक वार्षिक प्रतिवेदन

क्षेत्र–9 के अधीन 5 एटिक हैं। वर्ष 2016–17 में 43,470 कृषकों ने एटिक में भ्रमण किये, तकनीकी सूचनाओं से 45,481 कृषक लाभान्वित हुए एवं 1,38,646 प्रकाशित तकनीकी बुलेटिन आदि की प्रतियों के विक्रय से कुल 54.97 लाख रुपये अर्जित किये गये।

Executive Summary

ICAR-Agricultural Technology Application Research Institute, Zone IX has 105 KVKs located in three Indian states viz., Madhya Pradesh, Chhattisgarh and Odisha.

Technology Assessment through On-Farm Testing

During 2016-17, 1441 technologies were assessed in the Zone through 42201 On-Farm Trials. The highest number of technologies were assessed in the state of Madhya Pradesh (725) followed by Odisha (464) and Chhattisgarh (252). Out of total 1441 technologies assessed, 928 were on crops and remaining 513 technologies on enterprises.

Frontline Demonstrations

During 2016-17, 966 FLDs were conducted on crops (oilseeds, pulses, cereals, vegetables crops, cash crops, agro-forestry, millets, etc.) covering total area of 7461.02 ha. benefiting 19,665 farmers. FLDs were also conducted on important income generating enterprises, covering 6230 units and 931.32 ha area among 3295 beneficiaries.

Training and Capacity Building

During 2016-17, there was significant increase in the number of trainings and participants. KVKs organized 7676 courses and 1,92,822 participants including farmers and farm women, rural youth, extension personnel were benefitted. Besides, ICAR-ATARI, Jabalpur also organized 25 capacity building programmes in collaboration with various ICAR institutes for technical backstopping of 1669 scientists in the Zone.

Seed, Planting materials, Bio-products and Livestock material production

KVKs of the Zone produced total 22,048.35 q of seed and 71.30 lakhs planting material of different crops (cereals, pulses, oilseeds, vegetables), medicinal plants, fruits, etc. and distributed/sold among farmers. Besides, bio-products and livestock products were also produced and distributed.

Soil, water and plant analysis

During 2016-17, total 1,91,232 soil samples and 745 water samples were analyzed by KVKs of the Zone benefitted 5,59,113 farmers of 5607 villages.

Extension activities

A total of 1,40,558 extension activities were organized in the form of field days, farmers fair, farm advisory services, exhibition, film show etc. for promoting the technologies in the region which benefited 19,03,974 farmers and extension personnel in the ICAR-ATARI, Zone-IX.

Technological backstopping

Technological backstopping were carried out through production of 2,11,500 copies of technical literature, newsletters etc. of which 2,08,058 were provided to the farmers, Panchayats as well as Line department officials.

Scientific Advisory Committee Meeting

In the Zone, total 122 Scientific Advisory Committee (SAC) meetings were conducted by KVKs. In MP, 25 KVKs organized SAC meeting twice and 19 KVKs once during the reporting period. In Chhattisgarh, 20 KVKs organized SAC meeting once. In Odisha, 32 KVKs organized SAC once and one KVK organized SAC twice.

Projects and publications

During 2016-17, total seven Institute research projects were implemented by the ATARI scientists. As a results, total 18 research articles, 20 technical bulletins / manual, 3 book chapters, one technical/ popular article were published along with three presentations in different Conferences /Symposia / Seminars /other forums.

Awards and Recognitions

Mahindra Samridhi India Agri-Award was conferred to KVK Kanker (C.G.). and Pandit Deendayal Upadhyay Krishi Vigyan Protsahan Award was conferred to KVK, Kanker, C.G. and

KVK, Mayurbhanj-I, Odisha. Dr. A.A. Raut, Scientist, ATARI, Jabalpur received Young Scientist Award.

Footfalls in KVKs

In the KVKs, there were 1,81,343 footfalls (1,69,421 farmers, 10,563 officials and 1359 dignitaries/VIPs) during 2016-17. In Madhya Pradesh, it was 1,09,695 (60.50 %), in Chhattisgarh 39,560 (21.81 %), and in Odisha 32,088 (17.69 %).

ATIC Progress

In the Zone, five ATICs are operational under ATARI, Jabalpur which received 43,470 footfalls of visitors. Technological information was provided to 45,481 farmers. A total of 1,38,646 publications (print & electronic media) were sold and revenue of Rs. 54.97 lakh was generated.

Contents

1 INTRODUCTION

Zonal Coordinating Unit established on 11th September, 1979 at Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur campus Madhya Pradesh by ICAR was upgraded to Zonal Project Directorate (ZPD), Zone-IX in March 2009. The Directorate attained the status of Institution, when it was renamed as Agricultural Technology Application Research Institute (ATARI) in 2015. The Institute coordinates, monitors and evaluates the mandated activities of 105 KVKs spread across three Indian States- Madhya Pradesh, Chhattisgarh and Odisha.

Major activities of ATARI

- Formulate, implement, monitor and evaluate programmes organized by Krishi Vigyan Kendras
- Coordinate project related works of various agencies such as State Agricultural Universities (SAUs), ICAR Institutes, Voluntary agencies and development departments
- Serve as feedback point for research and extension systems
- Coordinate agri-based schemes for successful implementation and better convergence with State/Central Government departments
- Maintain liaison with research and extension Institutions

KVKs in ATARI, Jabalpur

As mentioned earliar the Institute monitors the activities of 105 KVKs in the three states namely Madhya Pradesh, Chhattisgarh and Odisha.

Table 1.1: KVKs across the three state in the Zone IX

State	No of Districts	No. of of KVKs under					
		SAUs	VU	CU	NGOs	ICAR	Total
Chhattisgarh	27	23	01	0	0	0	24
Madhya Pradesh	51	39	0	01	07	01	48
Odisha	30	31	0	0	0	02	33
Total	**108**	**93**	**1**	**1**	**7**	**3**	**105**

SAU - State Agricultural University; VU- Vetrinary University, CU-Central University, NGO - Non-Governmental Organization; ICAR - Indian Council of Agricultural Research.

Krishi Vigyan Kendra

Realizing the role and importance of improved technology in the agriculture development for increasing food and nutritional security, Indian Council of Agricultural Research made an institutional innovation in the form of KVK. It was also envisaged that technology assessed by the KVK will be used as model for the Line departments and act as a catalyst to improve the existing systems for better delivery mechanism. For proper functioning, great emphasis was given on the strengthening of physical and human infrastructure of KVKs. The name of the host Institutions managing the KVKs is given in Table 1.2.

Table 1.2: Institutional set-up of operational KVKs under ATARI, Zone IX.

Host Institutions	No. of KVKs
Madhya Pradesh	**48**
Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur	20
Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior	19
Indira Gandhi National Tribal University, Amarkantak	1
ICAR-Central Institute of Agricultural Engineering, Bhopal	1
Deen Dayal Research Institute, Chitrakoot, Satna	1
Kasturba Gandhi National Memorial Trust , Indore	1
Lok mata Devi Ahilyabai Holkar Social National Mission, Burhanpur	1
Kalukheda Shikhcha Samiti, Jaora, Ratlam	1
Deen dayal Krishi Vikas Awam Anusandhan Samiti (DKVAAS) Bhopal	1
Centre for Rural Development and Environment, Sehore	1
Shri Malwa Mahila Vikas Samiti, Sironj, Vidisha (sub-judice)	1

Host Institutions	No. of KVKs
Chhattisgarh	24
Indira Gandhi Krishi Vishwa Vidyalaya, Raipur	23
Chhattisgarh Kamdhenu Vishwa Vidyalaya, Durg	1
Odisha	33
Odisha University of Agricultural & Technology, Bhubaneswar, Odisha	31
ICAR-National Rice Research Institute, Cuttack	1
ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha	1

Mandates of KVK

Assessment, refinement and demonstration of technology/products.

Activities of KVK

- On Farm Testing to identify the location specific technologies in various farming systems
- Frontline Demonstrations to establish production potentials of newly released technologies in farmers' fields and provide feedback
- Training of farmers and farmwomen to update their knowledge and skills in modern agricultural technologies and training of extension personnel to orient them in the frontier areas of technology development
- Work as knowledge and resource centre of agricultural technologies for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district
- Create awareness about frontier technologies through various extension activities like Farmer fair, Field day, Strategic campaign, Ex-trainees meet, etc.
- Seed and planting materials production for making available to the farmers.

Staff Position

KVKs have sanctioned staff strength of 16 members. The current staff position in KVKs of Zone-IX is given in Table 1.3. Of the total posts, 64.52 per cent posts are filled while remaining 35.48 per cent are vacant. The percentage of vacant posts is comparatively higher in case of technical and administrative categories.

Table 1.3. Staff position in KVKs under ATARI, Jabalpur

State	No. of KVKs	Senior Scientist & Head (1)		Subject Matter specialists (6)		Programme Assistants (3)		Admn. (6)		Total (16)	
		Sanc.	Filled	Sanc.	Filled	Sanc.	Filled	Sanc.	Filled	Sanc.	Filled
MP	48	48	37	288	185	144	93	96	50	576	365
CG	24	24	15	144	114	72	47	48	14	288	190
Odisha	33	33	15	198	130	99	75	66	38	396	258
Total	**105**	**105**	**67**	**630**	**429**	**315**	**215**	**210**	**102**	**1260**	**813**

The detail of budgetary information of KVKs under Zone-IX, Jabalpur is given in Table 1. 4.

Table 1.4: Budgetary information of KVKs and ATARI, Jabalpur (Rs. in lakhs)

S. no.	State	Rs. in lakhs		
		Budget estimate	Revised estimate	Total expenditure
1	MP	4713.13	5153.88	4924.35
2	CG	2592.93	2854.95	2742.05
3	Odisha	3468.53	3430.25	3295.77
4.	ATARI, Zone IX	274.25	265.92	264.29
Total		**11048.84**	**11705.00**	**11226.46**

The details of status of infrastructure facilities in KVKs under Zone-IX is given in Table 1.5.

Table 1.5: Status of infrastructure facilities in KVKs under ATARI, Jabalpur

S. No.	State	No. of KVKs	Admn. Building			Trainees Hotel			Staff Quarters		
			Completed	In progress	NA	Completed	In progress	NA	Completed	In progress	NA
1	Madhya Pradesh	48	45	02	01	43	0	05	41	0	07
2	Chhattisgarh	24	15	09	0	10	02	12	06	0	18
3	Odisha	33	27	06	0	25	01	07	19	01	13
Total		**105**	**87**	**17**	**1**	**78**	**3**	**24**	**66**	**1**	**38**

Agro-climatic Zones (ACZ) in ATARI, Jabalpur

The coverage of KVKs under different agro-climatic zones is as given below.

Table 1.6: Agro-climatic Zones in ATARI, Jabalpur

State	Agroclimatic Zones (ACZs)	KVKs	No. of KVKs
M.P.	Chhattisgarh Plains	Balaghat	01
	North Hills of Chhattisgarh	Shahdol, Umaria, Dindori, Mandla, Anuppur	05
	Bundelkhand Region	Datia, Tikamgarh, Chattarpur	03
	Gird Zone	Guna, Gwalior, Morena, Ashoknagar, Shivpuri, Sheopur, Bhind	07
	Kymore Plateau and Satpura Hills	Satna, Sidhi, Seoni, Jabalpur, Katni, Panna, Rewa	07
	Jhabua Hills	Jhabua	01
	Malwa Plateau	Indore, Dhar, Dewas, Shajapur, Ujjain, Mandsaur, Ratlam, Rajgarh, Neemach	09
	Nimar Valley	Khandwa, Khargone, Badwani, Burhanpur	04
	Satpura Plateau	Chhindwara, Betul	02
	Vindhya Plateau	Sehore, Bhopal, Raisen, Sagar, Damoh, Vidisha	06
	Central Narmada Valley	Narsinghpur, Hoshangabad, Harda	03
Total	**11 ACZs**		**48**
CG	Chhattisgarh Plains	Bilaspur, Durg, Baloda Bazar, Raipur, Gariyaband, Raigarh, Dhamtari, Janjgir-Champa, Mahasamund, Korba, Kanker, Rajnandgaon, Kabirdham, Durg-II, Mungeli, Bemetra	16
	North Hills of Chhattisgarh	Surguja, Jashpur, Korea, Balrampur	04
	Bastar Plateau	Bastar, Dantewada, Bijapur, Narayanpur	04
Total	**3 ACZs**		**24**
Odisha	East and South Eastern Coastal Plain	Cuttack, Jagatsinghpur, Kendrapara, Khurda, Nayagarh, Puri	06
	Eastern Ghat High Land	Koraput, Navarangpur	02
	Mid Central Table Land Zone	Angul, Dhenkanal	02

State	Agroclimatic Zones (ACZs)	KVKs	No. of KVKs
	North Central Plateau	Keonjhar, Mayurbhanj, Mayurbhanj-II	03
	North Eastern Coastal Plain	Balasore, Jajpur,Bhadrak	03
	North Eastern Ghat	Ganjam, Ganjam-II, Kandhamal, Gajapati, Rayagada	05
	North Western Plateau Zone	Sundergarh, Sundergarh-II, Deogarh	03
	West Undulating Zone	Kalahandi, Nuapada	02
	Western Central Table Land Zone	Bargarh, Jharsuguda, Sambalpur, Boudh Sonepur, Bolangir	06
	South Easterm Ghat	Malkangiri	01
Total	10 ACZs		33

Thrust Areas of the KVKs under ATARI-IX Jabalpur

Seven broad areas identified for the KVKs are :

- Sustainable production system through location-specific assessment and demonstrations of technology.
- Resource conservation through watershed management, soil and water conservation as well as farm mechanization.
- Development and promotion of crop, enterprise diversification and alternate land use system.
- Integrated pest and disease management.
- Promotion of rural entrepreneurship (livestock, goatery, poultry, fishery, mushroom, lac, bee keeping etc. by production, processing, value addition and marketing) for additional income.
- Empowerment of farm women and youth through income generating activities and drudgery reduction.
- Alternate livelihood support system in rural sector for marginal farmers, landless, labourers and farm women to check migration.

2 TECHNOLOGY ASSESSMENT THROUGH ON-FARM TESTING

The claimed superiority of location specific technologies were tested by KVKs through On-Farm Testing (OFTs) and the numbers of technologies tested as well as trials are mentioned tables. Technologies to the tune of 1441 were tested in the Zone through 42,201 different trials (Table 2.1). The highest number of technologies were tested in the state of Madhya Pradesh (725) followed by Odisha (464) and Chhattisgarh (252). Out of these 928 technologies were assessed on crops whereas remaining 513 technologies were on enterprises. In crops (cereals, pulses, oilseeds and vegetables), major focus has been on testing of location specific technologies. The focus was on 'more crop per drop' through *in situ* moisture conservation, drip irrigation and plastic mulching in vegetables, soil test based nutrient management etc. Among enterprises, fish production and management, farm mechanization, animal husbandry, poultry production and management were the focus areas.

Table 2.1: State-wise overall technology assessed during 2016-17

State	No. of	
	Technologies assessed	Trials
Chhattisgarh	252	1594
Madhya Pradesh	725	36054
Odisha	464	4553
Total	**1441**	**42201**

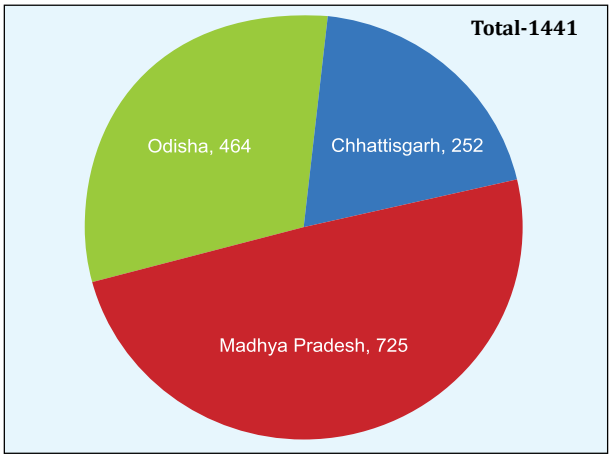


Figure-1: State-wise overall technology assessed during 2016-17

Table 2.2: Crop-wise OFTs conducted during 2016-17

Crop Category	No. of							
	Technologies assessed				Trials			
	MP	CG	Odisha	Total	MP	CG	Odisha	Total
Agro forestry	1	-	6	7	5	-	43	48
Cereals	126	60	79	265	1070	299	834	2203
Fibres	1	-	1	2	13	-	13	26
Flower	5	1	4	10	39	5	44	88
Fodder	1	-	1	2	5	-	7	12
Fruit	12	1	24	37	87	5	195	287
Intercropping	-	2	2	4	-	9	23	32
Lac	-	1	-	1	-	4	-	4
Medicinal	3	-	1	4	17		5	22
Nuts	1	-	-	1	5	-	-	5
Oilseeds	90	19	22	131	767	115	186	1068

Crop Category	No. of							
	Technologies assessed				Trials			
	MP	CG	Odisha	Total	MP	CG	Odisha	Total
Pulses	101	26	29	156	909	117	249	1275
Spices	65	11	31	107	534	47	249	830
Sugercane	2	2	2	6	17	10	15	42
Tuber crops	5	8	10	23	44	41	87	172
Vegetables	60	38	74	172	452	192	667	1311
Total	**473**	**169**	**286**	**928**	**3964**	**844**	**2617**	**7425**

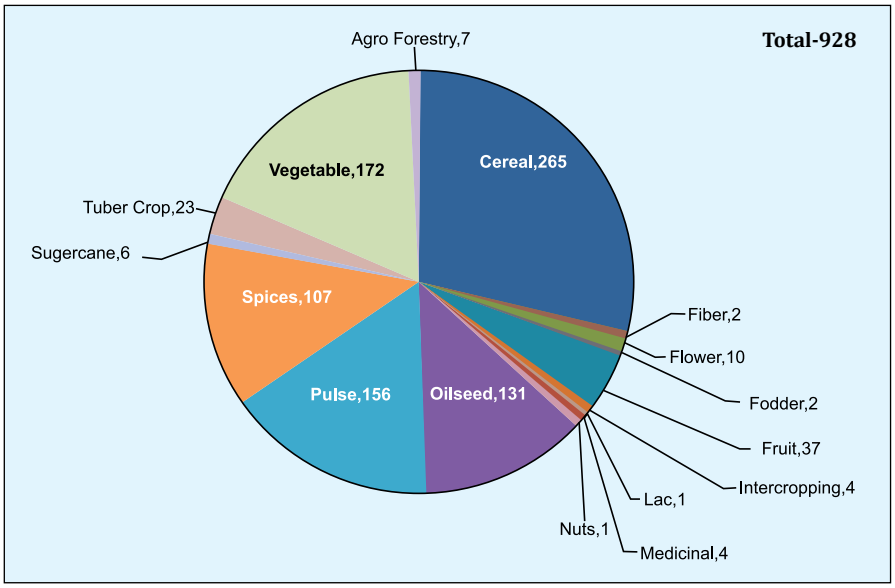


Figure-2 : Crop-wise OFTs conducted during 2016-17

Table 2.3: Thematic area-wise OFTs conducted on crops during 2016-17

Crop Category	No. of OFTs							
	Technologies assessed				Trials			
	MP	CG	Odisha	Total	MP	CG	Odisha	Total
Agro Forestry	3	1	12	16	20	5	84	109
Crop Diversification	-	5	7	12	-	22	61	83
Integrated Crop Management	17	13	17	47	122	61	141	324
Integrated Disease Management	47	24	31	102	355	114	310	779
Integrated Nutrient Management	84	32	56	172	682	168	495	1345
Integrated Pest Management	59	28	47	134	584	136	430	1150
Integrated Plant Nutrient Management	9	10	1	20	69	50	7	126
Integrated Weed Management	46	15	23	84	397	69	212	678
Resource Conservation Technology	78	11	14	103	701	59	135	895
Soil Fertilty Management	7	4	7	18	60	24	81	165
Tuber Crop Production	-	-	1	1	-	-	4	4
Varietal Evaluation	123	26	70	219	974	136	657	1767
Total	**473**	**169**	**286**	**928**	**3964**	**844**	**2617**	**7425**

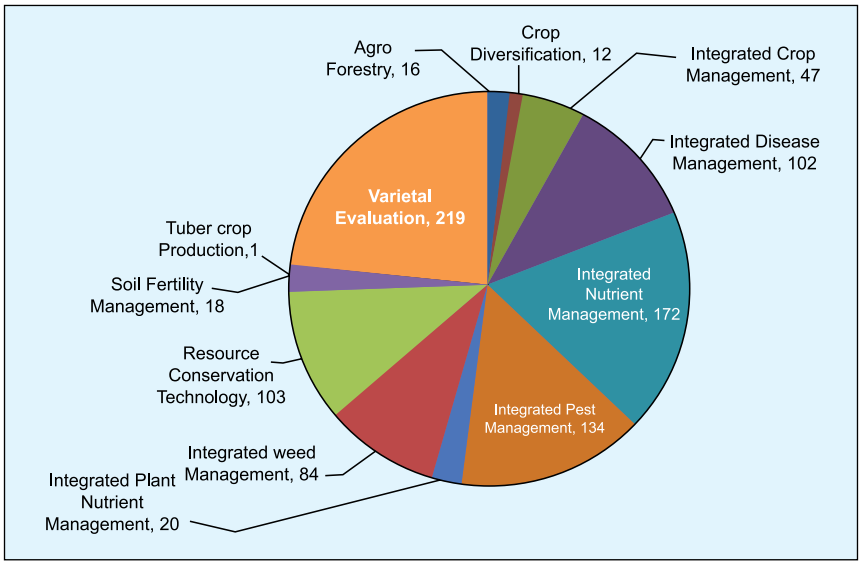


Figure- 3: Thematic area-wise OFTs conducted on crops during 2016-17

Table 2.4: Thematic area wise number of technologies assessed on enterprises during 2016-17

Thematic Area	No. of							
	Technology assessed				Trials			
	MP	CG	Odisha	Total	MP	CG	Odisha	Total
Agriculture Marketing	2	2	1	5	80	100	80	260
Animal Disease Management	6	1	3	10	74	30	39	143
Animal Feed / Fodder Production Management	7	5	1	13	55	22	13	90
Animal Nutrition Management	37	4	19	60	316	14	243	573
Capacity Building Dynamics	10	2		12	207	2		209
Composite Fish Farming	2	1	6	9	6	5	30	41
Drudgery Reduction	37	1	11	49	230		134	364
Farm Mechanization	15	18	23	56	99	86	209	394
Fish Breeding		1	2	3		4	6	10
Fish Nutrition	2	3	4	9	13	12	17	42
Fish Production & Management	2	5	6	13	13	21	31	65
Fish Seed Production		4	2	6		17	13	30
Fish-cum-Duck Farming	1	2		3	3	9		12
Impact Assessment	9			9	259			259
Income Generation	33	5	51	89	257	25	472	754
Information & Communication Technology	24	4	4	32	29894	280	140	30314
Livestock Production and Management	4	1	3	8	42	4	30	76
Nutritional Security	11	4	2	17	166	23	20	209
Post Harvest Management	3	1	1	5	23	5	13	41
Poultry Production & Management	8	10	11	29	86	46	168	300
Processing and Marketing		1		1		5		5
Resource Conservation Technology	23	6	10	39	148	32	71	251
Soil Health Management			1	1			13	13
Spawn to Fry Production		1		1		4		4
Value Addition	16	1	17	34	119	4	194	317
Total	**252**	**83**	**178**	**513**	**32090**	**750**	**1936**	**34776**

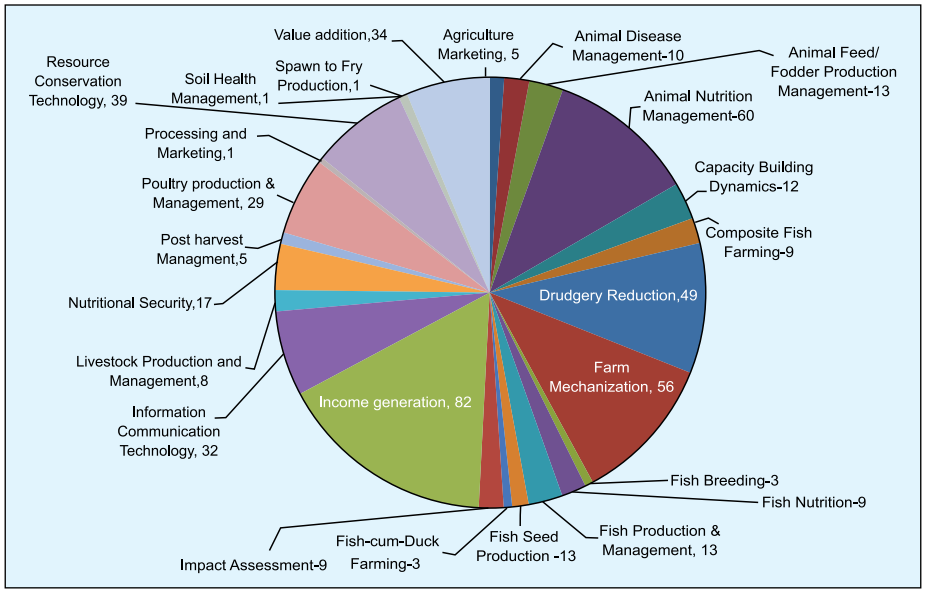


Figure- 4: Thematic area-wise number of technologies assessed on enterprises during 2016-17

TECHNOLOGIES ASSESSED FOR MAJOR CROPS/ENTREPRISES

SOYBEAN

Varietal Assessment in Soybean

Problem identified: Low yield of soybean due to use of old varieties

Technology assessed: Soybean varieties JS 20-29 and JS 20-34

KVK Chhindwara, Raisen and Satna conducted 28 OFTs to assess the performance of soybean varieties JS 20-29 and JS 20-34. The results of the assessment revealed that JS 20-34 gave 71.76 and 20.7 per cent higher yield over the T_1 and T_2 respectively. There was also increased number of pods per plant as 137.4 and 7.61 percent more pods per plant over T_1 and T_2 respectively. The incremental net return was Rs. 17,222 per ha with this variety along with 0.62 higher B:C ratio. This variety is noticeably preffered by the farmers in the soybean growing districts of Madhya Pradesh.

Table 2.5- Performance of soybean varieties JS 20-29 and JS 20-34

Details	No. of trials	Yield (q/ha)	No. of pods/plant	Net return (Rs/ha)	B:C ratio
Soybean variety JS 95-60/ JS 93-05 (Farmers' practice) T_1	28	12.11	32.75	15196	2.10
Soybean variety JS 20-29 (Recommended practice) T_2		16.23	72.25	24553	2.41
Soybean variety JS 20-34 (Recommended practice) T_3		19.59	77.75	32418	2.72

Soybean varieties JS 20-29 and JS 20-34 in farmer's field

Integrated Nutrient Management in Soybean

Problem identified: Low yield of soybean due to sulphur deficiency

Technology assessed: Response of N:P:K and sulphur in soybean

Soybean is an important *kharif* oilseed crop grown in majority of areas of Madhya Pradesh. Imbalanced and indiscriminate use of major plant nutrients and no use of secondary and micronutrients are the major reasons for declining yield of soybean. Farmers are usually not using recommended dose of NPK and the sulphur containing fertilizers. Sulphur deficiency in the soil is affecting the soybean productivity, as it is responsible for synthesis of amino acids and fatty acids which in turn increase the oil content in oilseeds. Looking at the above problem, KVKs of Dhar, Durg, Jhabua, Khandwa and Raisen conducted 39 OFTs to assess the response of NPK and sulphur appling NPK @ 20:60:40 kg/ha and sulphur @ 20 kg/ha through bentonite sulphur on soil test basis. The results revealed that the number of pods per plant and seed yield was more by 22.98 and 31.18 percent over farmers' practice respectively. Similarly, the net return and B:C ratio were also found to be higher by Rs. 9,518 and 0.66 over farmers' practice. On the basis of the above findings it was concluded that the assessed technology is effective as it increases the crop yield and maintains the soil health and fertility.

Table 2.6: Response of NPK and sulphur in soybean

Details of Technology	No. of trials	Yield (q/ha)	No. of pods/ plant	Net return (Rs/ha)	B:C ratio
NPKS @ 13:35:0:0 kg/ha (Farmers' practice-T_1)	39	11.78	49.72	15755	2.05
Rhizobium & PSB @ 5 g/kg as seed inoculation + 100% NPK @ 20:60:40 kg/ha and Sulphur @ 20 kg/ha (T_2)		15.46	71.15	25273	2.70

NPK and sulphur in soybean

Resource Conservation Technology in Soybean

Problem identified: Low yield due to moisture stress in Soybean

Technology assessed: Pusa Hydrogel in Soybean

In dry spell and drought conditions during *kharif* season, the growth and productivity of soybean severely suffers. Pusa Hydrogel is a natural super absorbent polymer with fast rate of fluid absorption and ability to retain it under high load (400 times water absorption of its dry weight) and release the same gradually as per the plant specific requirements. KVKs of Dhar and Satna assessed Pusa Hydrogel in soybean. Results of the 20 assessed OFTs revealed that use of Pusa Hydrogel increase the yield of soybean over the farmers' practice. The increase was 77.63 percent (T_3) when used with seed while sowing . The available soil moisture was recorded 94.28 and 71.43 percent higher in T_3 and T_2 respectively over farmers' practice. The net return and B:C ratio were Rs. 32,161 per ha and 1.32 units higher with the assessed technology (T_3) over farmers' practice.

Table 2.7. Performance of Pusa Hydrogel in soybean

Details of Technology	No. of trials	Yield (q/ha)	Soil moisture (%)	Net return (Rs/ha)	B:C ratio
No use of Pusa Hydrogel (Farmers' practice-T_1)	20	13.19	35	19607	1.91
Use of of Pusa Hydrogel before sowing mixed in soil @ 5 kg/ha (T_2)		20.64	60	43883	3.01
Use of Pusa Hydrogel mixed with seed during sowing @ 5 kg/ha (T_3)		23.43	68	51767	3.23

Effect of Pusa Hydrogel in soybean

Integrated Pest Management in Soybean

Problem Identified: Low yield of soybean due to heavy infestation of Semi looper.

Technology assessed: Chlorantraniliprole for management of Semi looper in soybean

Semi looper infestation in soybean is a major problem reduces crop yield up to 30-40% if not managed in time. KVKs of Jhabua, Khandwa, Mandsaur, Neemuch and Raisen from Madhya Pradesh conducted 42 OFTs for assessing the chemical management of semi looper in soybean. The result of these OFTs revealed that the yield increased by 23.02 and 4.81 percent with the assessed insecticidal treatment (spray of Chlorantraniliprole 18.5 SC @ 100 ml/ha at ETL (3- 4 larvae/ m^2) over farmers' practice (spray of Chloropyrophos 20EC @ 1.5 lit /ha at severe infestation -T_1) and spray of Trizophos 40 EC@800 ml/ha at ETL (T_2), respectively. The number of larvae /m^2 area reduced to 81.02 and 9.56 per cent in the assessed technology over T_1 and T_2 respectively. The net return and B:C ratio under the assessed technology also increased by Rs. 6925 per ha and 0.40 respectively over farmers' practice.

Table 2.8: Performance of Chlorantraniliprole for management of semi looper in soybean

Details of Technology	No. of Trials	No. of Larvae/m^2	Yield (q/ ha)	Net return (Rs/ ha)	B:C ratio
Use of Chloropyrophos @ 1.5 lit /ha at severe infestation (Farmers' practice T_1)	42	5.49	12.62	18456.4	2.336
Trizophos 40 EC@800 ml/ha at ETL (T_2)		1.16	14.81	23730.6	2.57
Chlorantraniliprole 18.5 SC @ 100 ml/ha at ETL (T_3)		1.04	15.53	25381	2.73

Semi looper management in soybean

Integrated Disease Management in Soybean

Problem Identified: Low yield of soybean due to severe incidence of yellow vein mosaic disease

Technology assessed: Integrated Management of Yellow Mosaic Disease of soybean

Yellow vein mosaic virus disease of soybean causes up to 50 percent yield loss. Susceptible varieties and non adoption of suitable integrated disease management modules cause YMV. KVKs of Burhanpur and Indore from Madhya Pradesh conducted 17 trials on YMV disease management in soybean. YMV management technology assessed was T_3- seed treatment with Carboxin 37.5% + Thiram (37.5%) 3 g/kg seed + Thiamethoxam (75% WG) 5 g/kg seed and Spray of Thiamethoxam 25 WG @100 g/ha 20DAS. T_2- by Seed treatment with Carboxin 37.5% + Thiram (37.5%) 3g/kg seed + Imidacloprid (17.8%) SL 3 ml/kg and foliar spray with Imidacloprid 17.8% SL @ 100ml/ha 20DAS (T_2). The increase of soybean yield in T_3 was 16.10 and 0.57 percent over T_1 and T_2 respectively, where disease incidence decreased in T_3 by 64.73 and 12.22 percent over T_1 and T_2, respectively. The increase in net return and B:C ratio was Rs. 7,756 per ha and 0.31 unit, respectively over farmers' practice.

IDM module for YMV management in soybean in farmer's field

Table 2.9: Performance IDM module for management YMV in soybean

Details of Technology	No. of Trials	No of pods/ plant	Disease incidence (%)	Yield (q/ ha)	Net return (Rs./ ha)	B:C ratio
Sowing without seed treatment (Farmers' Practice – T_1)	17	26.2	11	15.09	28583	2.29
Seed treatment with Carboxin 37.5% + Thiram 37.5%) 3gm/kg seed + Imidacloprid 17.8 SL@ 3 ml/kg and foliar spray with Imidacloprid 17.8 SL @ 100ml/ha 20DAS (T_2)		29.6	4.42	17.42	36097	2.58
Seed treatment with Carboxin 37.5% + Thiram 37.5% 3g/kg seed +Thiamethoxam 75 WS 5 g/kg seed and Spray of Thiamethoxam 25 WG @100g/ha 20DAS (T_3)		32.7	3.88	17.52	36339	2.6

RICE

Varietal Assessment in Rice

Problem identified: Low yield in medium duration rice variety due to moisture stress during dry spell in rainfed condition

Technology assessed: Improved short duration rice variety- Sahbhagi.

Selection of appropriate varieties for rainfed upland situations is most important factor among the various factors responsible for low productivity of rice in farmers' field. Use of improved early and draught tolerant rice variety may improve the productivity. Keeping in view the above, KVKs of Dindori, Malkangiri, Mandla and Sidhi of the Zone planned and conducted 45 OFTs to assess the performance of the improved early and draught tolerant rice variety Sahbhagi. The results revealed that the yield of Sahbhagi was 46.71 per cent higher over the farmers' practice (T_1). The number of effective tillers/hill was recorded higher by 63.82 per cent over farmers' practice (T_1). The incremental net return and B:C ratio of Sahbhagi was found to be Rs 8,115 per ha and 0.02 respectively as compared to the farmers' practice. The variety performed in draught situation rain fed condition.

Table 2.10: Performance of improved rice variety Sahbhagi

Details of Technology	No. of trials	Yield (q/ha)	No. of effective tillers/hill	Net return (Rs/ha)	B:C ratio
Medium duration rice varieties under rainfed situation-IR 36/IR 64 (Farmers' practice-T_1)	45	20.96	15.67	14926	2.60
Improved early duration drought tolerant rice variety Sahbhagi (T_2)		30.75	25.67	23041	2.62

Performance of rice variety Sahbhagi

Integrated Nutrient Management in Rice

Problem identified: Low yield of rice due to inadequate use of fertilizers

Technology assessed: Nutrient management in rice

Imbalanced/indiscriminate use of fertilizers and no use of micronutrients i.e. zinc and boron (in boron deficient soils) are the major reasons for declining yield of hybrid rice. Keeping in the above new problem, KVKs of Ganjam-II and Jajpur of the Zone conducted 20 OFTs to assess the response of balanced NPK application and zinc @ 5 kg/ha through zinc sulphate (T_2) and T_2 + boron @ 1 kg/ha (T_3) on soil test basis. The results revealed that the seed yield was 11.3 and 19.17 percent higher in T_2 and T_3 respectively over the farmers' practice. There was an increase in the number of tillers/hill by 40 (T_2) and 50 (T_3) percent over farmers' practice. Similarly the net return and B:C ratio were also found to be higher by Rs. 5,635 and 9,030; and 0.15 and 0.22 units in T_2 and T_3 respectively over farmers' practice Thus application of NPKZnB is effective in increasing the crop yield and maintaining the soil fertility.

Table 2.11: Response of balanced NPK application and micronutrients in rice

Details of Technology	No. of trials	Yield (q/ha)	No. of tillers/ hill	Net return (Rs/ha)	B:C ratio
NPKZnB @ 47:46:0:0:0 kg/ha (Farmers' practice-T_1)	20	49.55	10	26660	1.89
NPK @ 120:80:60 kg/ha and Zn @ 5 kg/ha (Recommended practice-T_2)		55.15	14	32295	2.04
NPK @ 120:80:60 kg/ha + Zn @ 5 kg/ha and boron 1 kg/ha (Recommended practice-T_3)		59.05	15	35690	2.11

Nutrient managed in hybrid rice

Integrated Plant Nutrient Management in Rice

Problem identified: Low yield of rice due to inadequate and imbalanced use of fertilizers

Technology assessed: STCR based nutrient management in rice

Imbalanced/indiscriminate use of fertilizers and no use of zinc is one among the major reasons for declining yield of rice. Looking to the above problem, KVKs of Ganjam-II, Gariaband and Korba of the Zone conducted 16 OFTs to assess the response of STCR based NPK application and zinc @ 5 kg/ha through zinc sulphate (T_2) on soil test basis. The results revealed that there was 22.68 percent higher seed yield in assessed technology over the farmers' practice. The number of tillers/ hill was 32.15 percent more over farmers' practice with the assessed technology. Similarly, the net return and B:C ratio were also found to be higher by Rs. 8,490 and 0.28 units in T_2 over farmers' practice. Thus T_2 is effective as it increases the crop yield and suppliements the major nutrients according to crop requirement and maintains the soil fertility.

Table 2.12: Response of STCR based NPK application in rice

Details of Technology	No. of trials	Yield (q/ha)	No. of tillers/ hill	Net return (Rs/ha)	B:C ratio
NPKZn @ 32:35:0:0 kg/ha (Farmers' practice-T_1)	16	36.64	19.44	23800	1.96
NPK as per STCR and Zn @ 5 kg/ha (Target Yield - 45 q/ha) (Recommended practice-T_2)		44.95	25.69	32290	2.24

STCR based nutrient managed rice

Soil Fertility Management in Rice

Problem identified: Low yield of rice due to low soil organic carbon, poor nutrient management and low water retension capacity of soil.

Technology assessed: Green manuring in transplanted rice

Low soil organic carbon in poor soil physical condition cause soil microbial biomass and humus content and availability of plant nutrients. Looking to the above problem, KVKs of Narayanpur and Shahdol of the Zone conducted 22 OFTs to assess the response of green manuring with sunhemp (T_2) and T_2 + Azatobactor + Azospirillum + PSB @ 2.5 kg/ha (T_3). The results revealed that there was 27.95 (T_2) and 48.15 (T_3) percent higher seed yield over the farmers' practice. The number of tillers/ hill also increased by 36.84 and 68.42(T_3) percent over farmers' practice. Similarly, the net return and B:C ratio were also found to be higher by Rs. 7,858 and 15,131 per ha; and 0.40 & 0.44 units in T_2 and T_3 over farmers' practice. The technology assessed in T_2 and T_3 is effective in increasing the crop yield and SOC SOM, essential nutrients and improves soil fertility.

Table 2.13: Response of green manuring in transplanted rice

Details of Technology	No. of trials	Yield (q/ha)	No. of tillers/ hill	Net return (Rs/ha)	B:C ratio
No green manuring and no use of biofertilizers (Farmers' practice-T_1)	22	29.7	19	19831	1.76
Green manuring with sunhemp (Recommended practice-T_2)		38.0	26	27689	2.16
Green manuring with sunhemp +Azatobactor + Azospirillum + PSB @ 2.5 kg/ha (Recommended practice-T_3)		44.0	32	34962	2.20

Green manured in transplanted rice

Problem identified: Low yield due to heavy weed infestation causes less nutrient availability in direct seeded rice

Technology assessed: Brown manuring in direct seeded rice

Less availability of plant nutrients due to heavy weed infestation at early stage is one of the major reasons for reduced the crop yield in direct seeded rice. Looking to the above problem, KVKs of Malkangiri and Mayurbhanj-I of the Zone conducted 26 OFTs to assess the response of brown manuring of sesbania (T_2). The results revealed that the seed yield was 10.15 per cent higher in T_2 over the farmers' practice. The organic carbon in soil increased by 0.03 percent over farmers' practice. Similarly, the net return and B:C ratio were also found to be higher by Rs. 11,340 per ha and 0.04 units in T_2 over farmers' practice. It is concluded that the technology assessed in T_2 is effective as it increases the crop yield due to increase in SOC and improves soil fertility.

Direct seeded rice with sesbania manuring

Table 2.14: Response of brown manuring in direct seeded rice

Details of Technology	No. of trials	Yield (q/ha)	Organic carbon (%)	Net return (Rs/ha)	B:C ratio
No brown manuring (Farmers' practice-T_1)	26	35.95	0.36	15630	1.87
Sowing of sesbania with rice and spray of 2,4-D (1 lit/ha) for brown manuring at 25 DAS (Recommended practice-T_2)		39.6	0.39	26970	1.91

Weed Management in Rice

Problem identified: Low yield of paddy due to heavy weed infestation

Technology assessed: Bispyribac sodium for weed management in transplanted rice

In general, the yield of cereal crops like rice lowers by 35-40 percent due to infestation of narrow and broad leaved grassy weeds. Farmers are either not using herbicide for weed management timely or applying pre-emergence herbicides; hence the crop yield is adversely affected due to high weed infestation. Looking to the above problem, KVK Bargargh, Harda, Morena and Sheopur of the Zone conducted 36 OFTs to assess the response of bispyribac sodium 10 SC for weed management in rice. The results revealed that the yield under the assessed herbicide (T_3) was 11.43 and 0.06 per cent higher over T_1 (farmers' practice) and T_2 (Use of Imazosulphuron 75 WG @ 230 g a.i./ha at 20-25 DAT) respectively. Use of Bispyribac sodium 10 SC reduced the number of weeds per m^2 by 68.37 i.e 8.7 percent over T_1 and T_2 respectively. Similarly the net return and B:C ratio was also found to be higher by Rs. 10,648 and 0.35 with the assessed herbicide (Bispyribac sodium) over farmers' practice.

Response of bispyribac sodium 10 SC in transplanted rice

Table 2.14: Response of bispyribac sodium for weed management in rice

Details of Technology	No. of trials	Yield (q/ha)	No. of weeds/ m^2	Net return (Rs/ha)	B:C ratio
No weed control/ use of Butachlor @ 1.5 kg/ha (Farmers' practice-T_1)	36	43.91	28.87	27035	2.00
Use of Imazosulphuron 75 WG @ 230 g a.i./ha at 20-25 DAT (T_2)		48.65	10.0	37207	2.27
Use of Bispyribac sodium 10 SC - 25 gram a.i./ ha at 15-20 DAT(T_3)		48.93	9.13	37683	2.35

Integrated Pest Management in Rice

Problem Identified: Low yield of Paddy due to heavy infestation of stem borer

Technology assessed: Integrated management of stem borer in rice

Remarkable reduction in yield has been observed due to heavy infestation of stem borer in rice. KVK Dindori from Madhya Pradesh, Korba, Raigarh from Chhattishgarh, Balasore and Dhenkanal from Odisha conducted OFTs for assessing the Integrated management of stem borer in rice. IPM modules i.e. Clipping of leaf tips of the seedlings at a time of transplanting and spray of Flubendiamide 20WG@ 150 g/ha at ETL (5-10% dead hearts) (T_2) and collection and destruction of egg mass, installation of pheromone trap @20/ha, bird percher @50/ha and spray of Chlorantranilprole 18.5SC@ 150 ml/ha at ETL (T_3) were assessed for managing the pest at 40 locations. The results revealed that the crop yield increased by 20.94 and 4.05 percent over T_1 and T_2, respectively .The number of dead heart decreased by 83.17 and 32.27 percent over T_1 and T_2 respectively. The net return and B:C ratio increased by Rs. 12559 per ha and 0.78 over farmers' practice.

Integrated management of stem borer in rice

Table 2.15: Performance of Integrated management of stem borer in rice

Details of Technology	No. of Trials	Dead heart plants (%)	Yield (q/ ha)	Net return (Rs./ ha)	B:C ratio
Indiscriminate use of insecticide after severe infestation of stem borer(Farmers' practice-T_1)	40	21.85	37.58	26931	2.43
Clipping of leaf tips of the seedlings at a time of transplanting and Spray of Flubendiamide 20WG@ 150 g/ha at ETL (T_2)		5.36	43.68	35052	2.8
Collection & destruction of egg mass , installation of pheromone trap @10/ha , Bird percher @50/ ha and spray of Chlorantranilprole 18.5SC@ 150 ml/ha at ETL (T_3)		3.63	45.45	39790	3.21

Management of Brown Plant Hopper in Rice

Problem Identified: Low yield of rice due to severe infestation of Brown Plant Hopper (BPH) and White Backed Plant Hopper (WBPH)

Technology assesed: Foliar spray of Thiomethoxam25WG @125g/ha at ETL and repeated 10 days after first spray

Remarkable reduction in yield has been recorded due to heavy infestation of Brown Plant Hopper (BPH) and White Backed Brown Plant hopper (WBPH) in rice. KVK Bhadrak, Rayagada, from Odisha; Rajnandgaon from Chhattishgarh and Rewa from Madhya Pradesh conducted OFTs for assessing the performance of Thiomethoxam for management of BPH & WBPH in rice. Two foliar sprays of Thiomethoxam 25WG @125g/ha at 10 days interval on ETL (10 insect/hill at vegetative stage; 20 insect/hill at post flowering stage) -T_3 and Fipronil-5SC @750ml/ha at ET (T_2) were assessed for managing BPH & WBPH in rice at 38 locations. The result of OFTs revealed that the yield of T_3 treatment increased by 25.4 and 5.34 percent over T_1 and T_2 respectively. The number of nymph and adult /hills decreased by 60.05 and 7.40 percent over T_1 and T_3 respectively. The net return and B:C ratio increased by Rs. 10383 per ha and 0.30, respectively over farmers' practice.

Brown Plant Hopper management in rice

Table 2.16: Performance of Thiomethoxam for management of BPH and WBPH in rice

Details of Technology	No. of Trials	No. of insects/ plant	Yield (q/ ha)	Net return (Rs./ ha)	B:C ratio
Indiscriminate use of insecticide at severe infestation of insect (Farmers' practice-T_1)	38	12.03	33.30	9183	1.31
Fipronil-5SC @750ml/ha at ETL (T_2)		5.13	39.64	17451	1.56
Thiomethoxam-25WG @125g/ha at ETL and repeated 10 days after first spray (T_3)		4.75	41.76	19566	1.61

Integrated Management of Leaf folder in Rice

Problem Identified: Low yield of rice due to heavy infestation of leaf folder

Technology assesed: Installation of bird percher, spraying of Indoxacarb @500ml/ha and Bifenthrin @2ml/lit alternatively.

Leaf folder is one of the most important insect pests in rice growing areas of the country. Losses caused by leaf folder may be extent to the 63 to 80 percent depending on agro-ecological situations. KVK Jagatsinghpur and Puri from Odisha conducted OFTs on integrated management of leaf folder in rice at 17 locations. IPM modules i.e. release of bio-agent *Trichogramma chillonis* @ 2.5 lakhs/ha (T_2) at weekly interval 5-6 times and Installation of bird perches@ 50 /ha , spraying of Indoxacarb 14.5SC @500ml/ha and Bifenthrin 10EC @2ml/ lit alternatively at 10 day interval ETL (2-3 fresh leaf folded/ hill) -T_3 were assessed for leaf folder management at 17 locations. The result revealed that the grain yield of T_3 was 19.45 and 16.01 percent higher over the farmers' practice (T_1) andT_2 respectively. The percent infestation of leaf folder was decreased in T_3 by 45.54 and 33.33 percent over T_1 and T_2 respectively. The net return and B:C ratio were also found to be higher by Rs. 11149 and 0.44 with the assessed IPM module under T_3 followed by T_2 which also reduced leaf folder infestation (18.18%) and 3.11 percent higher yield was found over farmers' practice.

Table 2.17: Performance of integrated management of Leaf Folder in rice

Details of Technology	No. of Trials	Infestation percentage %	Yield (q/ ha)	Net return (Rs/ ha)	B:C ratio
Trizophos 40EC @ 2.5ltr/ha (Farmers' practice-T_1)	17	22	50.335	34388.5	2.06
Release of bioagent *Trichogramma chillonis* at weekly interval 5-6 times @ 2.5lakhs/ha (T_2)		18	51.9	35584	2.29
Installation of bird perches @ 50 /ha , spraying of Indoxacarb 14.5SC @500ml/ ha and Bifenthrin 10EC @2ml/litre alternatively at 10 day interval (T_3)		12	60.21	45537	2.5

Leaf folder management in rice

Integrated Disease Management

Blast Management in Rice

Problem Identified: Low yield of rice due to high incidence of blast disease

Technology assessed: Carboxin 37.5% + Thiram 37.5% and Tricyclozole against blast of rice

Rice is the major cereal crop which is widely grown in Madhya Pradesh, Chhattisgarh and Odisha. Among the several diseases responsible for low yield in rice, leaf blast severely damages the rice crop especially in the old varieties. In view of the importance of disease management, KVKs of Katni, Gwalior from Madhya Pradesh, Kawardha from Chhattisgarh and Angul, Bargarh Ganjam-I from Odisha conducted 40 OFTs on blast management in rice. Seed treatment with Carboxin 37.5% + Thiram 37.5% and foliar spray of Tricyclozole @ 0.10 % at early onset of disease (T_3) and spray of Mancozeb 75WP @ 1 g/lit (T_2) were assessed for blast management. Results of OFTs revealed that there was yield increased on 29.05 and 8.36 percent over T_1 and T_2 respectively. The blast incidence decreased in T_3 by 87.45 and 28 percent over T_1 and T_2. The net return and B:C ratio increased by Rs. 13882 per ha and 0.25, respectively over farmers' practice.

Blast management in rice

Table 2.18: Performance of Carboxin 37.5% + Thiram 37.5% and Tricyclozole for blast management in rice

Details of Technology	No. of Trials	Disease incidence (%)	Yield (q/ ha)	Net return (Rs./ ha)	B:C ratio
Old variety and no Blast management practices (Farmers' practice-T_1)	40	28.7	30.01	19085	1.65
Mancozeb 75WP@ 1g/litre (T_2)		5.0	35.74	29390	1.91
Seed treatment with vitavax power (carboxin 37.5% + Thiram 37.5%) @ 2 g/kg of seed & foliar spraying of Tricyclozole @ 500 g/ ha (T_3)		3.6	38.73	32967	1.90

Sheath Blight Management in Rice

Problem Identified: Low yield of rice due to high incidence of sheath blight disease

Technology Assessed: Hexaconozole for sheath blight management in rice

Rice is the major cereal crop which is widely grown across the country. Sheath blight of rice caused by *Rhizoctonia solani* Kuhn is a major biotic constraint of rice in most of the rice growing countries of Asia. The losses due to sheath blight occurrs between 20 to 50 percent when all the sheaths are infected. KVKs of Bhatapara, Dhamtari, Durg, from Chhattisgarh; Katni from Madhya Pradesh and Kalahandi, Nuapada from Odisha conducted 44 OFTs on sheath blight management

in rice. Spray of Hexaconozole @ 1 l/ha at early onset of disease (T_3) and *Pseudomonas spp*. @ 1.5 kg/ha at early onset of disease (T_2) were assessed for sheath blight management. The results of OFTs revealed that the yield increased in T_3 by 29.35 and 18.39 percent over T_1 and T_2, respectively. Sheath blight incidence decreased in T_3 by 63.12 and 47.78 percent over T_1 and T_2, respectively. The net return and B:C ratio increased by Rs. 12995 per ha and 0.52 respectively over farmers' practice.

Sheeth Blight Management in rice by Hexaconozole

Table 2.19: Performance of hexaconozole for sheath blight management in rice

Details of Technology	No. of Trials	Disease incidence (%)	Yield (q/ ha)	Net return (Rs./ ha)	B:C ratio
Indiscriminate use of any fungicide after severe incidence (Farmers' practice-T_1)	44	26.17	33.38	23543	1.98
Spray of Pseudomonas spp.@ 1.5 kg/ha at early onset of disease (T_2)		18.31	39.52	31458	2.3
Spray of Hexaconozole @ 1 l/ha at early onset of disease (T_3)		9.65	43.18	36538	2.5

WHEAT

Varietal Assessment in Wheat

Problem identified: Low yield of wheat due to use of old variety i.e. Lok- 1

Technology assessed: Improved variety of wheat HI 8737 (Pusa Anmol) in irrigated condition

Among the *Rabi* cereals, wheat is an important crop which is grown in more than 31 million ha area in Madhya Pradesh. Use of local/old varieties of seeds is one of the major factors for its low productivity. Keeping this in view, KVK Ashoknagar, Dhar, Shajapur and Ujjain (Madhya Pradesh) of the Zone planned and conducted 31 OFTs to assess the performance of the improved wheat variety HI 8737 (Pusa Anmol)-T_2. The results revealed that the yield of HI 8737 variety was 31.97 per cent higher over the farmers' old variety (T_1). The number of effective tillers per plant was higher in T_2 by 63.33 per cent over T_1. The incremental net return and B:C ratio was found to be Rs 18,795 per ha and 0.51 units with this variety as compared to the farmers variety. The variety gave very good performance in irrigated condition even under high temperature and moisture stress over farmers' practice.

Wheat variety HI 8737 (Pusa Anmol)

Table 2.20: Performance of improved wheat variety HI 8737 (Pusa Anmol)

Details of Technology	No. of trials	Yield (q/ha)	No. of effective tillers/plant	Net return (Rs/ha)	B:C ratio
Wheat old variety i.e. Lok 1 (Farmers' practice-T_1)	31	40.87	7.50	39679	2.62
Improved wheat variety HI 8737 (Pusa Anmol) – T_2		53.94	12.25	58473	3.12

Problem identified: Low yield of wheat due to use of old variety (Lok 1)

Technology assessed: Improved variety of wheat RVW 4106 in irrigated condition

Use of old variety is major factor for low productivity of wheat. Improved variety under irrigated production system increased both, the production and productivity of the crop. Keeping this in view, KVK Bhopal, Dhar, Sheopur and Shivpuri planned and conducted 33 OFTs to assess the performance of the improved wheat variety RVW 4106 (T_2). The results revealed that the yield of RVW 4106 variety was 19.18 per cent higher over the farmers' old variety (T_1). The number of effective tillers per plant was recorded to be higher by 31.63 per cent over farmers' practice. The incremental net return and B:C ratio was found to be Rs 10,955 per ha and 0.24 units with this variety as compared to the farmers variety under irrigated condition.

Wheat variety RVW 4106

Table 2.21: Performance of improved wheat variety RVW 4106

Details of Technology	No. of trials	Yield (q/ha)	No. of effective tillers/plant	Net return (Rs/ha)	B:C ratio
Wheat old variety-Lok 1 (Farmers' practices-T_1)	33	40.14	8.50	42954	3.22
Improved wheat variety RVW 4106 (T_2)		47.84	13.65	53910	3.47

Problem identified: Low yield of wheat due to use of condition variety (Lok 1) in semi-irrigated condition

Technology assessed: Improved variety of wheat JW 3288 in semi-irrigated condition

In most of the agro-climatic zones of Madhya Pradesh, majority of the farmers have facility to provide 2 to 3 irrigations in wheat. Moisture stress during flowering/milking stage, reduces crop yield to greater extent, in such conditions, selection of suitable variety is very important factor. Keeping this in view, KVK Ratlam and Seoni planned and conducted 12 OFTs to assess the performance of the improved variety JW 3288 (T_2) of wheat. The results revealed that the yield of JW 3288 was 43 per cent higher over the farmers' old variety (T_1). The test weight (g/1000 grains) was recorded higher by 12.24 percent over farmers' practice. The incremental net return and B:C ratio was found to be Rs 12,175 per ha and 0.50 units with JW 3288 as compared to the farmers variety. The assessed variety gave very good performance in semi-irrigated situation over farmers' practice of growing Lok-I.

Wheat variety JW 3288 in semi-irrigated condition

Table 2.22: Performance of improved wheat variety JW 3288

Details of Technology	No. of trials	Yield (q/ha)	Test weight (g/1000 grains)	Net return (Rs/ha)	B:C ratio
Wheat old variety-Lok 1 (Farmers' practices-T_1)	12	29.55	39.71	18529	1.71
Improved wheat variety JW 3288 (T_2)		42.25	44.57	30704	2.21

Integrated Nutrient Management in Wheat

Problem identified: Low yield of wheat due to imbalanced/indiscriminate use of fertilizers and no use of zinc

Technology assessed: Use of zinc in wheat

Being nutrient exhaustive crop, irrigated wheat requires higher dose of NPK and micronutrients such as zinc for better production. Imbalanced/ indiscriminate use of plant nutrients are one of the major reasons for declining yield of wheat. Looking the above problem, KVK Dewas, Dhar and Gwalior of the Zone planned and conducted 33 OFTs to assess zinc @ 5 kg Zn/ha on soil test value basis in wheat. The results revealed that the crop yield in T_3 (RDF + 5kg Zn) was 26.32 and 7.32 per cent higher over the farmers' practice (T_1) and RDF (T_2), respectively. The number of effective tillers per plant in T_3 increased by 33.18 and 31.57 per cent over the farmers' practice (T_1) and RDF (T_2) respectively. Similarly, the net return and B:C ratio was also found to be higher by Rs. 13,906 and 0.27 with the assessed technology over farmers' practice. The technology is effective for irrigated situation as it increases the crop yield and maintains the soil fertility for optimum crop production.

Effect of zinc of wheat

Table 2.23: Response of Zinc in irrigated wheat

Details of Technology	No. of trials	Yield (q/ ha)	No. of effective tillers/ plant	Net return (Rs/ha)	B:C ratio
NPKZn @ 64:46:0:0 kg/ha (Farmers' practice-T_1)	33	38.18	7.13	43518	2.83
RDF-NPK @ 100:60:40 kg/ha (T_2)		44.93	9.5	53020	3.06
NPK @ 100:60:40 kg/ha + 5 kg Zn/ha (T_3)		48.22	12.5	57423	3.11

Integrated Nutrient Management in Late Sown Wheat

Problem identified: Low yield of wheat due to imbalanced/indiscriminate use of nutrients

Technology assessed: Integrated nutrient management in late sown wheat.

Imbalanced/indiscriminate use of plant nutrients and selection of unsuitable genotypes are the major factors for declining yield of wheat under late sown condition. Farmers are not using the organic inputs such as biofertilizers and composts and applying less/imbalanced use of fertilizers; hence, the soil health and fertility is declining gradually, significantly affecting the crop yields. Looking to the above problem, KVK Chhatarpur of the Zone planned and conducted 29 OFTs to assess the INM (FYM-3t/ha + NPK @ 60:40:20 kg/ha + 5 kg Zn/ha) on soil test value basis in late sown wheat. The results revealed that the crop yield in T_3 was 36.39 and 3.26 per cent higher over the farmers' practice (T_1) and RDF (T_2) respectively. The number of grains per ear head also increased by 65.71 and 20.83 per cent over the farmers' practice (T_1) and RDF (T_2) respectively. Similarly the net return and B:C ratio was also found to be higher by Rs. 16,298 and 0.87 with the assessed technology over farmers' practice. The technology is effective for irrigated under late sown condition as it increases the crop yield and maintains the soil health and fertility.

Wheat crop under Integrated Nutrient Management

Table 2.24: Response of INM in late sown wheat

Details of Technology	No. of trials	Yield (q/ha)	No. of grains/ ear head	Net return (Rs/ha)	B:C ratio
NPKZn @ 32:35:0:0 kg/ha (Farmers' practice-T_1)	29	25.98	35	20784	2.10
RDF-NPK @ 60:40:20 kg/ha (T_2)		34.32	48	30617	2.49
FYM-3t/ha + NPK @ 60:40:20 kg/ha + 5 kg Zn/ha (T_3)		35.44	58	37082	2.97

Resource Conservation Technology in Irrigated Wheat

Problem identified: Low yield of wheat due to poor water use efficiency and low nutrient uptake

Technology assessed: Pusa Hydrogel in irrigated wheat

Moisture stress affects crop growth and productivity in wheat. Pusa Hydrogel is a natural superabsorbent polymer with fast rate of fluid absorption and ability to retain it under high load (400 times water absorption of its dry weight) and release the same gradually as per the plant specific requirements. Looking to the above problem, KVK Panna, Sagar, Shahdol and Umaria of the Zone conducted 27 OFTs to assess the the response of Pusa Hydrogel (Use of Pusa Hydrogel @2.5 kg/ha + NPK@ 100:60:40 kg/ha with one flood and three sprinkler irrigations - T_2 and Use of Pusa Hydrogel @2.5 kg/ha+ NPK@ 100:60:40 kg/ha with one flood and two sprinkler irrigations - T_3) in wheat. The results revealed that the yield in T_3 was 55.52 and 12.22 per cent higher over the farmers' practice (T_1) and T_2 respectively. The number of tillers/m^2 in T_3 also increased by 49.57 and 4.71 per cent over farmers' practice (T_1) and T_2 respectively. Similarly the net return and BC ratio was also found to be higher by Rs. 20,403 and 0.61 with the assessed technology (T_3). The technology is effective as it serves the purpose of getting the optimum yield with lesser irrigation schedule.

Wheat treated with Pusa Hydrogel

Table 2.25: Response of Pusa Hydrogel in irrigated wheat

Details of Technology	No. of trials	Yield (q/ha)	No. of effective tillers/m^2	Net return (Rs/ha)	B:C ratio
No use of Pusa Hydrogel, five irrigations (One flood and four sprinkler) and use of NPK @ 22:57:0 kg/ha (Farmers' practice – T_1)	27	27.99	209.93	25183	2.36
Use of Pusa Hydrogel @2.5 kg/ha + NPK@ 100:60:40 kg/ha with one flood and three sprinkler irrigations (T_2)		38.78	299.87	39683	2.82
Use of Pusa Hydrogel @2.5 kg/ha+ NPK@ 100:60:40 kg/ha with one flood and two sprinkler irrigations (T_3)		43.52	314	45586	2.97

Resource Conservation Technology in Semi-irrigated Wheat

Problem identified: Low yield of wheat due to poor water use efficiency and moisture stress

Technology assessed: Pusa Hydrogel in semi-irrigated wheat

Moisture stress at critical stages i.e. flowering/ milking in wheat affects its productivity. Pusa Hydrogel is a natural superabsorbent polymer which possesses fast rate of fluid absorption and ability to retain it under high load (400 times water absorption of its dry weight) and release the same gradually as per the plant specific requirements. Looking the above problem, KVK Satna and Sidhi of the Zone conducted 20 OFTs to assess the the response of Pusa Hydrogel @ 2.5 kg/ha and two flood irrigations (T_2) in semi-irrigated wheat. The results revealed that the yield was 63.13 per cent higher over the farmers' practice (T_1). The number of tillers/running meter was also increased by 110.53 per cent over farmers' practice. Similarly the net return and B:C ratio was also found to be higher by Rs. 20,403 and 0.61 with the assessed technology. The technology is effective as it serves the purpose of getting the optimum yield.

Pusa Hydrogel in semi-irrigated wheat

Table 2.26: Response of Pusa Hydrogel in semi-irrigated wheat

Details of Technology	No. of trials	Yield (q/ha)	No. of tillers/ running meter	Net return (Rs/ha)	B:C ratio
No use of Pusa Hydrogel and three flood irrigations (Farmers' practices – T_1)	20	21.7	38	24125	3.0
Use of Pusa Hydrogel @2.5 kg/ha and two flood irrigations (T_2)		35.4	80	43300	3.8

Resource Conservation Technology through Zero Tillage in Wheat

Problem identified: Low yield of wheat due to delayed sowing because of pre sowing moisture stress and tillage operation.

Technology assessed: Zero tillage in wheat.

Rice residue burning is the common practice done by the famers in rice growing areas for easy field preparation. Due to burning of crop residues, soil losses moisture, nutrient, organic matter and microbial biomass. Loss of residual moisture result in delayed sowing due to pre-sowing tillage operations. Keeping in view the above problem, KVK Gwalior and Umaria of the Zone conducted 14 OFTs to assess the the response of Zero till sowing in wheat. The results revealed that the yield in T_2 was 9.72 percent higher over the farmers' practice (T_1). The number of tillers/m^2 also increased in T_2 by 14.75 per cent over farmers' practice. Similarly the net return and B:C ratio was also found to be higher by Rs. 9,797 per ha and 0.95 units with the assessed technology. The technology is effective as it utilizes residual moisture, increases soil organic carbon and essential nutrients for better soil environment to increase the crop productivity.


Zero tillage in wheat

Table 2.27: Response of zero tillage in wheat

Details of Technology	No. of trials	Yield (q/ha)	No. of tillers/m²	Net return (Rs/ha)	B:C ratio
Delayed sowing of wheat after rice crop residues and pre-sowing tillage operations (Farmers' practice – T_1)	14	35.64	213.5	47513	3.2
Direct sowing of wheat in residual moisture using Zero till seed drill (T_2)		39.11	245	57310	4.14

Weed Management in Wheat

Problem identified: Low yield of wheat due to heavy infestation of mono and dicot weeds

Technology assessed: Sulphosulfuron + metsulfuron methyl for weed management in wheat

Mono and dicot (narrow/broad leaf) grassy weeds infestation in crops drastically constraints the wheat growth and significantly reduces the seed yield (35-40%). Proper weed management is not a commonly practices; due to which the crop yield gets adversely affected. Looking to the above problem, KVK Gwalior, Hoshangabad, Jhabua, Mandsaur, Sheopur and Sehore of the Zone conducted 57 OFTs to assess the response of sulphosulfuron75% WP (25 g a.i./ha) + metsulfuron methyl 5% WP (6 g a.i./ha) at 25-30 DAS (T_2) and Clodinafop15% (60 g a.i./ha) + metsulfuron methyl 1% (4 g a.i./ha) at 25-30 DAS (T_3) for weed management in wheat. The results revealed that the yield under T_2 was 21.04 and 0.23 per cent higher over the farmers' practice (T_1) and T_3 respectively. The number of weeds per m² reduced to 51.14 and 0.77 per cent with the assessed technology over T_1 and T_3 respectively. The net return and B:C ratio was also found to be higher by Rs. 13,154 and 0.60 with the assessed herbicides under T_2 followed by T_3 which also restricted significantly the weed population per m² and increased 20.77 per cent yield over farmers' practice.


Weed free wheat crop treated with Sulphosulfuron + metsulfuron methyl

Table 2.28: Response of sulphosulfuron + metsulfuron methyl for weed management in wheat

Details of Technology	No. of trials	Yield (q/ha)	No. of weeds/ m^2	Net return (Rs/ha)	B:C ratio
One manual weeding (Farmers' practice-T_1)	57	36.6	34.14	41933	2.85
Use of sulphosulfuron75% WP(25 g a.i./ha) + metsulfuron methyl 5% WP (6 g a.i./ha) at 25-30 DAS (T_2)		44.3	16.68	55087	3.45
Use of Clodinafop15% (60 g a.i./ha) + metsulfuron methyl 1% (4 g a.i./ha) at 25-30 DAS (T_3)		44.2	16.81	51883	3.4

Maize

Integrated Nutrient Management in Maize

Problem identified: Low yield of maize due to imbalanced/indiscriminate use of fertilizers

Technology assessed: INM in maize

Maize being the most nutrient exhaustive crop requires higher dose of NPK and micronutrients for better production. Imbalanced/indiscriminate use of fertilizers and no use of organic resources are the major factors for declining yield of maize. Looking to the above problem, KVK Dhar, Khargone and Narsinghpur of the Zone planned and conducted 27 OFTs to assess NPK based on STV @ 120:60:40 kg/ha (T_2) and FYM – 6t/ha + seed inoculation with Azatobactor & PSB @ 10g/ha + 75% NPK @ 120:60:40 kg/ha (T_3) in maize. The results revealed that the integrated use of organic and inorganic nutrient enhanced the crop yield in T_3 by 32.84 and 8.7 percent over the T_1 (farmers' practice) and T_2, respectively. The cob length in T_3 also increased by 26.32 and 7.69 percent over the farmers' practice (T_1) and T_2, respectively. Similarly, the net return and B:C ratio was also found to be higher in T_3 by Rs. 13,410 and 0.26 over farmers' practice.

Integrated Nutrient Managed in maize crop

Table 2.29: Response of INM in maize

Details of Technology	No. of trials	Yield (q/ha)	Cob length (cm)	Net return (Rs/ha)	B:C ratio
NPK @ 64:46:0 kg/ha (Farmers' practice-T_1)	27	30.95	13.3	23144	2.65
NPK based on STV @ 120:60:40 kg/ha (T_2)		37.82	15.6	30459	2.74
FYM – 6t/ha + seed inoculation with Azatobactor & PSB @ 10g/ha + 75% NPK @ 120:60:40 kg/ha (T_3)		41.11	16.8	36554	2.91

STCR based Integrated Nutrient Management in Maize

Problem identified: Low yield of maize due to imbalanced/indiscriminate use of fertilizers

Technology assessed: STCR based integrated nutrient management in maize

As mentioned earlier, maize is the most nutrient exhaustive crop among cereals, pulses and oilseeds which requires higher dose of NPK and micronutrients for better production. Imbalanced/ indiscriminate use of fertilizers and no use of organic sources are the major factors for declining yield of maize. Looking to the above problem, KVK Jashpur, Jhabua, Rajnandgaon and Sarguja of the Zone planned and conducted 36 OFTs to assess STCR based fertilizer and manure application for targeted yield of 50 q/ha. Two treatments *viz.* NPK @ 120:60:40 kg/ha (T_2) and 4t/ha FYM + NPK as per STCR equation – Target yield - 50 q/ha (T_3) were assessed for validation of the technology. The results indicated that the integrated use of organic and inorganic nutrients as per STCR equation enhanced the crop yield by 35.28 and 31.23 per cent over the farmers' practice (T_1). The mean number of cobs/plant recorded in T_3 was 57.72 and 41.60 percent higher over farmers' practice (T_1) and T_2 respectively. Similarly the net return and B:C ratio was also found to be higher by Rs. 13,388 and 0.52 with the assessed technology (T_3) over farmers' practice.

STCR based integrated nutrient managed in maize

Table 2.30: Response of STCR based INM in maize

Details of Technology	No. of trials	Yield (q/ ha)	No. of cobs/ plant	Net return (Rs/ha)	B:C ratio
NPK @ 64:46:0 kg/ha (Farmers' practice-T_1)	36	34.04	1.23	25927	2.25
NPK @ 120:60:40 kg/ha (T_2)		35.09	1.37	23408	2.25
FYM (4t/ha) + NPK as per STCR equation (Target yield 50 q/ha) (T_3)		46.05	1.94	39315	2.76

CHICKPEA

Varietal Assessment in Chickpea for Wilt Resistance

Problem identified: Low yield of chickpea due to use of degenerated seeds of old and disease susceptible varieties

Technology assessed: Chickpea wilt resistant variety JG 16

Selection of unappropriate variety is one of the important factors responsible for the low yield of chickpea at farmers' field. Most of the biotic and abiotic stresses are the associated factors with the seed of the variety selected for crop production. Farmers are using degenerated seeds of old varieties which are mainly responsible for the low yield due to various diseases like wilt which is the most common disease of chickpea. Looking to the above problem, KVK Dewas, Indore, Raisen, Shivpuri and Tikamgarh conducted 37 OFTs to assess the performance of the improved disease resistant variety Kripa - Phule G 0517 (T_2) and JG 16 (T_3). The results revealed that the yield of

JG 16 was 45.48 and 7.5 per cent higher over the farmers' variety JG 315 (T_1) and Phule G 0517 (T_2) respectively. The number of pods per plant more by 43.62 and 0.93 percent more over farmers' practice and Phule G 0517 (T_2) respectively. Similarly, the net return and B:C ratio was also found to be higher by Rs 17,430 per ha and 1.23 units with JG 16 variety over farmers' practice. The variety gave very good performance due to tolerance to major pests and diseases over farmers' practice.

Performance of chickpea variety Phule G 0517 and JG 16

Table 2.31: Performance of chickpea variety JG 16

Details of Technology	No. of trials	Yield (q/ha)	Pods/plant	Net return (Rs/ha)	B:C ratio
Use of old variety JG 315 (Farmers' practice-T_1)	37	11.83	27.92	35697	3.41
Use of Kripa - Phule G 0517 (T_2)		16.01	39.63	49422	4.03
Improved variety JG 16 (T_3)		17.21	40.10	53127	4.64

Integrated Nutrient Management in Chickpea

Problem identified: Low yield of chickpea due to imbalanced/indiscriminate use of fertilizers

Technology assessed: STCR based integrated nutrient management in chickpea

Chickpea is an important pulse crop grown across the Zone. Imbalanced/indiscriminate use of plant nutrients and no use of FYM are the major reasons for declining yield of chickpea. Looking to the above problem on priority, KVK Jhabua, Rajnandgaon and Shahdol of the Zone planned and conducted 27 OFTs to assess the response of seed inoculation with Rhizobium @ 5 gram/kg seed, soil application of PSB @ 2.5 kg/ha, 75% NPK @ 20:50:20 kg/ha along with FYM 2.5t/ha (T_3) followed by NPK @ 20:50:20 kg/ha based on STCR (T_2) in chickpea. The results revealed that the crop yield in T_3 was higher by 34.95 and 7.83 per cent over the farmers' practice (T_1) and T_2, respectively. The number of pods per plant was also more in T_3 by 44 and 11 percent over the farmers' practice (T_1) and T_2 respectively. Similarly, the net return and BC ratio was also found to be higherin T_3 by Rs. 13,231 and 0.17 over farmers' practice.

STCR based Integrated Nutrient Management in chickpea

Table 2.32: Response of STCR based INM in chickpea

Details of Technology	No. of trials	Yield (q/ha)	No. of pods/ plant	Net return (Rs/ha)	B:C ratio
Use of NPK @ 9:23:0 kg/ha (Farmers' practice- T_1)	27	11.83	35	35541	2.94
NPK @ 20:50:20 kg/ha based on STCR (T_2)		14.81	45.4	44082	3.02
FYM (2.5t/ha) + PSB – 2.5 kg/ha + 75% NPK @ 20:50:20 kg/ha and seed inoculation with Rhizobium @ 5 gram/kg seed (T_3)		15.97	50.4	48772	3.11

Integrated Weed Management in Chickpea

Problem identified: Low yield of chickpea due to heavy infestation of weeds

Technology assessed: Pre-emergence herbicide Pendimethiline @ 1kg a.i./ha followed by Kulpa/ wheel hoe at 25 DAS

Weed infestation in chickpea at early stage restricts the crop growth and significantly reduces the seed yield. Farmers are not adopting appropriate weed management practices; hence the yield of chickpea is getting adversely affected. Looking to the above problem, KVK Jhabua and Shivpuri of the Zone conducted 15 OFTs to assess the response of pre-emergence herbicide-oxyfluorfen @ 200g a.i./ ha followed by Kulpa/wheel hoe at 25 DAS (T_2) and use of PE herbicide - Pendimethiline @ 1 kg a.i./ ha followed by Kulpa/wheel hoe at 25 DAS (T_3) for weed management in chickpea. The results revealed that the yield of T_3 was higher by 32.5 and 5.14 per cent over the farmers' practice (T_1) and T_2 respectively. The number of weeds per m^2 reduced in T_3 by 50.36 and 19.17 per cent over T_1 and T_2 respectively. The net return and B:C ratio was also found to be higher in T_3 by Rs. 16,366 per ha and 0.69 units.

Weedicide - Pendimethiline followed by Kulpa/wheel hoe in chickpea

Table 2.33: Response of Pre-emergence herbicide-Pendimethiline followed by Kulpa/wheel hoe in chickpea

Details of Technology	No. of trials	Yield (q/ ha)	No. of weeds/ m^2	Net return (Rs/ha)	B:C ratio
Weeding by Kulpa at 30-35 DAS (Farmers Practice – T_1)	15	11.26	27.5	35001	2.82
Use of pre-emergence herbicide-oxyfluorfen @ 200g a.i./ha followed by Kulpa/wheel hoe at 25 DAS (T_2)		14.19	17	47559	3.29
Use of pre-emergence herbicide-Pendimethiline @ 1 kg a.i./ha followed by Kulpa/wheel hoe at 25 DAS (T_3)		14.92	13.65	51367	3.51

Integrated Pest Management in Chickpea

Problem Identified: Low yield of chickpea due to severe infestation pod borer

Technology assessed: IPM module for pod borer management in chickpea

Pod borer is a major pest of chickpea, responsible for heavy reduction (20-35%) in yield. KVK Guna and Morena from Madhya Pradesh conducted 17 OFTs on integrated pod borer management in chickpea. IPM module-I i.e. Deep Summer ploughing, installation of bird perchers@ 50/ha, pheromone traps@ 10/ha and foliar spray of Rynaxypyr 20SC @ 75 ml/ha at ETL (one larvae/m row length) was used for assessing the integrated management module for pod borer in chickpea. Results of the OFTs revealed that the yield of T_2 increased by 37.5 percent while number of larvae/m^2 and infestation decreased by 62.77 and 52.99 percent respectively over farmers' practice. The net return and B:C ratio increased Rs. 15,556 per ha and 0.38 units respectively over farmers' practice. Farmers are satisfied by this technology for pod borer management and they realized that IPM modules in chickpea are better than only use of chemical insecticide.

Integrated Pod borer Management in chickpea

Table 2.34: Performance of IPM module-I for Management of Pod borer in chickpea

Details of Technology	No. of Trials	Plant Infestation (%)	No. of larvae/ plant	Yield (q/ ha)	Net return (Rs/ ha)	B:C ratio
Chloropyriphos-20EC@ 2.5 lit./ha after severe infestation (Farmers' practice T_1)	17	11.7	1.8	14.8	37962	2.6
Deep Summer ploughing, installation of bird perchers @ 50/ha, pheromone traps@ 10/ha and foliar spray of Rynaxypyr 20SC @ 75 ml/ha at ETL i.e. one larvae/ m row length (T_2)		5.5	0.67	20.35	54952	3.24

Similarly, KVK Dewas, Katni, Mandsaur and Sagar from Madhya Pradesh also conducted OFTs on integrated pod borer management in chickpea at 40 locations. IPM module-II i.e. deep summer ploughing, installation of bird perchers @ 50/ ha and spray of Prophenophos 50 EC @ 1.0 l/ ha at 50% flowering. Results of revealed that the yield in T_2 increased by 22.95 percent while the number of larvae/m^2 decreased by 73.64 percent over farmers practice. The net return and BC ratio were increased by Rs. 15,556 per ha and 0.38 units respectively over famer's practice. Farmers were satisfied by the assessed technology for pod borer management and they realized that IPM modules in chickpea are better than use of chemical insecticide alone.

Table 2.35: Response of IPM module-II for Management of Pod borer in chickpea

Details of Technology	No. of Trials	No. of larvae/m²	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Indiscriminate use of insecticide at severe infestation (Farmers' practice T_1)	40	2.58	9.15	24857	2.74
Deep Summer ploughing, installation of bird perchers@ 50/ha and Profenophos 50EC @ 1.0 l/ha at 50% flowering (T_2)		0.68	11.25	40413	3.12

Integrated Disease Management in Chickpea

Problem Identified: Low yield of chickpea due to severe incidence of wilt disease

Technology assessed: Integrated wilt management in chickpea

Remarkable reduction in yield has been observed due to heavy fusarium wilt complex incidence in chickpea. KVK Burhanpur and Harda from Madhya Pradesh and Dhamtari from Chhattisgarh conducted 24 OFTs on wilt management in chickpea. IDM modules i.e. seed treatment with Carboxin 37.5% + Thiram 37.5% (3g/kg) + soil treatment with *Trichoderma viride* @ 5 kg/ha multiplied in 100 kg FYM (T_2) and seed treatment with Metalaxyl (2g/kg of seed) and soil application of *Trichoderma viride* @ 5 kg/ha multiplied in 100 kg vermicompost (T_3) were assessed for wilt management. The results revealed that the yield in T_3 treatment increased by 52.69 and 34.52 per cent over T_1 and T_2 respectively. Wilt incidence decreased by 80.96 and 70.25 percent over T_1 and T_2 respectively. The net return and B:C ratio were increased by Rs. 39,358 per ha and 1.62 units respectively over farmers' practice. Farmers were satisfied with both the technologies assessed for wilt management in chickpea and they realized that IDM module is only option for wilt management.

Integrated wilt management in chickpea

Table 2.36: Performance of Integrated wilt management module in chickpea

Details of Technology	No. of Trials	Disease incidence (%)	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
No use of fungicides for the control disease (Farmers' practice-T_1)	24	17.86	15.03	51316.67	2.86
Seed treatment with Carboxin 37.5% + Thiram 37.5% (3g/kg) + soil treatment with *Trichoderma viride* @ 5 kg/ha multiplied in 100 kg FYM (T_2)		11.43	17.06	59450	3.09
Seed treatment with metalaxyl 2g/kg of seed and soil application of *Trichoderma viride* @ 5 kg/ha multiplied in 100kg vermicompost (T_3)		3.4	22.95	90675	4.48

Integrated Collar Rot Management in Chickpea

Problem Identified: Low yield of Chickpea due to high incidence of collar rot

Technology assessed: Integrated collar rot management module in Chickpea

Collar rot of chickpea is one of the devastating soil borne diseases of fungal origin, due to which 10-30 percent yield loss is recorded annually according to severity of the disease. KVKs of Chhattisgarh of viz. Bastar, Kawardha and Rajnandgaon conducted 15 OFTs on Integrated management of collar rot in chickpea i.e. Summer deep ploughing, sowing with broad bed raised furrow method and soil treatment with *T. viride* @ 5 kg /ha multiplied in 100 kg FYM; The results revealed that the yield of recommended practice (T_2) was more by 16.78 percent with 53.59 percent decrease in collar rot incidence over farmers practice. The net return and B:C ratio increased by Rs 9,791 per ha and 0.37 units respectively over farmers practice. Farmers were satisfied with summer deep ploughing, sowing with broad bed furrow method and soil treatment with *T. viride* @ 5 kg /ha multiplied in 100 kg FYM.

Integrated collar rot management in chickpea

Table 2.37: Performance of Integrated collar rot management module in chickpea

Details of Technology	No. of Trials	Disease incidence (%)	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Seed treatment with thiram @ 2g/ kg seed (Farmers' practice - T_1)	15	15.71	10.96	42987	2.72
Summer deep ploughing, Sowing on broad bed raised furrow method and Soil treatment with *Trichoderma viride* @ 5 kg/ha multiplied in 100 kg FYM (Recommended practice-T_2)		7.29	12.8	52778	3.09

BLACKGRAM

Varietal Assessment in Blackgram

Problem identified: Low yield of blackgram due to use of old variety sown traditionally on flat bed

Technology assessed: Blackgram variety IPU 94-1 by ridge-furrow method of sowing

Use of old variety degenerated seeds prone to various pests and diseases, germination and growth affected especially in flat bed sown fields of blackgram due to water logging by excess rain water are some of the factors for low yield of blackgram. To prevent the crop from various pest and diseases, improved multi-resistant blackgram variety should be used. In Ridge-Furrow the furrow after ridges made for rainwater management and the depth is kept 5-8 cm which works to conserve rain water within the field and to safe discharge of excess water. It enhances the moisture regime in the root zone in adverse conditions of rainfall. Keeping in view the above, KVK, Chhatarpur, Sagar and Tikamgarh assessed blackgram cv. PU 35 by ridge-furrow method of sowing (T_2) and cv. IPU 94-1 by

ridge-furrow method of sowing (T_3). Results of these trials conducted at 44 locations revealed that in IPU 94-1 variety the yield increased by 118.45 and 67.37 per cent over farmers' practice (T_1) and cv. PU 35 (T_2) respectively. Similarly, the increase in number of pods per plant also increased by 164.72 and 84.28 per cent over farmers' practice (T_1) and cv. PU 35 (T_2) respectively. The net return and B:C ratio were Rs. 27,249 per ha and 1.01 units higher with the assessed technology (cv. IPU 94-1) over farmers' practice. The blackgram variety PU 35 also performed well over the farmers' practice.

Blackgram crop improved variety IPU 94-1

Table 2.38: Performance of raised bed planting in blackgram

Details of Technology	No. of trials	Yield (q/ha)	No. of pods/ plant	Net return (Rs/ha)	B:C ratio
Sowing of old variety degenerated seeds of T9 at flat bed (Farmers Practice -T_1)	44	4.39	19.7	14164	2.64
Sowing of blackgram cv. PU 35 by ridge-furrow method (T_2)		5.73	28.3	20584	3.09
Sowing of blackgram cv. IPU 94-1 by ridge-furrow method (T_3)		9.59	52.15	41413	3.65

All component are the source on crop variety. Teh net return is almost double (41413) in T_3, there now can be B:C rates just 3.09 × 3.65

Integrated Nutrient Management in Blackgram

Problem identified: Low yield of blackgram due to imbalance use of fertilizers

Technology assessed: INM in Blackgram

Integrated Nutrient Management is perhaps the most important component which plays a key role in pest and disease free crop production as most of the disease occureance is caused by deficiency of essential nutrients. Blackgram is an important pulse crop grown among all the States of the Zone under rain fed situation. Imbalanced/ indiscriminate use of fertilizers and no use of biofertilizers and manures are the major reasons for declining yield of this crop. Due to no use of biofertilizers and manure, the soil health is adversersly affected and nutrient availability to the crop gets seriously restricted which affects the crop yield to the greater extent. Looking to the above problem, KVK Angul, Gariyaband and Shahdol of the Zone planned and conducted 26 OFTs to assess the response of NPK @ 20:50:20 kg/ha based on STCR (T_2) and INM (FYM-2.5t/ha, PSB @ 2.5 kg/ha, seed inoculation by Rhizobium @ 5 g/kg seed, seed coating by sodium molybdate @ 3g/kg seed and 75% NPK @ 20:50:20 kg/ha on soil

Integrated Nutrient Management in blackgram

test basis (T_3) in blackgram. The results showed that the seed yield in T_3 was higher by 77.64 and 25.82 per cent higher over the farmers' practice (T_1) and T_2 respectively. The number of pods/ plant with the assessed technology also increased by 51.55 and 20.36 percent over farmers' practice and T_2 respectively. Similarly the net return and B:C ratio was also higher in T_3 by Rs. 17,853 and 0.83 units over farmers' practice with the assessed technology (T_3). On the basis of the above findings it was concluded that the technology is effective as it increases the crop yield and maintains the soil health and fertility.

Table 2.39: Response of INM in blackgram

Details of Technology	No. of trials	Yield (q/ha)	No. of pods/ plant	Net return (Rs/ha)	B:C ratio
Use of NPK @ 7:17.5:0 kg/ha (Farmers' practice- T_1)	26	4.99	17.75	10143	1.69
NPK @ 20:50:20 kg/ha based on STCR (T_2)		7.05	22.35	17738	2.14
FYM-2.5t/ha + PSB – 2.5 kg/ha + 75% NPK @ 20:50:20 kg/ha and seed inoculation with Rhizobium @ 5 gram/kg seed and seed coating by sodium molybdate @ 3g/kg seed (T_3)		8.87	26.9	27996	2.52

Integrated Weed Management in Blackgram

Problem identified: Low yield of blackgram due to heavy weed infestation

Technology assessed: Post-emergence herbicide Imazethapyr @ 75 g a.i./ha at 18 DAS

Infestation of weeds in crops restricts crop growth due to higher and faster uptake of available soil nutrients hence the crop yield reduces significantly. Farmers are not applying herbicide, therefore they are getting low yield of blackgram due to weed infestation at early stage. Looking to the above problem, KVK Guna, Korba, Mandsaur and Raigarh of the Zone conducted 15 OFTs to assess the response of post-emergence herbicide-Imazethapyr @ 75g a.i./ha at 18 DAS (T_2) for weed management in blackgram. The results revealed that the yield under T_2 was 24.65 per cent higher over the farmers' practice (T_1). The number of weeds per m^2 reduced to 46.1 per cent with the assessed technology over farmers' practice. The net return and B:C ratio was also found to be higher by Rs. 9,328 per ha and 0.57 units with the assessed technology as it restricted significantly the weed population for better crop growth.

Application of post-emergence herbicide Imazethapyr in blackgram

Table 2.40: Response of Post-emergence herbicide - Imazethapyr in blackgram

Details of Technology	No. of trials	Yield (q/ ha)	No. of weeds/ m^2	Net return (Rs/ha)	B:C ratio
No weeding and no application of herbicide (Farmers' Practice – T_1)	28	7.13	14.62	27617	2.74
Use of post-emergence herbicide-Imazethapyr @ 75 g a.i./ha at 18 DAS (T_2)		8.89	7.88	36945	3.31

PIGEON PEA

Varietal Assessment in Pigeon Pea

Problem identified: Mono cropping of pigeon pea due to use of long duration varieties

Technology assessed: Pigeon pea variety Pusa 992

Only one crop in a year is usually cultivated when long duration variety of pigeon pea is selected in *kharif* season. Due to mono cropping, net return of the farmers reduced as pigeon pea gives less average production per unit area in comparison to its duration. Use of long duration variety, mixed and degenerated seed also reduces the yield due to occurance of various pests and diseases. Pusa 992 is a medium duration pigeon pea variety, matures in 119-162 days and recommended for early sowing in pigeon pea-wheat cropping system. In view of the above, KVK, Bhind and Shajapur assessed pigeon pea cv. Pusa 992. Results of these trials conducted at 17 locations revealed that there was an increase the yield in Pusa 992 by 13.6 percent over farmers' practice. The crop was harvested in 135-140 days, well before sowing of wheat. The net return and B:C ratio were Rs. 6,400 per ha and 0.12 units higher with the assessed variety over farmers' practice.

Pigeon pea variety Pusa 992

Table 2.41: Performance of Pigeon pea variety Pusa 992

Details of Technology	No. of trials	Yield (q/ ha)	Net return (Rs/ha)	B:C ratio
Use of unidentified old long duration variety/JA 4 (Farmers Practice -T_1)	17	12.46	42250	3.16
Use of improved medium duration variety Pusa 992 (T_2)		14.16	48650	3.28

Resource Conservation Technology In Pigeon Pea

Problem identified: Low yield of pigeon pea by traditional sowing method on flat bed

Technology assessed: System of pigeon pea intensification (SPI)

Among the pulses pigeon pea is an important *kharif* pulse crop used for *daal* but its production is quite low due to traditional sowing method on flat beds. The crop sown by broadcasting on flat beds suffers from water logging due to excess rain water and results in low yields. For optimum crop growth, efficient water and nutrient management and a considerable yield, system of pigeon pea intensification (SPI) may be adopted. In this system, 30 days old nursery is transplanted on the raised beds and nipping is done after 20 DAT. Besides the better production, SPI also facilitates to cultivate another crop as intercropping in between the rows which gives additional income apart from main crop. Keeping in view the above, KVK, Balaghat, Betul, Rewa, Sagar, Satna, Seoni, Shahdol, Sidhi and Umaria assessed system of pigeon pea intensification. Seed treatment by Rhizobium and PSB @ 10 g/kg seed, transplanting of 30 days old plants of pigeon pea variety TJT 501 at 90 cm plant to plant spacing, 150 cm row to row spacing, nipping at 30 DAT, application of FYM (3 t/ha), NPKS@ 20:50:20:20 kg/ha (T_3) compared to the sowing of

seed of old/unidentified varieties by broadcasting/ in furrows on flat bed and use of NPK @ 7:17.5:0 kg/ha (Farmers Practice-T_1) and Transplanting of 30 days old nursery of pigeon pea variety TJT 501 at 90 cm plant to plant spacing, 150 cm row to row spacing, nipping at 30 DAT, application of NPKS@ 20:50:20:20 kg/ha (T_2). Results of these trials conducted at 67 locations showed that this system of transplanting in TJT 501 enhanced the yield by 172.96 and 28.23 per cent over farmers' practice (T_1) and T_2 respectively. Similarly, the increase in number of pods per plant increased by 182.32 and 6.82 per cent over farmers' practice and T_2 respectively. The net return and B:C ratio were Rs. 73,031 per ha and 1.01 units higher with the assessed technology.

System of pigeon pea intensification (SPI) with INM

Table 2.42: Performance of system of pigeon pea intensification (SPI)

Details of Technology	No. of trials	Yield (q/ha)	No. of pods/ plant	Net return (Rs/ha)	B:C ratio
Use of old/unidentified varieties, sowing by broadcasting/ in furrows at flat bed and use of NPK @ 7:17.5:0 kg/ha (Farmers practice-T_1)	67	9.55	102.58	31265	2.51
Transplanting of 30 days old nursery of pigeon pea variety TJT 501 at 90 cm plant to plant spacing & 150 cm row to row spacing, nipping at 30 DAT + Application of NPKS@ 20:50:20:20 kg/ha (T_2)		20.33	271.11	75920	3.44
Seed treatment by Rhizobium and PSB @ 10 g/kg seed, transplanting of 30 days old nursery of pigeon pea variety TJT 501 at 90 cm plant to plant spacing & 150 cm row to row spacing, nipping at 30 DAT + Application of FYM (3 t/ha) + NPKS@ 20:50:20:20 kg/ha (T_3)		26.07	289.6	104297	3.52

Integrated Pest Management in Pigeon Pea

Problem Identified: Low yield of Pigeon pea due to severe infestation of pod borer complex

Technology assessed: IPM module for management of Pod borer complex in pigeon pea

Pigeon pea is most important *kharif* pulse widely grown in Central India which is consumed as *daal*. Among the several factors responsible for lowering the yield of pigeon pea, pod borer complex is an important one. Remarkable reduction in yield has been observed due pod borer complex in pigeon pea. Looking to the importance of crop and pest KVK Bhind, and Dindori from Madhya Pradesh and Baudh from Odisha conducted 22 OFTs on integrated management of pod borer in pigeon pea at 22 locations. IPM module i.e. installation of bird perches @ 50 /ha, pheromone trap @ 10/ ha and Profenophos 50EC @ 1.5 l/ha at ETL (one larvae/plant at flowering stage or 5-10 percent

Management of pod borer in pigeon pea

pod damage) was assessed for management of pod borer complex. Results revealed that the yield of pigeon pea in T_2 increased by 15.76 percent along with reduction in pod damage of 58.54 percent over farmers' practice. The net return and BC ratio increased by Rs. 8,267 per ha and 0.41 units, respectively over farmers' practice.

Table 2.43: Performance of IPM module for Management of Pod borer in pigeon pea

Details of Technology	No. of Trials	Pod damage (%)	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Indiscriminate use of insecticide after severe infestation of pod borer complex (Farmers' practice - T_1)	22	22.34	10.98	25496	2.53
installation of bird perches @ 50 /ha, pheromone trap @ 10/ ha and Profenophos 50EC @ 1.5 l/ha at ETL (T_2)		9.26	12.71	33763	2.94

MUSTARD

Varietal Assessment in Mustard

Problem identified: Low yield of mustard due to use of degenerated seeds of old varieties

Technology assessed: Mustard variety RH 749

Adoption of improved variety plays a major role in better crop production. Use of old variety degenerated seeds is one of the important factors responsible for the low yield of mustard at farmers' field. Most of the biotic and abiotic stresses are associated factors with the seed of the variety selected for crop production. Looking to the above problem, KVK Morena and Shivpuri conducted 20 OFTs to assess the performance of the improved variety RVM 2 (T_2) and RH 749 (T_3). The results revealed that the yield of RH 749 was higher by 23.9 and 5.82 percent over the farmers' local variety mixed seed (T_1) and RVM 2 (T_2) respectively. The number of siliqua per plant in T_3 was more by 30 and 5.41 per cent over farmers' practice and (T_2) respectively. Similarly the net return and B:C ratio was also found to be higher by Rs 12,387 per ha and 0.49 units with RH 749 variety over farmers' practice.

Mustard variety RH 749

Table 2.44: Performance of mustard variety RH 749

Details	No. of trials	Yield (q/ha)	Siliqua/plant	Net return (Rs/ha)	B:C ratio
Use of old variety (Farmers' practices-T_1)	20	19.06	15	41754	2.93
Use of improved variety RVM 2 (T_2)		22.32	18.5	49071	3.19
Use of improved variety RH 749 (T_3)		23.62	19.5	54141	3.41

Integrated Nutrient Management in Mustard

Problem identified: Low yield of mustard due to imbalance use of fertilizers

Technology assessed: Use of Sulphur in mustard

Mustard is an important oilseed crop grown in all the states of the Zone. Imbalanced/ indiscriminate use of fertilizers and no use of sulphur are the major reasons for declining yield of this crop. Most of the soils are deficient in sulphur due to no use of sulphur containing fertilizers and the yield of the oilseed crops is adversersly affected in such soils as sulphur plays an important role in formation of fatty acids and its deficiency reduces the oil content in seeds which in turn decreases the seed yield. Looking to the above problem on priority, KVK Gwalior, Jhabua, Ratlam and Rewa of the Zone planned and conducted 34 OFTs to assess the response of NPK @ 80:40:20 kg/ha based on STCR+ S @ 40 kg/ha (T_3) in mustard. The results revealed that the seed yield in T_3 was more by 46 and 9.6 per cent over the farmers' practice (T_1) and T_2 respectively. The number of siliqua/plant in T_3 was more by 50.16 and 14.8 per cent over farmers' practice and T_2 respectively. Similarly, the net return and B:C ratio was also found to be higher by Rs. 13,267 and 0.91 units over farmers' practice with the assessed technology (T_3).

Effect of sulphur in mustard at farmers' field

Table 2.44: Response of sulphur in mustard

Details	No. of trials	Yield (q/ha)	No. of siliqua/ plant	Net return (Rs/ha)	B:C ratio
Use of NPKS @ 32:23:0:0 kg/ha (Farmers' practice- T_1)	34	9.39	31.5	15677	2.05
NPK @ 80:40:20 kg/ha based on STCR (T_2)		12.51	41.2	25822	2.80
NPK @ 80:40:20 kg/ha based on STCR + S @ 40 kg/ha (T_3)		13.71	47.3	28944	2.96

Integrated Crop Management in Mustard

Problem identified: Low yield of mustard due to traditional sowing methods

Technology assessed: System of Mustard Intensification (SMI)

Mustard is an important *Rabi* oilseed crop. Its oil is commonly used as edible oil but its production is quite low due to traditional broadcasting method of sowing or in furrows at flat beds. System of mustard intensification (SMI) is the improved sowing technique which enhances the seed yield. In this system, 12-15 days old nursery are transplanted on the raised beds. Keeping in view the above, KVK, Betul, Chhindwara, Hoshangabad and Sagar assessed system of mustard intensification i.e. Transplanting of 12-15 days old nursery of mustard cv. DRMRIJ 31 at 45 cm plant to plant spacing and 60 cm row to row spacing (T_2) and transplanting of 12-15 days old nursery of mustard cv. RH 749 at 45 cm plant to plant spacing & 60 cm row to row spacing (T_3). Results of these trials conducted at 34 locations revealed that this system of transplanting in RH 749 (T_3) enhanced the yield by 100.18 and 4.13 per cent over farmers' practice (T_1) and T_2, respectively. Similarly, the increase in number of siliqua per plant in T_3 increased by 111.05 and 1.95 per cent over farmers' practice and T_2, respectively. The net return and BC ratio were Rs. 24,067 per ha and 0.53 units higher with the assessed variety in SMI.

Performance of system of mustard intensification (SMI) at farmers' field

Table 2.45: Performance of system of mustard intensification (SMI)

Details	No. of trials	Yield (q/ha)	No. of siliqua/ plant	Net return (Rs/ha)	B:C ratio
Use of old/unidentified varieties, sowing by broadcasting/in furrows at flat bed (Farmers practice-T_1)	39	7.93	114.73	19724	1.96
Transplanting of 12-15 days old nursery of mustard cv. DRMRIJ 31 at 45 cm plant to plant spacing and 60 cm row to row spacing (T_2)		15.24	237.53	40458	2.32
Transplanting of 12-15 days old nursery of mustard cv. RH 749 at 45 cm plant to plant spacing and 60 cm row to row spacing (T_3)		15.87	242.15	43791	2.49

VEGETABLES AND SPICES

Varietal Assessment in Potato

Problem identified: Low yield of potato due to used old/unidentified variety mixed propagation material (seed)

Technology assessed: Potato variety Kufri Surya

Potato is an important tuber crop grown and consumed across the country. Several factors are responsible for lowering the yields of potato, use of old/indetified varieties are important one which significantly affect the tuber yield. KVK Bhadrak and Jajpur from Odisha of the Zone planned and conducted 18 OFTs to assess the performance of the improved variety Kufri Surya. The yield of Kufri Surya recorded 29.85 percent higher over the farmers' variety. The increase in number of tubers/ plant was recorded as 25.71 per cent over farmers' practice. Similarly, the net return and B:C ratio was also found to be higher by Rs. 36,500 and 0.50 with the assessed variety. The variety performed very well in the area over the farmers' traditional variety.

Table 2.46: Performance of potato variety Kufri Surya

Details	No. of trials	Yield (q/ ha)	No. of tubers/ plant	Net return (Rs/ha)	B:C ratio
Farmers' local / old variety mixed seed (Farmers' practice - T_1)	18	198.85	3.5	99090	2.56
Use of improved potato variety Kufri Surya (T_2)		258.2	4.4	135590	3.06

Potato variety Kufri Surya at farmer's field

Problem identified: Low yield of *kharif* potato due to use of degenerated seed of Kufri Jyoti

Technology assessed: Early potato variety Kufri Pukhraj

Seed plays an important role in the vegetable production among the several biotic and abiotic factors responsible for lowering the yields. Use of improved seeds is important factor that significantly enhances the tuber yield. KVK Korba, Koraput and Surguja of the Zone planned and conducted 16 OFTS to assess the performance of the improved variety Kufri Pukhraj. Results of the assessed variety revealed that the yield of Kufri Pukhraj was 11.49 percent higher over the farmers' variety. The increase in weight of tubers/ plant was recorded as 5.02 per cent over farmers' practice. Similarly, the net return and B:C ratio was also found to be higher by Rs. 88,986 and 0.53 with the assessed variety. The variety performed very well in the area over the farmers' variety.

Potato variety Kufri Surya at farmer's field

Table 2.47: Performance of potato variety Kufri Pukhraj

Details	No. of trials	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Use of degenerated seed of Kufri Jyoti (Farmers' practice - T_1)	16	178.17	109572	2.79
Use of improved early variety Kufri Pukhraj (T_2)		198.65	198558	3.32

Varietal Assessment in Tomato

Problem identified: Low yield of tomato due to use of old/traditional varieties

Technology assessed: Tomato variety Arka Rakshak

Tomato crop is affected by various factors. Incidence of various diseases i.e. bacterial wilt, early blight and Tomato Leaf Curl Virus (TLCV) disease cause significant reduction in fruit yield. Use of local/old varieties which are prone to such diseases, reduces the fruit yield to a greater extent. Keeping in view the above, KVK Bhatapara, Jagatsinghpur, Mahasamund and Seoni of the Zone planned and conducted 25 OFTs to assess the performance of the improved variety Arka Rakshak of tomato. Results of these on farm trials showed that the yield of Arka Rakshak was 39.68 per cent higher over the farmers' variety. The increase in fruit weight was observed to be 20 percent high over farmers' practice. Similarly the net return and B:C ratio was also found to be higher by Rs. 73,122 per ha and 0.76 units with this variety. The variety performed very well in the area as the farmers preferred triple disease (TLCV, bacterial wilt and early blight) resistance tomato hybrid Arka Rakshak. Due to the excellent firmness and longer shelf life (15-20 days), fruits were found ideal for long distance transport and preferred in the market.

Tomato variety Arka Rakshak at farmers' field

Table 2.48: Performance of tomato variety Arka Rakshak

Details	No. of trials	Yield (q/ha)	Fruit weight (g)	Net return (Rs/ha)	B:C ratio
Farmers' local / old variety (Farmers' practice - T_1)	25	414.81	75	115991	2.41
Use of improved tomato variety Arka Rakshak (Recommended practice - T_2)		579.41	90	189114	3.17

Integrated Pest Management in Tomato

Problem Identified: Low yield of tomato due to high infestation of fruit borer

Technology assessed: Integrated management of fruit borer in tomato

Fruit and shoot borer in tomato is a major pest responsible for destroying the fruits and reduction in yield. KVK Dindori from Madhya Pradesh and Kalahandi from Odisha conducted 12 OFTs to manage the pest effectively. Installation of pheromone traps @ 10/ha, prophylactic spray of Neem oil @ 1%, followed by Profenophos 50 EC @ 1.5 l/ha at ETL (one larvae/metre row length or 2% fruit damaged) was used for managing the pest. The result of the OFTs revealed that the

Fruit borer management in tomato

yield increased by 36.51 percent and fruit damage was decreased by 52.94 percent. The net return and B:C ratio increased by Rs. 47,725 per ha and 0.70, respectively. Farmers were satisfied with this technology for fruit borer management and they realized that IPM modules in tomato are better than only use of chemical insecticide.

Table 2.49: Performance of IPM for Fruit borer management in tomato

Details	No.of trials	Fruit damage (%)	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Indiscriminate use of insecticide (Farmers' practice – T_1)	12	17	146.5	106100	3.95
Installation of Pheromone traps@ 10 /ha, Prophylactic spray of Neem oil @ 1%, followed by Profenophos 50EC @ 1.5 l/ha at ETL (Recommended practice - T_2)		8	200	153825	4.65

Varietal Assessment in Cowpea

Problem identified: Low yield of cowpea due to use of old/traditional varieties

Technology assessed: Cowpea variety Kashi Kanchan

Cowpea is an important vegetable commonly used across the Zone, but yield of this crop is quite less due to use of local/traditional varieties. Farmers are using local varieties which are having less production potential, hence they are getting low yield. Keeping in view the above, KVK Janjgir Champa and Sundargarh of the Zone planned and conducted 19 OFTs to assess the performance of the improved variety Kashi Kanchan of cowpea. Results of these on farm trials revealed that the yield of this variety was 19.67 per cent higher over the farmers' variety. The increase in number of fruits/plant was observed to be 14.58 percent higher over farmers' practice. Similarly, the net return and B:C ratio was also found to be higher by Rs. 21,071 per ha and 0.34 units with this variety. The variety performed very well in the area and the farmers preferred this variety.

Kashi Kanchan variety of cowpea

Table 2.50: Performance of cowpea variety Kashi Kanchan

Details	No. of trials	Yield (q/ha)	No. of fruits/ plant	Net return (Rs/ha)	B:C ratio
Use of traditional variety Gayatri (Farmers' practice - T_1)	19	84.65	864	78244	2.48
Use of improved cowpea variety Kashi Kanchan (Recommended practice - T_2)		101.30	990	99315	2.82

Integrated Pest Management in Brinjal

Problem Identified: Low yield of brinjal due to severe infestation (25-50%) of shoot and fruit borer

Technology assessed: IPM modules for management of shoot and fruit borer in brinjal

Remarkable reduction in yield (up to 40 percent) has been observed due to heavy infestation of shoot and fruit borer in brinjal. KVK Bastar, Narayanpur and Korba from Chhattisgarh; Sidhi from Madhya Pradesh and Dhenkanal from Odisha conducted OFTs at 27 locations on integrated management of shoot and fruit borer in brinjal. IPM module i.e. removal and destruction of infected plant part/fruits + spray of Neem oil @ 1% + need based Application of Indoxacarb -14.5 SC @ 500ml/ha, first spray at 30 DAT and second spray 15 days after Ist spray (T_2) and removal of infected plant part/fruits + foliar spray of NSKE @ 5% + foliar spray of Bt @ 1 kg/ha at 30 DAT + spray of Chlorantraniliprole – 20 SC @ 20 g a.i./ha (0.2 ml/lit of water) at ETL i.e. 1-5% fruit damage (T_3) were assessed for management of shoot and fruit borer. The results of the OFTs clearly showed that the yield of T_3 increased by 25.16 and 8.58 percent over T_1 and T_2 respectively. Fruit damage decreased by 77.61 and 31.72 percent over T_1 and $T_{2,}$ respectively. The net return and BC ratio increased by Rs. 23,390 per ha and 0.9 respectively over farmers practice. Farmers were satisfied with both the technologies assessed for shoot and fruit borer management in brinjal and they realized that IPM module is the only option for insect management.

Brinjal fruits damaged by fruit borer and its management

Table 2.51: Performance of Integrated Management of Shoot and Fruit Borer in brinjal

Details	No. of Trials	% Fruit damage	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Indiscriminate use of insecticides after severe infestation (Farmers' practice - T_1)	27	30.38	204.17	75445	2.41
Removal & destruction of infected plant part / fruits + Spray of Neem oil @ 1% + Need based Application of Indoxacarb -14.5 SC @ 500 ml/ha, first spray at 30 DAT and Second spray 15 days after Ist spray (T_2)		9.96	235.34	94770	2.96
Removal of infected plant part / fruits + Foliar Spray of NSKE @ 5% + Foliar spray of Bt @ 1.0 kg/ha at 30 DAT + spray of Chlorantraniliprole – 20 SC @ 20g a.i./ha (0.2ml/ l of water) at ETL (T_3)		6.8	255.55	98835	3.31

Integrated Pest Management in Cabbage

Problem Identified: Low yield of cabbage due to heavy infestation of diamond back moth

Technology assessed: Integrated diamond back moth management module in cabbage

Diamond back moth in cabbage is a major pest responsible for destroying the heads and reduction in yield. KVK Korba and Rajnandangaon from Chhattisgarh conducted 12 OFTs to manage the pest effectively. One spray of *Bt* @ 1 kg/ha in nursery + transplanting at 60x30 cm spacing, balance dose of fertilizers and two spray of *Bacillus thuringiensis* (Bt) @ 1 kg/ha after 15 days of first spray was assessed. The result revealed that the cabbage yield increased by 8.83 percent and number of larvae per plant reduced by 48.39 percent over farmer practice. The net return and B:C ratio increased by Rs. 15,494 per ha and 0.59 respectively over farmers' practice due to use of this technology. Farmers were satisfied with this management technology for diamond back moth in cabbage. The farmers were educated through training, field day and field visit during the crop growth and at the time of harvesting.

Integrated Pest Management of diamond back moth in cabbage

Table 2.52: Performance of Integrated management module for diamond back moth in cabbage

Details	No. of Trials	No. of larvae/ plant	Yield (q/ ha)	Net return (Rs/ha)	B:C ratio
One spray of Trizophos - 40 EC @ 500 ml/ha at severe (Farmers' practice - T_1)	12	5.31	271.71	95143	3.57
One spray of *Bt* @ 1.0 kg/ha in nursery + transplanted at 60x 30 cm spacing, balance dose of fertilizers and two spray of *Bacillus thuringiensis* (Bt) @ 1 kg/ha after 15 days of first spray (T_2)		2.74	295.71	110637	4.16

Integrated Pest Management in Okra

Problem Identified: Low yield of Okra due to heavy infestation of white fly

Technology assessed: Integrated white fly management module in Okra

White fly (*Bemisia tabaci)* causes severe damage to okra plants by feeding on sap, secreting honeydew and transmitting viral diseases. Remarkable reduction in yield has been observed due to heavy infestation of white fly. Looking to the above problem, KVK Durg from Chhattisgarh; Boudh, Jagatsinghpur and Keonjhar from Odisha

Integrated white fly management in okra at farmer's field

conducted 36 OFTs to managing this insect. Integrated management modules i.e. use of yellow sticky trap @ 20/ha (T_2) and alternate spraying of Betacyfluthrin and Neem oil with installation of Yellow sticky trap @ 20/ ha (T_3) were assessed for management of white fly at 36 locations. The results of these OFTs revealed that the yield in T_3 increased by 26.83 and 13.18 percent over T_1 and T_2 respectively. The number of white flies/leaf was decreased by 48.85 and 4.3 percent over T_1 and T_2 respectively. The net return and B:C ratio increased by Rs. 25,416 per ha and 0.36 units respectively over farmers practice. Farmers were satisfied with both the technologies assessed for white fly management in okra.

Table 2.53: Performance of Integrated White fly management in okra

Details	No. of Trials	No. of white flies/leaf	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Indiscriminate use of any insecticide after severe infestation (Farmers' practice - T_1)	36	17.4	97.45	62686.25	1.84
Use of yellow sticky trap @ 20/ ha (T_2)		9.3	109.2	86136.3	2.12
Instalation of Yellow sticky trap @ 20/ha with alternate spray of Neem oil @ 1% and Betacyfluthrin 10 EC @ 2ml/l at 10 days interval (T_3)		8.9	123.6	88102.5	2.20

Varietal Assessment in Onion

Problem identified: Low yield of *kharif* onion due to use of local/old variety mixed seed

Technology assessed: *Kharif* onion variety Bhima Super

Onion is an important spice used across the Zone and in the country. Several factors are responsible for lowering the yields of *kharif* onion. Use of old varieties significantly affect the bulb yield. KVK Koraput, Mahasamund, Raisen and Ratlam of the Zone planned and conducted 24 OFTs to assess the performance of the improved *kharif* variety Bhima Super. Results of the revealed that the yield of Bhima Super was 27.51 percent higher over the farmers' variety. The increase in bulb weight was recorded to be 61 per cent over farmers' practice. Similarly, the net return and B:C ratio was also found to be higher by Rs. 44,544 and 0.38 with the assessed variety. The variety performed very well in the area over the farmers' traditional variety.

Kharif onion variety Bhima Super at farmer's field

Table 2.54: Performance of *Kharif* onion variety Bhima Super

Details	No. of trials	Yield (q/ha)	Bulb weight (g)	Net return (Rs/ha)	B:C ratio
Farmers' local/old and unappropriate variety (N 53) (Farmers' practices - T_1)	24	168.26	62.27	93546	2.14
Use of improved *kharif* onion variety Bhima Super (T_2)		214.55	100.25	138089	2.52

Integrated Pest Management in Onion

Problem Identified: Low yield of onion due to heavy infestation of thrips in onion

Technology assessed: Imidachloprid for management of thrips in onion

Infestation of thrips is responsible for lowering the yields of onion. Looking to the above problem KVK Burhanpur, Damoh and Mandsaur from Madhya Pradesh of the Zone conducted 22 OFTs to assess the performance of Imidachloprid (seed treatment with Imidachloprid 70 WS @ 1.2 g/ kg seed and seedling treatment with Imidachloprid 17.8 SL @ 3 ml/10 litre of water for 2 hour before transplanting and Foliar spray of Imidachloprid 17.8 SL @ 120 ml/ha) for management of thrips in onion. The results revealed that the onion yield increased by 16.7 per cent and thirps population/ plant decreased by 69.07 percent over farmers' practice. The net return and BC ratio increased by Rs. 21722 per ha and 0.21, respectively over farmers' practice due to use of this technology. Farmers were satisfied with this technology for thrips management and they realized that Imidachloprid is one of the best options for management of thrips. The farmers were involved through training, field day and field visit during the crop growth and at the time of harvesting.

Management of thrips in onion by Imidachloprid

Table 2.55: Performance of Imidachloprid for thrips management in onion

Details	No. of Trials	Thrips population / plant	Yield (q/ ha)	Net return (Rs/ ha)	B:C ratio
Trizophos 40 EC@600ml/ha after infestation of thrips (Farmer practice - T_1)	22	22.8	208.21	81410	2.76
Seed treatment with Imidachloprid 70 WS @ 12 g/ kg seed and seedling treatment with Imidachloprid 17.8 SL @ 3 ml/ 10 litre of water for 2 hour before transplanting and Foliar spray of Imidachloprid 17.8 SL @ 120 ml/ha (T_2)		7.05	243.01	103132	2.97

Resource Conservation Technology in Chilli

Problem identified: Low yield of chilli due to low water and nutrient use efficiency in flat bed transplanting

Technology assessed: Mulching technique in chilli

Chilli is an important spice use across the country by every farm family. Due to transplanting on flat beds, the available moisture and nutrients are not efficientialy utilized by the crop, hence famers get low yield and less returns. Moreover the heavy weed infestation causes poor crop growth due to uptake of available soil nutrients and moisture. Crop residue i.e. dried leaves of sugarcane may be used for mulching which restricts weeds and maintains soil moisture for availability to crop from time to time. Despite the above, it enrichs the soil by its decomposition gradually, hence nutrient availability increases in the soil which ultimately increases the crop production. Keeping in view the above, KVK, Burhanpur and Dewas assessed use of 30 micron black plastic mulching (T_2) and use of sugarcane dried leaves for mulching (T_3) in chilli transplanted on raised beds. Results of these trials conducted at 17 locations showed that the mulching

Chilli crop under different mulches

by sugarcane dried leaves enhanced the fruit yield by 23.3 and 13.1 per cent over farmers' practice (T_1) and T_2 respectively. Similarly, the increase in fruit length was observed by 37.78 and 30.72 per cent over farmers' practice and T_2 respectively. The net return and B:C ratio were Rs. 1,21,232 per ha and 0.79 units higher with the assessed technology.

Table 2.56: Performance of mulching in chilli

Details	No. of trials	Yield (q/ ha)	Fruit length (cm)	Net return (Rs/ha)	B:C ratio
No use of mulching (Farmer Practice – T_1)	17	250.59	9.08	173208	2.77
Use of 30 micron black Plastic mulch (T_2)		273.18	9.57	234852	3.31
Use of sugarcane dried leaves for mulching (T_3)		308.97	12.51	294440	3.56

Integrated Disease Management for wilt in Chilli

Problem Identified: Low yield due to high incidence of wilt disease in chilli

Technology assessed: Wilt management practices in chilli

Wilt of chilli is a serious problem since past decade with the disease incidence ranging from 2 to 85 per cent in different regions of India. The yield losses due to the disease are known to vary from 10 to 80 per cent depending upon the variety being grown and prevailing climatic conditions. In view of the importance of disease and crop, KVK Sagar and Gajapati of the Zone conducted 17 OFTs on integrated management of wilt in chilli. Seed and seedling treatment with *Trichoderma viride* @ 10 g/kg seed/lit of water and soil application of *Trichoderma viride* 5 kg/ha with FYM (T_3) and seed and seedling with *Trichoderma viride* @ 10 g/kg seed (T_2) were assessed for management of wilt in chilli. The results of the on farm trial showed that the yield of T_3 treatment increased by 36.59 and 9.67 percent over T_1 and T_2 respectively. Wilt incidence decreased by 77.54 and 35.33 percent over T_1 and T_2 respectively. The net return and B:C ratio increased by Rs. 28,687 per ha and 0.34 respectively over farmers' practice.

Wilt management in chilli

Table 2.57: Performance of wilt management practices in chilli

Details	No. of Trials	% Disease incidence	Yields (q/ ha)	Net return (Rs/ha)	B:C ratio
Seed treatment with carbendazim (Farmers' practice - T_1)	17	19.15	72.75	62375	2.41
Seed and Seedling with *Trichoderma viride* @ 10 g/kg seed/ lit of water (T_2)		6.65	90.6	81150	2.62
T-2 + Soil application of *Trichoderma viride* 2.5 kg/ha with FYM (T_3)		4.3	99.37	91062	2.75

Integrated Disease Management for Low Wilt in Chilli

Problem Identified: Low yield of chilli due to high infestation of Leaf curl virus

Technology assessed: Thiomethoxam and Imidacloprid for the management of leaf curl disease in chilli

KVK Rewa and Raisen from Madhya Pradesh conducted 10 OFTs on leaf curl management in chilli. IDM module i.e. seed treatment with Thiomethaxom -75 WG @ 3 g/kg + One Spray of NSKE @ 5 % and one spray of Imidacloprid @ 120 ml/ha before flowering at 15 days interval was assessed for leaf curl management. Result of the OFTs revealed that the green chilli yield increased by 36.80 percent and disease incidence decreased by 68.98 percent. The net return and B:C ratio increased by Rs. 29584 per ha and 0.99 respectively. Farmers were satisfied with this technology to control leaf curl in chilli.

Leaf curl affected plants and its management in chilli

Table 2.58: Performance of IDM module for leaf curl management in chilli

Details	No.of trials	Yield (q/ha)	Disease incidence (%)	Net return (Rs/ha)	B:C ratio
Spray of unappropriate insecticides at later stage of incidences (Farmers' practices-T_1)	10	79.78	31.5	58593	2.81
Thiomethaxom -75 WG @3 g/kg + One Spray of NSKE @ 5 % and one spray of Imidacloprid -17.8 SL @ 120 ml/ha before flowering at 15 days interval (Recommended practice - T_2)		109.14	9.77	88177	3.8

Varietal Assessment in Fenugreek

Problem identified: Low yield of fenugreek due to use of old/traditional varieties

Technology assessed: Fenugreek variety RMT 305

Seed is the important factor responsible for lowering the yield of fenugreek if the local/ traditional variety seed is used for cultivation. Keeping in view the above, KVK Ratlam and Sheopur of the Zone planned and conducted 15 OFTs to assess the performance of the improved variety RMT 305. Results revealed that the yield of RMT 305 was 43.65 per cent higher over the farmers' variety. The number of pods per plant was found to be higher by 42.14 percent over farmers' practice. Similarly the net return and B:C ratio was also found to be higher by Rs. 20,000 per ha and 0.77 units with this variety. On the basis of above findings it was concluded that the variety performance very well in the area.

Fenugreek variety RMT 305

Table 2.59: Performance of fenugreek variety RMT 305

Details	No. of trials	Yield (q/ha)	No. of pods/plant	Net return (Rs/ha)	B:C ratio
Farmers' local / old variety (Farmers' practices - T_1)	15	12.83	24.42	33246	2.87
Use of improved variety RMT 305 (Recommended practice - T_2)		18.43	34.71	53246	3.63

Integrated Pest Management in Garlic

Problem Identified: Low yield of onion due to heavy infestation of Thrips in Garlic

Technology assessed: Fipronil 5 SC @ 500 ml/ha at 30 DAS for management of thrips in garlic

Infestation of thrips lowers the yields of garlic. Looking to the above problem KVK Mandsaur and Sheopur from Madhya Pradesh of the Zone conducted 18 OFTs for management of thrips in garlic. Spray of Fipronil 5 SC @ 500 ml/ha at 30 day after sowing (T_3) and Imidachloprid 17.8 SL @ 120 ml/ha (T_2) were assessed for management of thrips. The result of OFTs revealed that the yield increased by 31.59 and 9.0 percent over T_1 and T_2, respectively. Thrips population/plant decreased by 91.79 and 85.27 percent respectively over T_1 and T_2. Number of damaged leaf/plant was also decreased by 62.5 and 54.16 percent respectively over T_1 and T_2. The net return and B:C ratio increased by Rs 1,09,585 per ha and 0.75 units respectively over farmers' practice. The insecticide used under T_2 also worked better in lowering the thrips population and number of infected leaf/ plant over farmers' practice.

Fipronil and Imidachloprid for thrips management in garlic

Table 2.60: Performance of Fipronil and Imidachloprid for thrips management in garlic

Details	No. of Trials	Thrips population / plant	No. of damaged leaf/plant	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Use of trizophos 40 EC @ 600ml/ha after infestation of thrips (Farmer practice - T_1)	18	25.6	2.4	100.95	248890	4.44
Use of Imidachloprid 17.8 SL @ 120 ml/ha (T_2)		3.77	1.1	121.80	318852	5.15
Use of Fipronil 5 SC @ 500 ml/ha at 30 day after sowing (T_3)		2.1	0.9	132.85	358475	5.19

Integrated Disease Management in Ginger

Problem Identified: Low yield due to severe incidence of rhizome rot ginger

Technology assessed: Deep summer ploughing, rhizome treatment with Mencozeb + metalyxil - M @ 3 g/lit of water for control of rhizome rot disease in ginger

KVK Raigarh from Chhattishgarh, Dhar from Madhya Pradesh as well as Gajapati and Koraput from Odisha conducted OFTs on soft rot management in ginger. Integrated disease management module i.e. Rhizome treatment with metalyxil –M 8 percent + Mancozeb 64 percent @ 2.5 g/kg rhizome and soil treatment with 5 kg *Trichoderma viride* + FYM @ 25 t/ha was assessed for soft rot management. Results of the 28 OFTs revealed that the ginger yield increased by 26.7 percent and disease incidence decreased by 57.10 percent over farmer practice. The net return and B:C ratio increased by Rs. 190278.89 per ha and 0.67 units respectively. Farmers were satisfied with this technology to control soft rot of ginger.

Rhizome rot managed Ginger

Table 2.61: Performance of Integrated Disease Management module for soft rot in ginger

Details	No. of Trials	Disease incidence (%)	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
No rhizome treatment or indiscriminate spray of fungicides (Farmers practice – T_1)	28	12.24	89.70	60544.61	2.38
Deep summer ploughing + rhizome treatment with *T. viride* @ 5 g/kg of rhizome (T_2)		5.25	105.33	171745	2.74
Rhizome treatment with metalyxil – M 8% + mancozeb 64% @ 2.5 g/kg rhizome and soil treatment with 5 kg *Trichoderma viride* + FYM @ 25 t/ha (T_3)		9.07	113.65	250823.3	3.05

FLOWERS AND FRUITS

Varietal Assessment in Marigold

Problem identified: Low yield of marigold due to use of unidentified varieties

Technology assessed: Marigold variety Pusa Narangi.

Flower cultivation is profitable but use of unidentified varieties lower the net return per unit area due to their limited production potential. Using the improved variety seeds, its production and net return can be enhanced. Marigold is an important flower which has high demand hence its cultivation may be quite profitable if the improved varieties are cultivated and proper management practices adopted. Keeping in view the above, KVK Bhind, Dhenkanal and Mahasamund of the Zone planned and conducted 28 OFTs to assess the performance of the improved variety Pusa Narangi. Results revealed that the flower yield of this variety was 30.46 per cent higher over the farmers' variety. The flower diameter was found to be larger by 64.33 percent over farmers' practice. Similarly the net return and BC ratio was also found to be higher by Rs. 43,333 per ha and 0.51 units with this variety. On the basis of above findings it was concluded that the variety performed very well as it yielded higher flowers' yield and the larger flower size.


Marigold variety Pusa Narangi

Table 2.62: Performance of marigold variety Pusa Narangi

Details	No. of trials	Yields (q/ha)	Flower diameter (cm)	Net returns (Rs/ha)	B:C ratio
Use of unidentified variety (Farmers' practice - T_1)	28	130.23	3.14	99233	2.44
Use of improved marigold variety Pusa Narangi (Recommended practice - T_2)		169.90	5.16	142567	2.95

Problem identified: Low yield of marigold due to indiscriminate use of fertilizers

Technology assessed: INM in Marigold

Plant essential nutrients play a key role in the production of crops. In case of deficiency of any nutrient the crop yield is reduced upto a greater extent. In the marigold cultivation farmers are using indiscriminate dose of fertilizers and no use of FYM or other organic inputs. Hence the soil fertility and health is declining resulting in less marigold flower production. Keeping in view the above, KVK Indore and Ratlam of the Zone planned and conducted 28 OFTs to assess the performance of balanced nutrients application i.e. use of NPK @ 60:75:50 kg/ha based on STCR (T_2) and use of FYM @ 25 t/ha + NPK @ 60:75:50 kg/ha based on STV (T_3) respectively. Results showed that the flower yield under T_3 was 30.3 and 11.46 per cent longer over the farmers' practice (T_1) and T_2 respectively. The flower diameter was found to be higher with the assessed technology by 40.33 and 11.1 percent over farmers' practice and T_2 respectively. Similarly, the net return and BC ratio was also found to be higher by Rs. 40,065 per ha and 0.62 units with this treatment. On the basis of above findings it was concluded that the technology performed very well by raising flower yield as well as maintaining soil fertility.

Integrated Nutrient Managed in marigold

Table 2.63: Performance of INM in marigold

Details	No. of trials	Yield (q/ha)	Flower diameter (cm)	Net return (Rs/ha)	B:C ratio
Use of NPK @ 120:80:0 kg/ha (Farmers' practice - T_1)	28	61.36	2.43	75735	2.33
Use of NPK @ 60:75:50 kg/ha based on STCR (T_2)		71.74	3.07	94245	2.62
Use of FYM @ 25 t/ha + NPK @ 60:75:50 kg/ha based on STV (T_3)		79.96	3.41	115800	2.95

Varietal Assessment in Banana

Problem identified: Low yield of banana due to cultivation of unidentified varieties

Technology assessed: Tissue culture banana cv. Grand Naine

Cultivation of local banana varieties gives low yield due to their limited production potential. Farmers generally uproot poor quality suckers from the mother plants and unscientific transplant in the main field, hence the plant growth of such suckers restricts which also results in poor fruiting. Keeping in view the above, KVK Bolangir and Jharsuguda of the Zone planned and conducted 15 on farm trials to assess the performance of the tissue culture varieties i.e. Dwarf Cavendish (T_2) and use of improved variety Grand Naine (T_3) of banana. Results showed that the fruit yield of Grand Naine was 85.63 and 8.52 per cent higher over the farmers' variety (T_1) and T_2 respectively.

The number of hands per bunch was found to be higher by 42.86 and 11.11 percent over farmers' variety and $T_{2,}$ respectively. Similarly the net return and B:C ratio was also found to be higher by Rs. 3,33,629 per ha and 1.22 units with this variety. On the basis of above findings it may be concluded that this variety performed very well as it yielded higher fruits' yield and more hands per bunch.

Tissue culture banana variety Grand Naine

Table 2.64: Performance of tissue culture banana variety Grand Naine

Details	No. of trials	Yield (q/ ha)	No. of hands per bunch	Net return (Rs/ ha)	B:C ratio
Use of Champa/Bhusabali (Farmers' practices - T_1)	15	353.4	7	197689	1.75
Use of tissue culture banana variety Dwarf Cavendish (T_2)		604.5	9	475167	1.95
Use of tissue culture banana variety Grand Naine (T_3)		656.0	10	531317	3.17

Varietal Assessment in Papaya

Problem identified: Low yield of papaya due to cultivation of unappropriate varieties

Technology assessed: Papaya cv. Pusa Nanha

Papaya is an important fruit which can be cultivated successfully by using improved varieties with proper management practices. Farmers get low production of papaya due to use of unappropriate varieties, improper planting geometry, poor INM, pest, disease and water management. Keeping in view the above, KVK Bhind and Dhenkanal of the Zone planned and conducted 23 OFTs to assess the performance of the improved variety Pusa Nanha of papaya. Results showed that the fruit yield of Pusa Nanha was 23.77 per cent higher over the farmers' variety. The fruit weight was also found to be higher by 105.56 percent over farmers' variety. Similarly, the net return and B:C ratio was also found to be higher by Rs. 63,620 per ha and 0.27 units with this variety. On the basis of above findings it was concluded that this variety performed very well as it yielded higher fruits' yield with longer fruit size.

Papaya variety Pusa Nanha

Table 2.65: Performance of improved papaya variety Pusa Nanha

Details	No. of trials	Yield (q/ ha)	Fruit weight (kg)	Net return (Rs/ ha)	B:C ratio
Use of unappropriate varieties (Farmers' practices - T_1)	23	482.5	0.9	174500	2.02
Use of improved variety Pusa Nanha (T_2)		597.2	1.85	238120	2.29

DRUDGERY REDUCTION OF FARM WOMEN

Pedal Operated Potato Slicer for Drudgery Reduction

Problem identified: Low efficient manual slicing of potato and irregular size of chips

Technology Assessed: Pedal operated potato slicer

Annual post harvest losses of potatoes vary from 5 to 40 percent mainly due to inadequate storage facilities in rural areas. Hence, the farmers are forced to sell potatoes at a very low price. Therefore, pedal operated potato slicer for farm women was assessed to process potatoes at household level.

Manual slicing is time consuming and involves risk of injury to hand. KVKs Sagar, Sidhi and Indore of Madhya Pradesh conducted 32 OFTs on assessment of pedal operated potato slicer for farm women to address the problem of manual slicing. Results revealed that use of pedal operated potato slicer had mean output of 65 kg/h, mean of estimated energy expenditure 6.39 kj/min, mean of WHR 95 beat/ min, average reduction in drudgery 67.9 percent, average of increase in efficiency 376.78 percent, cardiac cost of work 23.1 and saving of cardiac cost 32.08 percent. It avoids bending or squatting posture and the energy consumption is 54 percent as compared to manual and hand operarated peeler and slicer.

Manual slicing of potato

Potato slicer

Table 2.66. Performance of efficiency and drudgery reduction of farm women by using pedal operated potato slicer

Details	No. of trials	Output (kg/hour)	Est. Energy (kj/min)	WHR (beat/min)	reduction in drudgery (%)	increase in efficiency (%)	Cardiac Cost of Work	Saving of cardiac Cost (%)
Manual slicing of potato (FP-T_1)	32	7.375	4.32	82			72	
Pedal operated potato slicer (T_2)		39.71	6.39	95	67.9	376.78	23.1	32.08

Twin Wheel HOE for Drudgery Reduction Power Weeder and Manual

Problem identified: High drudgery and low efficiency of farmwomen involved in manual weeding manually

Technology asssessed: Twin wheel hoe and power operated weeder

In *Kharif* and *Rabi* season crops due to high infestation of weeds there is involvement of farm women in hand weed management. During manual weeding, bending as well as squatting posture and stress of wrist pains result to low weeding efficiency. KVKs of Jabalpur, Sagar, Gwalior, Rajgarh of Madhya Pradesh and Keonjhar of Odisha conducted 61 OFTs on assessment of twin wheel hoe and power operated weeder for farm women to address the problem of manual weeding. Results revealed that use of twin wheel hoe and power operated weeder showed average of output 133.79 and 1600 m^2/h, average of estimated energy expenditure 7.39 and 8.6 kg/min, average of WHR 101.34 and 109 beat/min, average reduction in drudgery 41.15 and 4.88 percent, average of increase in efficiency 53.95 and 2644 percent, cardiac cost of work 25.34 and 1.56, saving of cardiac cost 43.81 and 93.3 percent. It avoids bending/squatting postures. Productivity of worker increased more than three times. It saves 59 percent labour and operating time.

Twin wheel weeder in brinjal field

Power weeder in cabbage field

Table 2.67. Performance of efficiency and drudgery reduction of farm women by using Twin wheel hoe and power operated weeder

Details	Number of KVK	Mean					Cardiac Cost of Work	Saving of cardiac Cost (%)
		Output m^2/h	Est. Energy Expenditure kj/min	WHR beat/ min	reduction in drudgery ((%)	increase in efficiency (%)		
Manual Weeding (Farmer Practice) T_1	48	61.61	12.56	113.85	-	-	57.85	-
Weeding by Twin Wheel Hoe (Recommended Practice) T_2		133.79	7.39	101.34	41.15	53.95	25.34	43.81
Power operated weeder (Recommended Practice) T_3	13	1600	8.6	109	4.88	2644	1.56	93.3

Spiral Seed Grader for Drudgery Reduction

Problem identified: High drudgery and low efficiency of farm women involved in soybean seed grading (80% farm women affected)

Technology Assessed: Spiral Seed Grader

Spiral Seed Grader is used for grading and cleaning round shaped grains like green peas, soybean, black gram, Sorghum, bajra, etc. quick segregation of grains and husk. Same grain of different sizes can be segregated. It has very low maintenance cost, very durable, easy to operate, supreme quality, effective output, highly efficient, precisely designed, robust construction, time saving, minimizes the labour and reducing drudgery. KVKs Neemuch, Guna, Harda, Katni, Hosangabad, Shajapur and Dewas (M.P) conducted 42 OFTs on assessment of spiral seed grader for farm women to address the problem of manual grading. Results revealed that use of Spiral Seed

Grader shonad mean of output 230.32 kg/hr, with mean of estimated energy expenditure 8.29 kj/min, mean of WHR 96.39 beat/min, average reduction in drudgery 28.66 percent, average of increase in efficiency 65.68 percent, Cardiac cost of worker 18.39, saving of cardiac cost 58.12 percent. It avoids bending/squatting postures.

Soybean grading through spiral grader

Table 2.68. Performance of efficiency and drudgery reduction of farm women by using spiral seed grader

Details	Number of KVK	Mean					Saving of cardiac Cost (%)
		Output kg/h	Est. Energy Expenditure kj/min-	WHR beat/ min	reduction in drudgery (%)	Cardiac Cost of Worker	
Manual Seed Grading (Farmer Practice) T_1	52	90	8.57	110.76	-	34.78	-
Seed Grading by spiral Seed Grader (Recommended Practice) T_2		230.32	8.29	96.39	28.66	18.39	58.12

Groundnut Stripper for Drudgery Reduction

Problem identified: High drudgery involved during manual stripping of Groundnut

Technology assessed: Stripping by Groundnut stripper

The groundnut stripper consists of a square frame of vertical legs and a horizontal strip of expanded metal fixed on each side of the frame in the form of comb. The stripping of the pods is accomplished by drawing a handful of vines across the comb with a slight force. The structure facilitates its use by four women simultaneously.

KVKs Ganjam-II and Cuttack (Odisha) conducted 29 OFTs on assessment of groundnut stripper for farm women to address the problem of manual stripping. Results revealed that use of groundnut stripper revealed an average of output 9.5kg/h, average of estimated energy expenditure 7.29 kj/ min, average of WHR 100.5 beat/min, average reduction in drudgery 13 percent, average of increase in efficiency 76.8 percent, cardiac cost of Work 24.5, saving of cardiac Cost 78.22 percent squatting posture is avoided which minimizes stress at knee.

Stripping by goundnut stripper

Measurement of heart beat

Details	Number of KVK	Mean					Cardiac Cost of Worker	Saving of cardiac Cost (%)
		Output kg/hr	Est. Energy Expenditure kj/min-	WHR beat/ min	reduction in drudgery (%)	increase in efficiency (%)		
Manual stripping (Farmer practice- T_1)	29	2.5	8.34	107.32	-	-	31.3	-
Stripping by groundnut stripper (Recommended practice - T_2)		9.5	7.26	100.5	13	76.8	24.5	78.22

INCOME GENERATION

Nursery Management

Problem identified: Low income of farm women due to high mortality of vegetable seedlings

Technology assessed: Planting seedling in pro tray, biodegradable pots and low cost poly tunnel

Nursery management is important for vegetable production. Involvement of farm women in vegetable production is higher than other agricultural crops. Healthy seedlings are necessary for high production of vegetables however higher mortality of seedling at farmer level in observed. Preparation of seedling on flat bed also results in low income of farm women. KVK's Neemuch, Raisen, Mandsau, Ratlam, Guna, Shahdol, Bargarh, Ganjam-I conducted 66 OFTs on assessment of pro tray, biodegradable pots and low cost poly tunnel for increasing germination with reduced mortality. Result, revealed the performance of low cost poly tunnel and biodegradable pots technique for nursery rising was more profitable than the farmers practice.

Sowing in biodegradable pots

Preparation of pro tray for sowing

Table 2.69. Performance of nursery management in pro tray, biodegradable pots and low cost poly tunnel

Details	No. of trials	Yield per unit	Cost of input (Rs/unit)	incremental Income (Rs/unit)	Net return (Rs/unit)	Savings (in Rs)	B: C ratio
Flat bed (FP- T_1)	47	1480	1100	1480	330	200	1.5
Pro tray (T_2)		1680	1150	1680	530		
Flat bed (FP- T_1)	12	100 seedling			50	70	
Biodegradable pots (T_3)		100 seedling	50	160	110		3.2
Flat bed (FP-T_1)	7	24000	3100	12000	8900	5600	
Low cost poly tunnel (T_4)		36000	3500	18000	14500		5.14

Mushroom Production

Problem identified: Poor economic status of farm women during lean period

Technology assessed: Mushroom production

Non-availability of suitable and improved oyster mushroom and paddy straw mushroom species influences greatly its production. Oyster mushroom and paddy straw mushroom production can be enhanced by introducing high yielding species, KVK's Jabalpur, Gwalior, Hosangabad (MP), Bargarh, Jajpur, Keonjhar, Bhadrak, Ganjam-I, Kendrapara, Sundergarh-II, Bolangir and Rayagada (Odisha) conducted 95 OFTs on oyster mushroom Pleurotues spices (*Sajarcaju, Pulmonaries, Florida* and *Hypsizygous Ulmarius* (Blue colour). Different substrate like maize, drumstrick straw, sesamum stalk, groundnut hulm, sugarcane is used for growing of oyster mushroom. Puri, Angul, Balasore, Ganjam-II, Jajpur, keonjhar, Mayurbhanj - II, Puri, Bhadrak, Bhadrak, Ganjam-I, Kendrapara, Nuapada, Sundergarh-II, Jagatsinghpur, Dhenkanal and Bolangir conducted 164 OFTs of paddy straw mushroom species like OSM-11, OSM-12 *V.volvaceae,* to assess the performance. Results revealed that 32.32 percent higher mushroom yield was obtained over farmers practice with oyster mushroom species; net return per bag was Rs.64.8 higher over farmers practice. The trials revealed that the performance of oyster mushroom *(Pleurotus pulmonarious* and *florida)* was more profitable than the local mushroom species. Similarly, result revealed that paddy straw gave 33.33 percent higher mushroom yield over farmers practice. Similarly the net return was higher Rs. 69.69/bed. The trials revealed that the performance of paddy straw mushroom *(OSM-12)* was more profitable than the local mushroom species.

Oyster mushroom

Cultivation of OSM-12

Table 2.70. Performance of Oyster and Paddy straw mushroom production

Details	No. of trials	Yield per unit (kg/ bag)	Cost of input (Rs./ bag)	Incremental income (Rs./bag)	Net return (Rs/bag)	Savings (in Rs)	B: C ratio
Local mushroom species (FP - T_1)	98	1.64	46.64	114.81	73.77	27.12	2.46
Oyster Mushroom (T_2)		2.17	45.94	179.16	138.57	92.63	3.90
Local mushroom species (FP - T_1)	177	1.05	52.91	92.27	19.59	-	1.37
Paddy straw mushroom (OSM-12)- T_3)		1.40	57.47	146.75	89.28	31.81	2.57

NUTRITIONAL SECURITY

Nurti-Garden in Backyard

Problem identified: Nutritional insecurity of farm family due of fruit and vegetables at household level.

Technology Assessed: Nutritional kitchen garden.

Women in rainfed areas are switching over to kitchen gardens, which provide nutrition and cash to the family. By recycling the limited water available, these women have shown that it is possible to grow vegetables all round the year. Initially women established kitchen gardens with all types of vegetable seeds in their backyards. They started getting good harvests of vegetables and greens, which were used for consumption. Little surpluses were shared with the neighbours and also sold in the local markets. With growing access to vegetables on a daily basis, these families stopped buying vegetables from the market helping them save around money every month. In

a month, each family could harvest 1388 kg of all seasonal vegetables in their backyards. Established kitchen gardens in an area of 100 to 150 sq.ft. in their homesteads, increase the per capita consumption 300 g/day. There was a visible change in food consumption patterns. The family diet now included more variety of vegetables. There was an improvement in the health status as well. Women say that with increased intake of greens (fibres) they no longer have digestive problems. KVK's Rewa, Raisen, Seoni (MP) and Cuttack (Odisha) conducted 33 OFTs on assessment of backyard nutritional gardening for farm women to address the problem of unavailability of fresh vegetables for nutrition supplementation.

Table 2.71: Performance of nutritional kitchen garden

Details	No of Trials	Performance indicators / Parameters			Nutrient intake				Anthropometric measurements		
		Name of vegetable/ Fruit/Product	Yield (kg/ unit area)	Per capita consumption (g/ day)	Energy (kcal)	Protein (g)	Iron (mg)	Calcium (mg)	Increase		
									Wt. (kg)	Ht. (cm)	BMI (%)
No use of backyard (FP - T_1)	18	Few vegetables	177.2	104	7.214	2.288	4.55	13.23	1 .5	1	1.36
Nutritional Kitchen Garden (T_2)		Round the year vegetables	1388	300	17.04	6.014	2.69	30.24	4.3	5	3

Value Addition of Food for Children

Problem identified: Iron and protein deficiency among adolescent girls and farm women in farm family

Technology assessed: Iron and protein rich food product for household food security of farm families

In rural area awareness about iron and protein rich foods for fulfilment of iron and protein requirement of adolescent girls and farm women is increasing. Daily nutrient intake is less than recommended dietary allowances among adolescent girls. KVK's Bilaspur, Surguja, Raigarh (CG) Harda, Neemuch, Ratlam and Tikamgarh (MP) conducted 40 OFTs on assessment of value addition of iron and Protein rich food product in diet for household food security and observe 15.3 percent BMI and 16.7 percent BMI in use of Soya Poha laddoo and Iron RIch Ladoo respectively. The iron rich product to check the iron deficiency in adolescent girls.

Observation of pre-school children and adolescent girls

Table 2.72: Performance of iron and protein rich food product

Details	No of Trials	Performance indicators/ parameters			Nutrient intake				Anthropometric measurements		
		Name of vegetable /Fruit/ Product	Yield (kg/unit area)	Per capita Consumption (g/ day)	Energy (kcal)	Protein (g)	Iron (mg)	Calcium (mg)	Increase		
									Wt. (kg)	Ht. (cm)	BMI (%)
Insufficient daily diet (FP - T_1)	23	Insufficient daily diet	--	--	--	--	--	--	7.400	0.76	12.7 kg/ m^2 (Under weight)
Soy-Poha Laddoo (T_2)		Soy-Poha Laddoo with daily diet	100 g Laddoo/ day/child	100 g/day	500	14.6	4.50	300.00	8.900	0.76	15.3 kg/m^2 (Healthy weight)
Iron Rich laddoo (T_3)	17	Iron Rich laddoo		100g/day	291	7.3	16.1	1070	40.2	155	16.7

Value Addition of Tamarind

Problem identified: Tribal families sell tamarind to third party and get less price and lack knowledge on quality parameter

Technology assessed: Value added product of Tamarind (tamarind sauce and tamarind RTS)

T_1- Tamarind bulb

T_2- Tamarind Sauce

T_3- Tamarind RTS

Preparation of tamarind sauce

Table-2.73: Performance of value added product of tamarind

Details	No. of trials	Composition of product	Input used	Product (kg)	Cost of input (Rs/unit)	Incremental income (Rs/unit)	Net return (Rs/unit)	Saving (in Rs)	B. C ratio
Tamarind bulb (FP -T_1)	40	Ripen Tamarind as bulb with seed	Salt+ chilli powder	1kg	50	150	100		2.0
Tamarind Sauce (T_2)		Tamarind pulp as mint Sauce-	Pulp+ Cumin powder+ chilli Powder+ Mint+ salt + Sugar	3.75	125	500	375		3.0
Tamarind RTS (T_3)		Tamarind pulp as RTS	Pulp+Sugar+ water+ citric acid+ Mint+ KMS	25.8	740	1300	560		0.75

Table-2.73.1: Sensory parameter

Trial	Colour	Texture	Flavour	Taste	Overall acceptability
T_1 (Bulb)	9.0	7.8	8.0	7.5	Good
T_2 (Sauce)	9.0	8.5	8.0	9.2	Better
T_3 (RTS)	8.5	8.5	8.0	8.5	Better

Table-2.73.2: Nutritional security parameter

Trial	Energy (Kcal)	CHO (g)	Protein (g)	Fat (g)	Fibre (g)	Vit. C (mg)	Vit.K (mg)
T_1 (Bulb)	239	62.50	2.80	0.60	5.1	3.5	2.8

FARM MACHINERY

Resource Conservation Technology

Zero tillage

Problem identified: Burning of Combine harvested rice/wheat stubbles before field preparation affecting crop productivity of subsequent crop due to delay in sowing

Technology assessed: Direct sowing of crop in Combine harvested rice/wheat field by Happy Seeder

Burning of Combine harvested rice/wheat stubbles before field preparation affected productivity of subsequent crop by delay in sowing. Moreover the burning of crop residue degraded the soil in terms of soil organic carbon, loss of soil microbial biomass and in conversion of soil upper layer into hard crust. In addition the continuous use of chemical fertilizers – ignoring the organic manures – has lead to decreasing of organic carbon in the soil. Under such circumstances the use of Happy Seeder has come as a boon to the farmers. Happy Seeder facilitated the timely sowing of subsequent crop in Combine harvested rice/wheat fields without burning the crop residue along with increase in soil organic carbon. KVK Narsinghpur, Damoh, Janjgir-champa and Jaipur conducted 32 OFTs on direct sowing in Combine harvested rice/wheat field by Happy Seeder. The results of the assessment were encouraging. Cost of cultivation reduced due to direct sowing in Combine harvested rice/wheat fields. In case of chickpea there was an increase in yield from 6.85 to 8.12 q/ha. The B:C ratio was encouraging as the recommended practice showed a BC ratio of 2.27 against 2.0 found under the farmer practice under chickpea. Similar was the case of wheat and summer green gram. Overall the use of Happy Seeder gave good results.

Table 2.74: Yield response of chickpea, wheat and summer green gram on sowing through Happy Seeder

Details	No. of trials	Crop	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Burning of crop residue (FP - T_1)	32	Chickpea	6.85	12375	2.0
		Wheat	26.3	24490	2.2
		Summer green gram	8.75	21610	2.6
Direct sowing of subsequent crop by Happy Seeder in Combine harvested field (T_2)		Chickpea	8.12	15920	2.27
		Wheat	32.1	33387	2.8
		Summer green gram	10.15	28970	3.5

Crop residue after Combine harvested rice fields


Sowing of wheat by Happy Seeder

Problem identified: Delay in *Rabi* crop sowing due to non availability of optimum field condition for field preparation after paddy harvest.

Technology Assessed: Sowing through tractor drawn zero till seed drill

After the harvest of *kharif* paddy crops the field conditions at times delay the work of field preparation for the next crop. Delayed sowing results in low crop yields. Moreover the field preparation work increases the cost of cultivation. Sowing through tractor drawn Zero till seed drill not only reduces the cost of cultivation but also facilitates timely sowing. Twenty OFTs were conducted by KVK Mayurganj-I, Bhatapara and Bargarh on sowing by tractor drawn Zero till seed drill after harvest of *kharif* paddy crop. Results of mustard sowing showed an increase of 19.51 percent over conventional sowing after field preparation. The net return also increased in the case of sowing by tractor drawn Zero till seed drill. Overall the use of Zero till seed drill reduced the cost of cultivation and facilitated in timely sowing and increased yields.

Table 2.75: Effect of Zero tillage on crop yield

Details	No. of trials	Crop	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Conventional sowing after field preparation (FP - T_1)	5	Mustard	8.2	19810	2.13
Sowing through tractor drawn Zero till seed drill (T_2)		Mustard	9.8	28790	2.82

Water use efficiency

Problem identified: Low water use efficiency and low yield under conventional irrigation systems.

Technology assessed: Drip irrigation system

The conventional system of irrigation requires high amount of water and has low irrigation efficiency. At times conditions of water logging creates problems as the yield decreases. Drip irrigation system not only provides uniform application of irrigation water but also creates an environment conducive for better crop growth. KVK Bargarh, Mayurbhanj-II, Seoni, Angul and Gajapati conducted 38 OFTs on use of drip irrigation system in banana, cabbage, cauliflower, onion and tomato. KVK Seoni, Mayurbhanj-II, and Gajpati have considered the initial cost of installation of drip irrigation in their trials following which the BC ratio is showing a decreasing trend. Here it may be noted that the increase in yield recovers the cost of installation over the years and eventually the whole setup becomes profitable. KVK Seoni also utilized plastic mulch in drip irrigation. Results of the trials are encouraging.

Flood irrigation in cauliflower

Drip irrigation in cauliflower

Table 2.76: Effect of drip irrigation on crop yield

Details	No. of trials	Crop	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Conventional irrigation (flood / furrow) ($FP - T_1$)	38	Banana	203	600000	1.73
		Cabbage	224	130545	3.91
		Cauliflower	155	75300	1.94
		Onion	150	45000	2.5
		Tomato	482	143425	3.09
Drip irrigation (T_2)		Banana	221	77500	1.83
		Cabbage	294	175100	3.55
		Cauliflower	180	45040	1.33
		Onion	200	65000	3.85
		Tomato	642	161690	2.60

Problem identified: Low infiltration and poor surface drainage develops water stagnation thereby affected the initial plant population and crop performance

Technology assessed: Raised Bed sowing through bed planter

Low yield of chickpea due to poor plant population, heavy wilt incidence in compact soil and poor nitrogen fixation has been observed in flat bed sowing. Even in the case of pigeon pea and soybean low infiltration and poor surface drainage due to flat bed sowing develops water stagnation thereby affecting the initial plant population and crop performance. Similar is the case with potato. Under such circumstances it was necessary to cultivate crop on raised beds as it resulted into better rainwater management. KVK Indore, Dewas, Damoh, Khandwa, Shajapur, Narsinghpur, Korea, Kawardha, Shivpuri, Bhatapara, Seoni and Bhopal conducted 106 OFTs on raised bed. The results were very encouraging. Yield under raised bed planting increased by 36 percent in chickpea, 25 percent in pigeon pea, 68 percent in potato and by 37 percent in soybean over that of flat bed sowing. Eventually, raised bed sowing was found to be a better approach for rainwater management.

Raised bed planting of pigeon pea

Rainwater management on raised beds

Table 2.77: Effect of raised bed sowing through bed planter

Details	No. of trials	Crop	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Flat bed sowing (FP - T_1)	106	Chickpea	12.35	33902	2.49
		Pigeon pea	12.5	33650	2.48
		Potato	159.18	41128	2.32
		Soybean	11.47	15981	1.68
Raised bed sowing through Bed Planter (T_2)		Chickpea	16.77	47531	2.93
		Pigeon pea	15.6	46200	2.93
		Potato	267.33	50973	3.14
		Soybean	15.75	26862	2.13

Farm Mechanization

Problem identified: Low germination percentage, problem in intercultural operation, uneven spread of seeds and low yield under broadcast sowing of rice.

Technology assessed: Sowing of pre germinated rice seeds through eight-row rice drum seeder.

There is a general practice of sowing of rice through broadcast method. Broadcasting results in higher seed rate. In addition the percentage of germination in case of broadcasting is also low. Even the interculture operations cannot be done properly in such fields. The net effect is lowering of rice crop yield in broadcasted fields. KVK Seoni, Dhamtari, Bastar, Dantewada, Mahasamund and Gajpati conducted 32 OFTs on sowing of pre germinated rice seeds through eight-row rice drum seeder. Yield in case of rice drum seeder was higher and was 43.7 q/ha as against 38.3q/ha obtained in the broadcasting method. The incremental nets return per ha in case of rice drum seeder was Rs. 13195/- over broadcasting method. The BC ratio under the broadcasting system was 1.6 which increased to 2.4 under the rice drum seeder. In all the results of rice drum seeder were encouraging as compared to the broadcasting method.

Germinated rice seeds

Rice sowing by Drum seeder

Table 2.78: Yield response of pre germinated rice seeds sown through rice drum seeder

Details	No. of trials	Crop	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Broadcast sowing of rice (FP - T_1)	32	rice	38.3	20456	1.6
Sowing of pre germinated rice seeds through rice drum seeder (T_2)		rice	43.7	33651	2.4

Problem identified: Higher seed rate and less number of effective tillers affected crop productivity under conventional broadcasting method of sowing.

Technology Assessed: Use of seed cum fertilizer seed drill for line sowing

The conventional broadcasting method of sowing of seeds on one hand results in higher seed rate and on the other hand lesser number of effective tillers. Even the interculture operations becomes difficult in broadcasting method. Eventually yields under broadcasting method are lower as compared to line sowing. KVK Angul, Korea, Jaipur, Dhenkanal, Bastar, Kanker, Mayurbhanj-I and dantewada conducted 97 OFTs on line sowing through seed cum fertilizer seed drill. A total of ten crops were tested. Results of yield, net return per ha and B:C ratio of the different crops are tabulated below. It is well clear from the results that the line sowing through seed cum fertilizer drill is better than broadcasting of seeds. Seed cum fertilizer drill facilitates proper seed rate, good seed germination and uniform application of fertilizer, timely interculture operations and eventually higher crop yields.

Tractor drawn seed cum fertilizer drill for groundnut sowing

Line sown groundnut crop

Table 2.79: Effect of line sowing through seed cum fertilizer drill on crop yield

Details	No. of trials	Crop	Yield (q/ha)	Net return (Rs/ha)	B:C ratio
Broadcast sowing (FP - T_1)	97	Blackgram	4.5	20000	2.74
		Chickpea	7.5	10140	1.42
		Field pea	5.31	9850	1.67
		Groundnut	18.4	37583	2.04
		Linseed	3.54	7460	1.84
		Maize	40.35	24528	1.98
		Mustard	3.14	12730	1.68
		Rice	33.1	14793	1.52
		Wheat	42.1	51570	3.56
Line sowing through seed cum fertilizer seed drill (T_2)		Blackgram	5.1	22700	2.75
		Chickpea	9.7	24000	2.20
		Field pea	7.45	17960	2.10
		Groundnut	20.25	46784	2.36
		Linseed	5.95	16950	2.64
		Maize	44.25	31484	2.38
		Mustard	5.24	28590	2.20
		Rice	36.55	20550	1.83
		Wheat	46.5	58050	3.76

Problem identified: Loss of time and labour in manual harvesting by sickle

Technology Assessed: Harvesting of crop through vertical conveyor reaper

Traditional harvesting method with sickle is time consuming requires more manpower and cost. Risk of adverse effect of weather viz. rainfall, storm, hail etc. harvesting operation persists. Moreover the field preparation for the next crop also gets delayed. KVKs of Korba, Kawardha, Mandla and Mandsaur conducted 35OFTs on use of vertical conveyor reaper in harvesting of rice and wheat crop. Results of KVK Korba and Mandsaur are reported show considerable saving in labour and time in the case of vertical conveyor reaper.

Harvesting of wheat by self-propelled vertical conveyor reaper

Harvesting of rice by self-propelled vertical conveyor reaper

Table 2.80: Labour and time saving on using vertical conveyor reaper for harvest of field crop

Details	No. of trials	Crop	Labour (man-hr/ha)	Field capacity (ha/hr)	Net return (Rs/ha)	B:C ratio
Use of sickle for harvest of field crop (T_1)	35	Rice	152	0.007	12715	1.64
		Wheat	77.16	0.013	37250	2.58
Use of vertical conveyor reaper for harvest of field crop (T_2)		Rice	3.12	0.32	15964	1.85
		Wheat	5.56	0.18	38850	2.77

LIVESTOCK PRODUCTION AND MANAGEMENT

Animal Feed Management

Problem diagnosed: Low milk yield due to lack of essentials mineral in feed

Technology assessed: Assessment of metho-chelated minerals mixture on milk production in dairy cattle/buffaloes

Metho-chelated minerals are one in which chelated organic trace minerals are bound to organic ligands through coordinate covalent bonds. The traditional inorganic trace minerals rapidly dissociate in rumen and free to interact with antagonists leading to loss of these trace minerals in gut before its absorption by animals. Therefore, the benefits of supplementing metho-chelated minerals mixture is that it forms a bond between the ligand and the mineral can prevent the mineral from interacting with antagonists and improve its bioavailability. Metho-chelated mineral mixture contains trace minerals (Ca, P, Mg, Mn, Fe, I, Cu, Zn, Co, S, K, Na & Se), stable vitamins (Vitamin A, D_3, E & B_3) and bypass methionine complex which helps to overcome deficiency in ration and helps in increase of milk yield.

Seven KVKs (06 from MP and one from CG) from the Zone conducted 60 OFTs on effect of supplementing metho-chelated minerals mixture for increased milk production along with daily feed. With the use of the above preparation the average milk yield and net returns increased by 14.81 and 23 percent respectively indicating beneficial effect of the mentioned preparation and enhancement in milk production.

Farmers with mineral mixture

Feeding mineral mixture to animal

Table 2.81: Performance of metho-chelated minerals on milk production in dairy cattle/buffaloes

Details	No. of trials	Average milk yield (lit/day)	Avg. net returns (Rs.)	B:C ratio
No feeding or feeding of plain mineral mixture along with feed ($FP - T_1$)	60	6.21	3276	1.97
Feeding of metho-chelated mineral mixture along with feed @ 30 g/animal/day (T_2)		7.29	4255	2.17

Problem diagnosed: Low milk yield in lactating animals due to calcium deficiency after parturition

Technology assessed: Assessment of oral calcium supplementation on milk production in lactating animals

The animal skeleton tissues consist of about 80 to 85 percent of the total body mineral matter, Among all calcium is the major mineral providing structural and neuromuscular strength. Its deficiency in blood is associated with various metabolic and production disorders. So, the supplementation of calcium after calving or during lactation is very essential. Oral calcium supplementation is the source of calcium and its physical form greatly influence calcium absorption and blood calcium responses. Prophylactic treatment with oral calcium around calving can reduce the risk for postpartum problems and increase milk yield of dairy animals.

Three KVKs (02 from MP and one from CG) from the Zone conducted 24 OFTs for improving milk production and decrease in incidence of deficiency disease of calcium during lactation. The above study revealed that with use of oral calcium there was increase in average milk yield and net return by 16.10 and 22.7 percent respectively indicating that oral calcium is good source of calcium for improving milk production of dairy animals.

Table 2.82: Performance of oral calcium supplementation on milk production

Details	No. of trials	Average milk yield (l/day)	Avg. net returns (Rs.)	B:C ratio
No Ca supplementation for lactating animal ($FP - T_1$)	24	9.90	6102.70	1.60
Liquid Ca supplement @100 ml/d/animal (T_2)		11.80	7895.40	1.82

Training on use of oral calcium suspension to dairy farmers

Problem diagnosed: Poor growth in goats due to imbalance concentrate feeding

Technology assessed: Assessment of balance concentrate feeding on body growth performance in goats

Goats are mainly kept by the poor farmers in extensive system under ranged condition without any supplementation leading to reduced growth rate and poor reproductive performance. So to overcome this along with browsing these animals should be fed with concentrate in a balanced form. Concentrate mixture is well balanced in protein and energy which is helpful in gaining body weight and improving other production performance.

Four KVKs (02 from MP and 02 from Odisha) from the Zone conducted 43 OFTs for increasing body weight in growing goats. The above studies revealed that balance concentrate feeding in growing goats increases average body weight and net return by 13 and 29 percent, respectively indicating that balanced concentrate feeding along with mineral mixture supplementation helps in gaining body weight in goats.

Feeding concentrate mixture to goats

Concentrate mixture feeding to goat kid

Table 2.83: Performance of balance concentrate feeding and deworming in goats

Details	No. of trials	Average body weight (kg)	Avg. net returns (Rs.)	B:C ratio
Imbalance concentrate feeding without mineral mixture supplementation (FP - T_1)	43	15.4	3275.75	2.60
Balanced concentrate feeding + mineral mixture + de-worming (T_2)		17.7	4609	3.27

Problem diagnosed: Low milk production from high lactating dairy animals due to low dietary energy intake

Technology assessed: Bypass fat (rumen protected fat) in diets of high lactating animals

Bypass fat are also called rumen protected fat as they resists lipolysis and bio-hydrogenation in rumen by rumen micro-organisms, but gets digested and absorbed in lower digestive tract. Feeding bypass fat supplement to high yielders during advance pregnancy and early lactation helps in minimizing the energy deficiency. This in turn would help in improving milk production and reproduction.

Five KVKs (02 from MP and 03 from Odisha) from the Zone conducted 61 OFTs for increase in milk yield and fat percent. These trials revealed that there was an increase in average milk yield and net return by 20 and 26 percent, respectively, indicating that the bypass fat escapes the rumen degradation and helps in providing energy to the animal for higher milk production.

Cow fed with bypass fat mixed feed

Cow fed with bypass fat

Table 2.84: Performance of bypass fat feeding on milk production in dairy animals

Details	No. of trials	Average milk yield (l/day)	Avg. net returns (Rs.)	B:C ratio
No use of bypass fat in feed (FP-T_1)	61	7.98	3055	2.08
Bypass fat @100 g/animal/day in feed (T_2)		10.0	4114	2.20

Problem diagnosed: Low milk yield due to lack of or poor feed additives in milch animals

Technology assessed: Probiotics supplementation to enhance milk production in lactating dairy animals

Probiotics are live cultures of non-pathogenic organisms which are administered orally in adequate amounts, confer a health benefit on the host by improving its intestinal microbial balance. Because of the growing concern about antibiotic resistance, the probiotics provides a potential alternative strategy to prevent the practice of sub therapeutic antibiotic. In ruminants feed additive yeast (*Saccharomyces cerevisiae*) in the form of live culture, has proved to a successful in beneficially modifying rumen fermentation and enhance milk production in milch animals.

Five KVKs (03 from MP and 02 from Odisha) from the Zone conducted 48 OFTs for enhancing mik production. The study revealed that there is an increase in average milk yield and net return by 15 and 26 percent, respectively, indicating that the probiotics supplemented along with normal feed improves the efficacy of forage digestion and quantity and quality of milk production.

Table 2.85: Performance of probiotics to enhance milk production in milch animals

Details	No. of trials	Average milk yield (lit/day)	Avg. net returns (Rs.)	B:C ratio
Feed without probiotic supplementation (FP - T_1)	48	5.51	3219	2.39
Feed with probiotic supplementation (T_2)		6.52	4374	2.55

Probiotic powder distribution to farmers


Mixing probiotic in feed

Animal Fodder Management

Problem diagnosed: Low milk yield and high cost of milk production in summer season due to unavailability of green fodder

Technology assessed: Green fodder on production performance of lactating dairy animals

The most important nutrient source for ruminants is roughage which is met mainly through fodder. Green fodder is an economic source of nutrients for the dairy animals as this helps in enhancing the rumen microflora thus improving digestibility which further helps in maintaining good health and increasing quality and quantity of milk.

Nine KVKs (06 from MP, 02 from CG and 01 from Odisha) from the Zone conducted 86 OFTs for enhancing milk production especially during summer season when there is unavailability of green fodder. The study revealed that there was an increase in average milk yield and net return by 17 and 28 percent respectively, indicating that along with normal concentrate feed and dry fodder, green fodder is also essential for improving production of an animal.

Table 2.86: Performance of green fodder on milk production of milch animals

Details	No. of trials	Average milk yield (l/day)	Avg. net returns (Rs.)	B:C ratio
Feeding only dry fodder ($FP - T_1$)	86	4.60	2351	1.93
Feeding dry along with green fodder (T_2)		5.55	3257	2.16


Hybrid Napier at farmers field


Berseem cultivation at farmers field

Problem diagnosed: Low milk production due to unavailability of green fodder in the diet of milch animal

Technology assessed: *Azolla* as feed supplement for sustaining milk production

Azolla is a floating fern and belongs to the family of Azollaceae, has high protein content, essential amino acids, vitamins, growth promoter intermediaries and minerals like calcium, phosphorus, potassium, ferrous, copper, magnesium etc. The carbohydrate and fat content of *Azolla* is very low. It is very easy to cultivate and is an ideal feed for cattle and other animals.

Five KVKs (from MP) from the Zone conducted 40 OFTs to assess the effect of *Azolla* as green fodder for sustaining milk production. The results revealed that there was an increase in average milk yield and net return by 13 and 14 percent, respectively, indicating that when *Azolla* is supplemented with existent feed regularly at appropriate amount, is beneficial in improving production of an animal.

Azolla cultivation at farmers field

Azolla feeding to animal

Table 2.87: Performance of Azolla as feed supplement on milk production

Details	No. of trials	Average milk yield (l/day)	Avg. net returns (Rs.)	B:C ratio
Feeding only dry fodder (FP - T_1)	40	4.84	3031	2.45
Feeding dry fodder along with Azolla @ 1 to 1.5 kg / animal/day (T_2)		5.55	3506	2.62

Animal Health Management

Problem diagnosed: Low yield in terms of milk and body weight due to heavy ecto-endo parasites infestation in livestock

Technology assessed: Anti-parasitic drugs on control of parasites for production performance

Parasites are a major cause of disease and production loss in livestock frequently causing significant economic loss and have impact on animal welfare. To combat this problem, planned

Ivermectin injection for ecto-endo parasite control

Farmer applying herbal oil to control ectoparasite

preventive programs are necessary to minimize the risks of parasitic disease outbreaks and sub-clinical losses of animal production by affecting productivity such as weight loss, reduced milk production, reproductive inefficiency etc.

Six KVKs (04 from MP and 01 each from CG and Odisha) from the Zone conducted 40 OFTs for assessing the effect of different anti-parasitic drugs for the control of various ecto and endo parasites as well as herbal drugs such as neem leaves oil and karanj oil for the control of parasites in livestock. This resulted in reduction of incidence of parasites along with increase in average milk yield and net return by 16 and 16.44 percent, respectively.

Table 2.88: Performance of anti parasitic drugs for ecto-endo parasites management

Details	No. of trials	Average milk yield (lit/day)	Avg. net returns (Rs.)	B:C ratio
No use of anti-parasitic drugs to control ecto-endo parasite (FP - T_1)	40	4.21	2306	2.14
Control of ecto-endo parasites by using correct anti-parasitic drugs routinely (T_2)		5.00	2760	2.39

BACKYARD POULTRY

Problem diagnosed: Low income due to poor body weight gain and egg production of local breeds of poultry reared in backyard/semi range system

Technology assessed: Improved variety of poultry birds in backyard rearing system

Backyard poultry production is being practiced by the farmers since long time in rural areas but due to rearing of local/indigenous variety of poultry birds with poor production performance leads to low return. However, the backyard poultry production can be easily boosted up with improved varieties of chicken/ducks and can promise a better production of meat and eggs.

Fifteen KVKs (05 from each M.P, C.G and Odisha) of the Zone conducted 565 OFTs on assessment of improved variety of poultry birds (Kadaknath, Black Plymouth Rock, Vanaraja, Gramapriya, RIR, Giriraja, Red Cornish, Narmada Nidhi etc.) in backyard free range system with better management resulting in increase in average body weight by 27.12 percent and eggs by 44 percent with net return by 37.7 percent.

Scientist visit at farmer backyard

Rural women rearing poultry in backyard system

Table 2.89: Performance of improved poultry bird in backyard system

Details	No. of trials	Avg. body weight (kg.)	Avg. egg production/ month (nos.)	Net returns (Rs.)	B:C ratio
Rearing of Local bird (poor in egg and meat production) (FP - T_1)	565	1.04	10	1554	2.06
Rearing of improved poultry bird (Kadaknath, Vanaraja, Gramapriya, Narmada nidhi) with better health and feeding management (T_2)		1.43	18	2497.34	2.63

FISHERY

Fish-cum-Duck Farming

Problem diagnosed: Low fish yield due to lack of natural feed in village ponds

Technology assessed: Fish cum duck farming at village ponds

Village ponds are being utilized for domestic purposes and no inputs are allowed into it for fear of killing the aesthetic value of the pond. So only fish seed as input is being allowed and any other input is taken as a cognizance offence by the villagers hence fish productivity is very low. To overcome this problem, integration of fish with duck farming was introduced as it is socially acceptable. Duck droppings serves as organic manure for the growth of plankton a high protein natural feed for fishes enhancing production of fish.

KVK Ambikapur, Balaghat and Kawardha conducted 12 OFTs on assessment of integrated fish duck farming system at village ponds. Significant increase in production was found (30.51 q/ha) due to plankton growth with the help of duck droppings. Farmers also economically benefited from duck meat and eggs along with fish.

Distribution of ducklings


Grazing of ducks in pond

Table 2.90: Performance of integrated fish duck farming system

Details	No of trials	Avg. yield (q/ha)	Cost of cultivation (Rs)	Net return (Rs.)	B:C ratio
Stocking of fingerlings and traditional practice management (FP - T_1)	12	20.40	85313	115110	1.69
Stocking of fingerlings @ 6000-7000/ha and stocking of 90 days old ducks @ 250-300/ha (T_2)		30.51	114777	215074	2.22

Composite Fish Farming

Problem identified: Low yield are being obtained by farmers from single species / improper stocking of fish species.

Technology Assessed: Composite fish culture, mixed fish culture and polyculture using different fish species.

In order to obtain high production per unit area of water body, fast growing compatible fish species of different feeding habits are stocked together in the same pond so that all ecological niches are occupied by fishes. This system of pond management is called mixed fish farming. It is also known as Composite Fish Culture or polyculture. Optimum utilization of the pond's productivity for maximization of fish yield, the aim in composite fish culture is achieved through culture of fast growing, compatible fish species with complementary feeding habits occupying different ecological niche in pond. Carps satisfy these demands and since they feed on the lower links in food chain and accept low cost feed are economical to be cultured.

KVK, Bastar, Datia, Balaghat, Angul, Ganjam-I, Ganjam-II, Bhadrak and Dhenkanal conducted 41 OFTs on assessment of composite fish culture, mixed fish culture and polyculture using different fish in grow-out culture of carps showing increasing fish yield by 34.13 percent.

Stocking of fingerlings

Haul of fish produced

Table 2.91: Performance of composite fish culture

Details	No. of trials	Yield (q/ha)	Cost of cultivation(Rs)	Net return (Rs)	B:C ratio
No practices and do not stocked fish seed proper ratio. (FP - T_1)	41	20.01	82225	106437	2.65
Stocking 8000 fingerling/ha in the ratio 4:3:3 Catla:Rohu: Mrigala (T_2)		26.84	113723	175161	3.26

Fingerling Production in Seasonal Ponds

Problem diagnosed: Low survival rate and growth of fingerlings due to poor management practice and traditional supplementary feeds.

Technology assessed: Production of fingerlings (IMC) in seasonal ponds.

Production of quality fish seed is the key factor in aquaculture production. Growth and survival rate of fingerlings depends on management practice of seasonal ponds. Still farmers are using traditional feeds i.e. rice bran and mustard oil cake but there is urgent demand to use floating feed and slow sinking crumble feed as supplementary feeds which increase survival rate as well as growth of fingerlings.

KVK Ambikapur, Mahasamund, Kawardha and Bhadrak conducted 25 OFTs on assessment for production of fingerlings in seasonal ponds. Maximum survival rate (79%) was recorded by KVK Mahasamund, whereas average survival rate 57.75 percent was achieved in seasonal ponds.

Harvested fingerlings

Table 2.92: Performance of production of fingerlings in seasonal ponds

Details	No of trials (Nos.)	Survival rate (%)	Cost of cultivation (Rs)	Net return (Rs)	B:C ratio
Stocking of fry @2-3 lacs/ha and feeding rice bran and oil cake 2:1 as supplementary feed (FP - T_1)	25	45.15	80450	105185	1.98
Stocking of fry @2-3 lacs/ha and supplementary feed @ 5% total biomass (T_2)		57.75	110956	193658	2.57

Problem identified: Low production of fish without supplementary feed.

Technology assessed: Farm made feed from locally available ingredients in grow-out culture of carps

In the profitable fish farming, there is a need of regular supply of sustained and balanced food for fish growth. Supplementary feeds usually consist of feed materials available locally such as agricultural by-products i.e. groundnut oil cake, mustard oil cake, rice bran etc

KVK, Bastar, Raigarh, Dewas, Ganjam-II and Dhenkanal conducted 28 OFTs on assessment of farm made feed from locally available ingredients in grow-out culture of carps resulting in increasing fish yield by 53 percent.

Feed managment in carps

Table 2.93: Performance of feed management on fish yield.

Details	No. of trial	Yield (q/ha)	Cost of cultivation (Rs/ha)	Net income (Rs/ha)	B:C ratio
No use of supplementary feed (FP-T_1)	28	17.25	70495	89646	2.23
Farm made traditional feed (T_2)		26.40	112438	154278	2.86

3 FRONTLINE DEMONSTRATIONS

Frontline demonstration (FLD) is conducted to demonstrate the superiority of frontier and location specific proven technologies of agriculture and allied sector among the farming community and extension functionaries for up-scaling in the larger area as well as for generating the production data along with the feedback. During the year 2016-17, 966 FLDs were conducted on oilseeds, pulses, cereals, vegetables crops, cash crops, agro-forestry, millets, etc covering the total area 7461.02 ha and benefitting 19665 farmers. FLDs were also conducted on important income generating enterprises, covering the total area of 931.32 ha in the Zone IX including, 6230 units and 3295 beneficiaries.

Table 3.1: Summary of FLDs (State-wise) conducted in by KVKs of Zone-IX

State	Categories	No. of FLDs	Area (ha)/ Unit (no.)	Beneficiaries
Chhattisgarh	Crops	147	1378.48	3288
	Enterprises	31	90.85/52	354
Madhya Pradesh	Crops	537	4400.33	11128
	Enterprises	129	261.4/562	1611
Odisha	Crops	282	1682.21	5249
	Enterprises	109	579.07/5616	1330
Total	**Crops**	**966**	**7461.02**	**19665**
	Enterprises	**269**	**931.32/ 6230**	**3295**

Table 3.2: Summary of FLDs (Crops and enterprises) conducted by KVKs of Zone-IX

Crops	No. of FLDs	Area (ha)	Beneficiaries
Cereals	224	1014.78	2804
Fibres	5	21	60
Flowers	15	76.65	245
Fruits	24	35.45	174
Intercropping	8	15.4	95
Medicinal	6	12.3	40
Millets	10	43.2	109
Nuts	2	3	18
Oilseeds	200	2591	6089
Pulses	235	3165.06	7741
Spices	90	222.5	882
Vegetables	147	260.68	1408
Plantation crops	2	1.8	15
Total	**966**	**7461.02**	**19665**

Crops	No. of FLDs	Area (ha)	Beneficiaries
Enterprises (Units)			
Agro Forestry, Farm Mechanization, Fodder, Fish, Vegetable production	181	885.67	1122
Cattle, Dairy, Goatry, Poultry, Vermi-compost, Duckery, Quail		812	1077
Women empowerment	88	45.65/5418	1096
Total	**269**	**931.32/ 6230**	**3295**
Grand Total	**1235**	**8392.34/6230**	**22960**

Table 3.3: Summary of FLDs conducted by KVKs of Madhya Pradesh

Crops	No. of FLDs	Area (ha)	Beneficiaries
Cereals	105	594.1	1486
Fibres	4	20	55
Flowers	3	6.05	41
Fruits	9	14.25	75
Medicinal	4	11	25
Millets	10	43.2	109
Oilseeds	135	1559.5	3723
Pulses	164	1903.26	4546
Spices	58	162.5	638
Vegetables	45	86.47	430
Total	**537**	**4400.33**	**11128**
Enterprises (Units)	**No. of FLDs**	**Area (ha)**	**Beneficiaries**
Agro Forestry, Farm Mechanization, Fodder, Fish, vegetable production	90	237.2	502
Cattle, Dairy, Goatry, Poultry, Vermi compost, Duckery, Quail		542	691
Women empowerment	39	24.2/20	418
Total	**129**	**261.4/562**	**1611**
Grand Total	**666**	**4661.73/562**	**12739**

Table 3.4: Summary of FLDs conducted by KVKs of Chhattisgarh

Crops	No. of FLDs	Area (ha)	Beneficiaries
Cereals	49	299.3	672
Intercropping	1	4	10
Oilseeds	27	378	776
Pulses	37	598.4	1426
Spices	7	26	55
Vegetables	26	72.78	349
Total	**147**	**1378.48**	**3288**

Enterprises (Units)	No. of FLDs	Area (ha)	Beneficiaries
Agro Forestry, Farm Mechanization, Fodder, Fish, vegetable production	28	90.8	232
Cattle, Dairy, Goatry, Poultry, Vermi compost, Duckery, Quail		47	60
Women empowerment	3	0.05/5	62
Total	**31**	**90.85/52**	**354**
Grand Total	**178**	**1469.33/52**	**3642**

Table 3.5: Summary of FLDs conducted by KVKs of Odisha

Crops	No. of FLDs	Area (ha)	Beneficiaries
Cereals	70	121.38	646
Fibres	1	1	5
Flowers	12	70.6	204
Fruits	15	21.2	99
Intercropping	7	11.4	85
Medicinal	2	1.3	15
Nuts	2	3	18
Oilseeds	38	653.5	1590
Pulses	34	663.4	1769
Spices	25	34	189
Vegetables	76	101.43	629
Total	**282**	**1682.21**	**5249**
Enterprises (Units)	**No. of FLDs**	**Area (ha)**	**Beneficiaries**
Agro Forestry, Farm Mechanization, Fodder, Fish, vegetable production	63	557.67	388
Cattle, Dairy, Goatry, Poultry, Vermi compost, Duckery, Quail		223	326
Women empowerment	46	21.4/5393	616
Total	**109**	**579.07/5616**	**1330**
Grand Total	**391**	**2261.28/5616**	**6579**

Table 3.6: Summary of FLDs under Integrated Crop Management

Crops	No of FLDs	Area (ha)	No. of farmers	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cereals							
Maize	4	85.8	220	78.62	210.86	92955	234424
Pearlmillet	1	8	20	17.5	22.5	39250	54250
Ragi	1	2	5	12	15	7000	7500
Rice	19	94.98	251	622.16	794.31	442356	706657
Wheat	17	129.4	307	588.29	694.34	630602	763689

**FP-Farmer practices, ** RP-Recommended practice*

Crops	No of FLDs	Area (ha)	No. of farmers	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Flowers							
Marigold	1	1	13	102.8	82.6	90910	191210
Pusa Narangi Gainda	1	1	10	165	230	50500	69800
Sunflower	3	48	131	272.3	485.4	36600	150147
Fruits							
Banana	1	0.4	5	500	400	300000	170000
Mandarin	1	1	10	196.6	234.6	30993	32426
Watermelon	2	2.4	15	529.6	567.8	212870	275560
Intercropping							
Groundnut + Sunflower	1	1	5	22.5	20.5		50000
Millets							
Barley	4	24.8	57	164.27	176.03	110277	157199
Kodo	2	6	15	19.11	20.04	28580	42733
Kutki	1	2	5	4.9	8.6	3700	7275
Nuts							
Cashewnut	1	1	13	8.2	6.4	490	370
Oilseeds							
Groundnut	17	411	936	235.9	286.55	558795	707608
Linseed	9	197	408	45.54	73.4	91130	202794
Mustard	27	435.6	998	324.05	412.55	721912	1043149
Niger	5	140	325	13.48	23.09	46660	99986
Sesame	11	255.2	611	50.66	70.72	326922	454185
Soybean	30	498.2	1098	345.79	464.75	563186	1091591
Pulses							
Black gram	30	553.8	1376	584.72	703.42	657225	1036744
Chick pea	37	630.46	1532	459.75	615.33	1206349	1875887
Field pea	5	130	323	52.92	73.76	73734	122971
Green gram	16	408.4	1080	96.34	118.89	319559	453709
Horse gram	2	60	138	8.04	13.08	19980	39048
Lentil	14	229.8	522	143.17	158.62	356065	490247
Pea	1	4	20	3.5	4.49	3000	8940
Pigeon pea	27	530.2	1143	247	358.53	702763	1108545
Spices							
Chilli	4	6	45	603.32	791.97	383904	550888
Coriander	3	9.6	28	203	248.1	270620	392740
Fenugreek	1	5	5	8	10	12000	18000
Garlic	3	4.6	32	298.21	360.14	680083	860905
Ginger	2	7	15	312.42	413.34	953473	800863
Onion	7	34	133	964	1353.98	571885	845184
Turmeric	4	7.8	30	552.12	745.82	549985	844907

Crops	No of FLDs	Area (ha)	No. of farmers	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Vegetables							
Brinjal	3	1.2	15	835.4	949.9	186050	183050
Capsicum	1	2	10	165.74	245.61	50403	87219
Cauliflower	1	1	9	238.9	254.74	68510	74446
Cluster Bean	1	2	5	17.78	22.16	53412	42396
Cowpea	1	1	15	85.4	104.6	32320	45680
Gardenpea	1	8	25	87	107	50500	75000
Okra	1	2	10	61.73	92.99	30077	62946
Potato	2	5.4	17	208	232.75	69450	90600
Tomato	4	28	53	913.6	1153.5	264281	386632
Total	**330**	**5017.04**	**12039**				

Case Study-1

Higher Production of Soybean through Raised Bed Technique (KVK, Ujjain, M.P.)

Background

Soybean is the major *kharif* crop in the district that covers an area 4.53 lakh ha out of 4.89 lakh ha with average productivity of 14.2 q/ ha. Shri Kailash Chandra Panchal (47 years) of village Nahariya is a progressive farmer, educated up to 5th standard in school. The main source of income of family is farming from his 5.85 ha land nearby Undasa pond. He grows soybean crop during *kharif* season and harvest on an average 16-18 q/ ha.

Technology Demonstrated

Soybean variety JS 95-60@30 kg per acre + seed treatment with fungicide (Thiram + Carbendazim) @ 2.5 g/kg seed + seed Innoculating cultures namely; Rizobium culture@5ml/kg seed and PSB culture@5ml/kg seed + FIRB sowing method.

KVK intervention

KVK's Scientists survey the farmer's field during May-June 2016 (*https://www.youtube.com/watch?v=oI1xvKCXFH8)* and selected the field for displaying the technologies. Team met the farmer and discussed regarding *kharif* crop productivity and their constraints for higher yield. Shri Panchal agreed for adopting the new technology as per KVK's suggestions. The major factor like variety, RDF, sowing method, plant protections measures also were discussed. The sowing machine for FIRB was arranged with the help of district level Agricultural Engineering Department in the district. The BTM of ATMA-Ujjain also suggested farmers time-to-time.

Outcome

Practice used	Total cost of cultivation (Rs.)	Gross income (Rs.)	Net income (Rs.)	B:C ratio	% increase
Farmer's practice	14520	58464	43944	4.03	-
Recommended practice	16520	69600	53080	4.21	19.04

Table 3.7: Summary of FLDs on Integrated Disease Management

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cereals							
Rice	13	45.8	114	518.66	572.25	318143	401101
Wheat	1	2	5	44	47	33060	42020
Fruit							
Banana	2	3	12	1110.5	1330	396600	529000
Medicinal							
Betel Vine (Leaves In Lakhs)	1	0.5	5	18	27	790000	1485000
Oilseeds							
Groundnut	1	1	10	14.6	18.5	49770	65000
Linseed	1	10	10	5.5	7.8	10250	18550
Sesame	2	6	20	11	13.55	30782	43447
Soybean	3	29	83	24.86	35	43580	80831
Pulses							
Black gram	1	2	5	3.72	8.02	660	14960
Chick pea	4	8	20	47.62	68.97	129913	199210
Green gram	1	1	13	6.01	4.98	12200	16879
Lathyarus	1	4.8	12	5	7	4500	8000
Pigeon pea	2	4	10	19.2	25.9	50175	74585
Spices							
Chilli	3	7	30	488.11	634.45	225749	340126
Coriander	2	3	15	25.96	27.22	99140	93100
Ginger	1	2	5	77.5	99.5	90000	127000
Onion	2	6	22	344.77	410.69	72949	81869
Vegetables							
Brinjal	5	11.2	42	819.3	986.3	424140	512240
Cabbage	1	1	5	211.4	270	85208	113782
Cucumber	1	1	10	229	283	33831	36831
Okra	2	3	15	177.9	231.8	100400	147860
Onion	1	0.8	10	215	130	500	170
Potato	2	2	20	271	372	100300	180800
Sponge gourd	1	2.6	13	75	90	130000	160000
Tomato	2	5.32	18	662.2	897.6	319267	411862
Total	**56**	**162.02**	**524**				

Table 3.8: Summary of FLDs on Integrated Nutrient Management

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cereals							
Maize	6	16.8	52	209.42	233.29	166481	194650
Ragi	2	2	15	21.6	26.99	11150	18330
Rice	22	54.6	192	818.65	873.29	487969	578806
Wheat	11	32.9	94	390.38	478.54	403219	539552
Fibres							
Cotton	1	4	10	11.97	15.3	46591	61424
Flowers							
Chrysanthemum	1	2.5	10	102	117	165000	201020
Gladiolus (Spike)	1	10	10	135000	207130	241652	30912
Marigold	1	0.2	5	94	134	74200	116600
Tuberose	1	1	5	4.12	6.03	211523	345930
Fruits							
Aonla	1	0.25	10	37.4	5.7	9450	19000
Banana	3	3.4	15	1080	1166	669000	736200
Mango	1	2	10	0	0	0	0
Sweet orange	1	2	10	163	220	92800	155600
Watermelon	2	1.2	15	510.6	643.1	134900	211500
Millets							
Pearl millet	1	2	5	17.5	21.1	750	1200
Oilseeds							
Groundnut	7	10.2	52	92.99	118.15	159290	257130
Mustard	4	19.8	52	28.28	46	52907	104174
Sesame	1	0.5	10	5.48	7.35	10836	16020
Soybean	14	81.7	279	175.64	218.08	229395	339681
Pulses							
Black gram	5	18.6	56	35.55	46.13	86988	125087
Chick pea	12	36.6	102	144.75	184.93	366492	515799
Field pea	1	1	10	14.6	17.6	18085	24480
Green gram	6	13	51	38.45	46.51	116444	182162
Pigeon pea	4	9	33	35.16	48.46	81970	128055

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Spices							
Chilli	2	9	12	560	607	503100	576750
Coriander	1	10	10	51.7	31.5	38550	800150
Garlic	2	4.5	20	177.73	200.93	293970	367845
Ginger	2	4	23	205.85	273.53	610012	846633
Onion	5	6.4	35	1187.99	1381.43	575294	691896
Vegetables							
Brinjal	2	1.4	10	385	480	173800	251407
Capsicum	1	0.4	5	173	198	82900	105050
Cauliflower	7	13.4	46	1473.3	1935.4	650963	990845
Cucumber	1	0.8	10	210.6	245.9	149600	183250
Okra	2	2.4	15	273.1	310.2	209124	249079
Potato	2	3	15	312.3	393.4	91580	127940
Spine gourd	1	1	5	90	123	97797	182078
Tomato	5	6.22	56	1444.7	1725.7	362775	514541
Total	**142**	**387.77**	**1365**				

Table 3.9: Summary of FLDs on Integrated Pest Management

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cereals							
Maize	2	2	18	93.1	90.3	54651	71515
Rice	21	44.2	191	787.77	902.11	478606	613768
Wheat	3	8.8	27	95.75	115.16	89056	115544
Fibres							
Cotton	2	6	20	35.95	42.87	87180	112325
Fruits							
Guava	1	4	10	167.5	189.5	136250	156000
Papaya	1	1	10	388.4	494.3	29800	34125
Watermelon	1	2	5	362.2	500	127332	200000
Medicinal							
Betel Vine (Leaves In Lakhs)	1	0.8	10	44.1	50.5	157000	235600
Millets							
Little Millet	1	2.4	12	4.5	8	4650	9450
Nuts							
Cashewnut	1	2	5	0	0		
Oilseed							
Groundnut	1	2	10	14	20.8	21000	44700
Mustard	10	41.4	117	84.34	110.46	261166	429387
Sesame	1	5.2	13	5.04	6.39	35130	45205
Soybean	8	33	64	109.61	132.73	180509	269190
Sunflower	1	2	10	2	15.6	21720	28240
Pulses							
Black gram	2	4	17	102.2	148.9	20665	38470
Chick pea	13	99.8	250	172.32	215.18	611896	721387
Green gram	1	2	10	3.9	5.65	28400	53800
Pigeon pea	7	24.2	77	60.4	81.01	326845	481779
Spices							
Chilli	10	22.8	88	1502.2	1899.71	870351	1225534
Coriander	1	2	15	15	17.5	47000	56500
Garlic	1	5	12	85.2	104.4	261720	326340
Onion	5	11	35	901.5	1083.38	430541	591998
Vegetables							
Bottle Gourd	1	1	10	321.9	362	127900	150800
Brinjal	14	21.72	112	3062.6	3255.3	1328724	1820926

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cabbage	2	2	23	315.8	391.8	164320	230340
Cauliflower	2	3	5	554.8	573.7	231735	359115
Cluster Bean	1	2	5	14.2	19.1	27230	42490
Colocasia	1	2	12	161	107	56650	102950
Okra	2	3	20	202.3	241.8	81900	108990
Potato	2	2.6	20	373.3	385.9	133940	177620
Tomato	7	11.26	69	2208.9	2593.1	1000260	1178185
Total	**127**	**376.18**	**1302**				

Table 3.10: Summary of FLDs on Integrated Weed Management

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cereals							
Maize	1	4	10	25.14	34.63	12968	23450
Pearl millet	1	2	5	22.22	25.62	20828	26928
Rice	14	40.4	114	440.96	519.1	314717	438627
Wheat	9	88.8	219	327.36	407.01	341347	466758
Fibres							
Cotton	1	1	5	18	22	31300	41005
Oilseeds							
Groundnut	4	10.6	33	66.6	69	99766	182125
Soybean	6	25.4	64	70.27	90.3	123323	190069
Pulses							
Black gram	2	9.8	21	13.73	14.17	35048	36203
Chick pea	4	14.8	37	49.65	63.62	152565	211632
Field pea	1	5	10	16.96	22.58	12186	23904
Green gram	1	2	5	6.4	7.86	16040	21674
Pea	1	2	10	52	65.87	27388	41478
Spices							
Garlic	1	5	12	97.25	113.1	292875	347650
Onion	4	11.4	37	785.61	853.16	236420	315921
Vegetable							
Okra	1	1	10	112.2	132.8	39760	60240
Total	**51**	**223.2**	**592**				

Case Study-2

High yield in Chick pea under Cluster Demonstration through adoption of new technology (KVK, Burhanpur, M.P.)

Background

Agriculture is the backbone of the district and farmers are very progressive in nature. The main crops are Cotton, Soybean, Jawar, Maize, Chilli, Banana, Black gram, and Pigeon pea in *kharif*, whereas, Sugarcane, Wheat and Gram are the major *rabi* crops. Total cultivated area is 1,17000 ha which comprises about 30 percent of the total geographical area of the district. The district receives less rainfall hence rainfed. The irrigated area at present is only 40 percent of the total cultivated area. Among the *rabi* crops, chick pea is one of the important crop grown approx 7500 ha area with productivity of 16 q/ha. The low productivity is due to use of old variety, imbalance dose of fertilizer, traditional method of sowing with high seed rate, and poor management against pest and disease management. Shri Arun Raghunath Prajapati belongs to the village Hanumat Kheda is a progressive farmer, having total 12 acre of land with irrigation facilities. The main crop of *kharif* is Soybean, Cotton, Maize, Banana and Wheat, *Rabi* Maize and chick pea under *rabi* crops.

KVK Intervention

Shri. Arun Raghunath Prajapati is associated with KVK from since 2014, always open to adopt new technology/variety. Keeping above background in view KVK selected Shri Prajapati under chick pea cluster demonstration.

Technology Demonstrated

Improved seed variety –JAKI - 9218 + seed treatment with fungicide, ammonium molybdenum, rhizobium culture + direct seeding (dibbling) use of drip for irrigation and RDF with sulphur application.

Outcome

Practice used	Yield (kg/ha)	Total cost of cultivation (Rs.)	Gross income (Rs.)	Net income (Rs.)	B: C ratio	% yield increase
Farmer practices	1650	22000	74250	52250	3.37	00
Demonstration	2250	23500	101250	77750	4.30	26.66

Impact

Shri Prajapati harvested 22.5q/ha as compare to his earlier practice (16.5 q/ha). He was satisfied with use of drip in chick pea and reduced seed rate/ recommended dose of fertilizers. Quality seeds of variety JAKI 9218 are now available with farmers for further multiplication.

Chickpea at farmer's field

Table 3.11: Summary of FLDs on Varietal evaluation

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cereals							
Maize	6	14	48	243.17	276.45	172436	271294
Maize (Cobs)	1	1	5	46100	51500	49400	93800
Rice	24	147.1	367	803.64	908.99	439882	624496
Wheat	25	110	266	837.04	1035.14	850946	1121332
Flowers							
Marigold	4	5.95	41	523.06	617.19	250810	337876
Fruit							
Watermelon	1	1	10	222.5	295.1	86550	124750
Medicinal							
Nigella	1	5	10	10	13	62500	88300
Millet							
Kodo	1	6	15	5	9	5000	10850
Oilseeds							
Groundnut	2	31	85	29.4	37.98	50415	80425
Mustard	4	77.2	193	51.24	67.29	101683	155671
Niger	1	4	10	1.82	2.48	14560	19840
Sesame	5	84	223	20.55	24.62	38383	65642
Soybean	10	99	178	131.49	173.87	207150	260327
Sunflower	1	5	10	0	10.5	0	15326
Pulses							
Black gram	3	24	40	27.47	34.55	48716	107160
Chick pea	15	119.2	274	192.92	253.81	620072	901126
Green gram	2	41.8	107	10.41	10.61	35440	38460
Field Pea	1	1	8	59.4	98.8	53480	91360
Pigeon pea	4	77	193	35.34	52.94	101655	171466
Red gram	1	12.8	32	11.8	16.9	47000	69540

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Spices							
Chilli	2	2.2	10	438.65	547.7	235080	496480
Coriander	2	4	25	10.15	85.17	69190	310322
Fenugreek	4	8.9	47	130.08	154.18	151560	224259
Ginger	1	0.2	7	0	127.5	0	199710
Onion	8	8.6	74	1534.96	1621.16	773543	1366716
Turmeric	2	2.1	15	208.4	260.8	323430	465930
Vegetables							
Bean	1	1	10	92.11	122.89	57111	85738
Bitter gourd	2	3	27	215.63	206.96	153440	198475
Bottle gourd	1	1	10	290.66	433.38	122480	188510
Brinjal	7	9.45	56	1425.82	2074.91	557234	713471
Broccoli	2	1	18	182	257	95740	181600
Capsicum	4	2.53	25	387.27	565.92	300338	572989
Carrot	1	2	19	179.12	206.56	69507	81773
Cauliflower	3	1.9	21	510	587.5	294800	479500
Colocasia	2	9	9	284.3	365.9	155108	244204
Cowpea	5	8.4	33	383.52	572.54	215784	374535
Elephant foot yam	1	0.42	5	0.42	220	121880	560480
Okra	2	2	10	261.6	289.4	111280	246760
Onion	1	1	10	180.4		196200	
Potato	5	7.1	98	778.31	1077.3	394869	621090
Radish	1	1	20	201.62	229.29	60591	69851
Spinach	2	1.2	23	192.02	234.86	44809	63179
Sweet Potato	2	3	20	204	302	55000	92000
Table Pea	1	5	73	45.5	89.8	91000	182600
Tomato	12	26.16	108	3801.1	5102.98	1663464	2294591
Total	**186**	**978.21**	**2888**				

Case Study-3

High Value Vegetable Cultivation (KVK, Gajapati, Odisha)

Background

Shri Iswar Raita - a small farmer of village Kankadaguda, Block - R. Udayagiri, Gram Panchayat- Sabarpalli is heading a 5 member family and owns 4 acre of land. He cultivates maize in 2 acre, rice in 2 acre in *kharif* season and has four cattles. He was producing maize given by Sahukar along with all the inputs from which he was earning very low profit. Due to lack of guidance he was unable to utilize the perennial water source nearby his field during the *rabi* season.

KVK intervention

Shri Iswar Raita is a hard working and adoptive farmer. After the advise, technical guidance and motivation from the KVK Scientists he procured hybrid maize seed and other inputs by himself rather than Sahukar, adopted improved package of practice, soil test based fertilizer application in rice and maize, use of micronutrient in maize, pest management in rice and saved money out of it. Through the proper advice and guidance he procured a pair of cattle and one pump set from the saved money which he utilized in vegetable cultivation during *rabi* in half acre of land. Under OFT and FLD programme he was provided with two honey bee boxes, high value vegetable (Broccoli, Cauliflower, Tomato, Brinjal, Onion) seedlings. Scientist had regular visit to his fields. Since then he has been in touch with KVK, Scientist, attending different meetings and farmer scientists interaction etc.

Output- Profit-Share Analysis

Crop	Gross cost (Rs.)	Gross return (Rs.)	Net return (Rs.)
Hybrid Maize	18000	35000	17000
Rice	13000	28000	15000
Vegetable	20000	55000	35000
Apiary	2500	1200	-
Total	**53500**	**119200**	**67000**

Outcome :

Gain in knowledge	Before	After
Improved cultivation techniques	Moderate level of knowledge	Higher level of knowledge gained
Skill - Seed treatment, Soil test based fertilizer application, Inter culture, Intercropping, Pest and diseases management	Low level of skill	Skill developed upto moderate level
Role in technology dissemination	Very low	Self motivated and in guidance with KVK
Involvement of women farmers	Shy and hiding introvert	Skill developed and better oriented towards participation in capacity building programmes organized by KVK

Impact

As a small tribal farmer he became a role model for all the other farmers of Kanakadaguda and nearby villages of R.Udayagiri block. He was also a member of SAC committee during 2016-17. He's further plan is to buy a tractor and increase the vegetable area up to 1 acre to produce vegetable throughout the year.

Scientists visiting farmer's vegetable fields

Case Study-4

Successful *Kharif* Potato Production (KVK Surguja, C.G.)

Background

Mainpat block situated 65 km away from Surguja district headquarter is known as 'Shimla' of Chhattisgarh. The farmers of Mainpat block grow *kharif* potato for the past several years but due to lack of technical knowledge its productivity has slided down over a last couple of years.

KVK intervention

Shri Matthias Son of Shri Atva lives in Aamgaon village of Mainpat block. He got advance technical knowledge of *kharif* potato, from KVK, Ambikapur (Surguja) on use of healthy seed material, seed treatment, sowing in furrow, timely use of balance fertilizer dose.

Output

With the help of advance technical knowledge on *kharif* potato production, the farmer has got huge production with less cost of cultivation.

Outcome

Earlier Shri Matthias use to get 100-130 q/ha. production, but this year he harvested 217 q/ha. potato and earned Rs. 2,05,500 net profit/ha.

Impact

The farmers of nearby villages saw the scientific way of *kharif* potato cultivation and are adopting new potato production technology.

Kharif potato at farmer's field

Table 3.12: Summary of FLDs on Intercropping

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Capsicum + Maize	2	4.0	40	583.15	787.63	900420	1111228
Pointed gourd + Onion	1	4.0	25	177.6	199.44	135150	156102
Total	**3**	**8.0**	**65**				

Table 3.13: Summary of FLDs on Livestock and Poultry Production

Thematic area	No. of FLD'S	Area (ha)/ No.of animals or birds	No. of farmers	Yield (q/ha)		Net return (Rs.)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Cattle/Buffalo (Average milk yield-l/day)							
Nutrition management	27	404	314	7.13	8.35	146	233
Health/Disease management	10	102	96	4.23	4.84	79	102
Feed/Fodder management (ha)	14	28	122	5.36	6.61	103	138
Goat/Sheep (Average body weight in kg)							
Nutrition management	2	47	18	10.32	13.10	993	1321
Health/Disease management	6	237	46	10.00	12.02	1710	2190
Others (Shelter, heat stress, production, breeding management)	3	55	18	10.70	13.94	2968	5366
Poultry (Average body weight in kg)							
Backyard poultry production	10	2155	164	1.05	1.94	137	243
Nutrition management	4	30	104	1.15	1.65	155	386
Health/Disease management	2	1300	16	1.43	1.96	238	352
Others (Duck rearing etc.)	5	691	59	1.08	1.76	79	193
Total	**83**	**5021 (nos.) and 28 ha**	**957**				

Case Study-5

Organic vegetables and spices production by tribal women SHGs (KVK, Dhar, M.P.)

Background

Dhar is tribal dominated district consisting three agro climatic zones under which more or less resources are available in time for their livelihood security especially of tribal farmers and farm women. The farmers in the village are marginal land holders (0.5 to 3.0 ha) soil fertility is very poor resulting low yield of crops.

KVK intervention

A SHG of 10 farm women was formed by KVK with the help of DSC- an NGO of Gujarat working in Dhar. The SHG made collection and saved Rs. 62643/- during the year. They were motivated for organic farming and imparted On-campus as well as Off-campus training by KVK scientists for vermin-composting. Exposure visits to improve soil fertility and organic farming in small holding were also organised by the help of KVK Scientists. Smt Khajuri Bai of the village provided the land to the SHG for starting the project of Vermi composting. All the members decided to work together in group participatory approach and each member will help for 2 hours for the collection of farm waste, cow dug and other required material. Initially they prepared 5 beds of 10X5X2 feet. They purchased required equipments and 10 kg worms @ Rs 250/- per kg with the help of KVK.

Output

All the 10 members contributed manual labours and produced 20 q compost in six months. They distributed among them 2.0 q compost among each member for cultivation of ginger, Chilli and cucurbitaceous vegetables.

Outcome

During following 6 months they prepared 40 q vermicompost and sold @ Rs. 500/q to other farmers earnning Rs 20,000/-. Presently, most of the farmers in the village are only using organic products in their small holding. They are selling organic vegetables to nearby market of Kukshi at higher prices. As per the data collected from SHG members by KVK ginger was sold @ Rs 100/- per kg which is preferred by the consumers. In this way they earned 30 percent more income. Others farmers of the same village and neighbouring villages are contacting to the SHG for knowing the technology.

Impact

At present in addition to SHG members, 23 more farm and farm women have adopted organic farming and selling Vermicompost as well as worms. In the village 12.5 ha area has come under organic farming and farmers of other three adjoining villages also adopted organic farming and preparing organic products like vermin wash, vermin compost.

Vermi-composting as an enterprise by SHG women

Table 3.14: Summary of FLDs on Small Scale Income Generation

Crop	No. of FLDs	Area (ha)	No. of farmers	Yield (q/ha)		Net return (Rs.)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Income Generation							
Aonla /Aonla supari (Salty)	1	0	13	0	0	270	1388
Backyard poultry farming	4	200	45	0	0	5779	20507
Soybean /fortified soy paneer (Tofu)	1	0	13	0	0	260	2181
Vegetable production	21	1661.54	505	129837.3	56751.2	362101	605566
Vermi compost	8	8	58	6275.8	9845.4	12266	34857
Lac cultivation	5	91	54	21.8	43.98		
Duck cum fish farming	1	1	5	26000	29000	90000	105000
Bee- keeping							
Honey Bee	3	4	12	0	0	375	775
Mushroom production							
Paddy straw mushroom	6	250	138	2.25	163.25	53	12710
Oyster mushroom	11	20	154	1.848	68.292	571	56513
Nutritional Kitchen Garden							
Vegetable production	3	250	30				2835
Nutritional management							
Azolla	2	0	17	0	0	7760	11300
Resource Conservation Technology							
Vegetable production	4	25	31	17263.8	69503.6		
Grand Total	**70**	**2510.54**	**1075**				

Case Study-6

Bee Keeping: A Profitable Enterprize (KVK, Morena, M. P.)

Background

Shri Beniram Kushwah hails from village Mirghan which is situated 30 km away from district head quarter Morena in Ambah block. In Mirghan, farming is the main source of livelihood of farm families, they grow mostly pearl millet, sesame, black gram, pigeon pea, rapeseed- mustard, wheat and gram. Low productivity and income in the area is mainly due to lack of technical knowledge. Since 2007-08, Shri. Beniram Kushwah was motivated for bee keeping by Krishi Vigyan Kendra, and imparted vocational training.

KVK Intervention

Shri. Beniram Kushwah came in contact with KVK, Morena with problem of unemployment and poor economic status of the family. KVK provided Technical knowledge on beekeeping, honey processing, packaging, marketing, products of Honey bees (wax, propalis, royal jelly, pollen etc.), role of honey bee in pollination and crop productivity enhancement. Shri. Beniram was trained on various aspects of Bee farming.

Output: Shri. Beniram Kushwah started beekeeping using recommended technical practices by KVK with two bee colonies in 2007-08. He gradually increased bee colonies every year, as a result his honey production and income increased substantially with the scientific knowledge. He has increased bee colonies to 350 and income Rs. 14.92 lakhs per annum in the year 2015-16. He has refined his skill of honey production, queen rearing, mass multiplication, beekeeping management, other bee products and adopted options that reduced cost of cultivation.

Outcome

About 6-7 his family members and relatives are employed round the year in beekeeping. He is leading migratory honey bee in Chambal region. He harvested honey from pigeon pea, rapeseed-mustard, coriander, barseem, ajwain, adusa and forest plants. He has registered own firm namely M/s Beniram Honey Industry, Mirghan district Morena. At present Rs. 14.92 lakh earned from selling of honey and bee colonies.

Status of Beekeeping

Before intervention Beneram's annual income was very low, after intervention annual income is Rs. 1350000 from honey and Rs. 142000 by selling of bee colony.

Person employed

6-7 family members and relatives employed round the year.

Impact

Bee farming has brought prosperity in Shri Beniram's family and village Mirghan due to adoption of this technology by several farmers/rural youths. The productivity of rapeseed- mustard and pigeon pea increased 15 to 25 percent in the village by pollination on of honey bees. Introduction of medium duration pigeon pea in the village by villagers for availability of the flora Bee keeping increased economic and social status of the farmers.Mr. Kushwah work is recognized by society and follows several rural youth and landless farmers.

Training on bee-keeping at field condition

Case Study-7

Mushroom production by Women Entepreneurs (KVK, Angul, Odisha)

Background

Smt. B. Sahu was at a state of shock when she lost her husband. But she being a brave lady and encouraged by KVK. Smt. B. Sahu being a laborious lady and started growing mushroom in 2011. Initially she faced lots of problem but succeed as a mushroom entrepreneur. She is totally involved in Mushroom cultivation throughout the year and from this income she is maintaining her family and her children's education. She is training and guiding other farmers on mushroom in her locality and neighbouring villages. She also awarded on OUAT Foundation day as a mushroom entrepreneur.

KVK interventions

- Scientific management of Paddy straw mushroom cultivation training (2014-15)
- FLD on Oyster mushroom var. Hypsizygous *ulmarius* (2015-16)
- Vocational training on Mushroom spawn production (5 days) (2015-16)
- OFT on high yielding var. OSM 11 & OSM-12 (2016-17)

Output

Smt. B. Sahu recognized as progressive women mushroom enterpreneur and participated in state level Mushroom Federation meeting. Her annual income of Rs. three lakhs-an important indicator to measure individual standard of living. She is not only economically well off but today also caters to the good life style of her two children including their technical education. She has planned to construct a building for renting shops with an initial investment of rupees five lakhs.

Outcome

Crop/ Enterprise	Season	Area (ha/no.)	Before intervention		After intervention	
			Production	Net income (Rs)	Production	Net income (Rs)
Paddy	*Kharif*	0.8 ha	15 q	20,000/-	15 q	20,000/-
Paddy straw mushroom	*Kharif*	5400 beds	-	-	4860 kg	1,62,000/-
Paddy straw mushroom in poly house	*Rabi*	1200 beds	-	-	960 kg	48,000/-
Oyster mushroom (4 months)	*Rabi*	1200 bags	-	-	2400 kg	72,000/-
Total				**24,200/-**		**3,06,200/-**

Impact

She intends to increase the awareness of the advantages of taking of mushroom farming as a lucrative enterprise to augment the income of the poor. She also encourages and motivates women Self Help Groups to take up mushroom production and to include mushroom as part of their daily diet. She provide employment to two farmers and trained them as expert mushroom farmers

Mushroom production by entrepreneur

Table 3.15: Summary of FLDs on Farm Mechanization

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Farm Mechanization							
Banana	1	2	5	375	387.5	200000	220000
Black gram	2	2.4	13	9.3	10	34700	40500
Chick pea	2	8	13	9.65	13.55	18707	35664
Chilli	1	1	5	144.76	216.3	67770	114150
Digging of pits	1	2	5				
Field preparation	1	12	6		0	0	0
Garlic	2	5	8	95.64	93.22	133360	139940
Groundnut	3	2.8	25	51.4	52.4	68291	82895
Incorporation of weed	1	5	5		0	0	0
Maize	1	2	10				
Methi	1	2	5	38.2	41.8	32300	38700
Mustard	1	5	12	14.27	16.67	30991	38211
Paddy	1	10	10	38	46.5	28600	40100
Pigeon pea	1	2	5	14.6	16.8	56480	66640
Potato	2	4.5	8	177.6	172	71080	85100
Soybean	5	11	25	13.28	15.95	24480	33332
Wheat	6	36	63	82.52	94.47	123061	150817
Wheat & soybean	1	15	15	0	0	0	0
Rice	18	69.65	150	639.34	680.11	781435	539803
Tractor Drawn two bottom reversible MB Plough	1	10	0	0	0	0	0
Black gram/Power operated grain cleaner	2	26	26	0	0	62200	62800
Chick pea	1	5	13	11.5	16.48	36080	43880
Garlic/ Garlic planter	2	5.2	26	161.96	176.02	544840	606080
Soybean/Tractor operated boom sprayer	2	5.2	26	29.62	32.04	29260	36720

Crops	No. of FLDs	Area (ha)	No. of farmers Total	Yield (q/ha)		Net return (Rs/ha)	
				FP (T_1)	RP (T_2)	FP (T_1)	RP (T_2)
Wheat/Rotavator	2	5.2	26	74.36	82.92	71876	87572
Wheat straw	1	4	6	0	0	0	0
Ground nut	1	2	13	0	0	73800	78300
Chick pea	2	3	20	14.8	19.8	18600	33080
Sugarcane	1	13	13	0	0	53493	67293
Post Harvest Management							
Banana	1	0	10	0	0	0	0
Finger millet	1	15	15	2500	4500	100	1490
Maize	1	2	10	0	0	6110	11960
Pineapple	1	5	5	280	280	1400	4200
Rice	1	5	5	41	41	24500	28000
Resource Conservation Technology							
Maize	1	2	5	44.5	54.5	30775	47075
Soybean	4	21.4	39	64.85	80.18	122392	163039
Total	76	326.35	646				

Table 3.16: Summary of FLDs conducted on Enterprises (Fisheries) by KVKs of Zone IX during 2016-17

Particulars	No. of FLDs	Area (ha)	No of Farmers	Results (q/ha)		Net returns (Rs)	
				FP (T1)	RP (T2)	FP (T1)	RP (T2)
Fish nutrition	7	12.1	28	22.23	27.79	89030	118906
Fish-cum-duck farming	2	5.2	8	8.00	13.00	72100	194000
Fish seed production (Fry) (no./ha)	2	2	15	890000	1202500	44500	58375
Fish seed production (Fingerlings) (no./ha)	4	5	33	92093	146368	48916	59775
Fish production & management	17	44.38	102	13.61	16.42	120535	184230
Ornamental fish culture (no/ ft^2)	2	435	8	0	25.16		98065
Total	**34**	**503.68**	**194**				

Case Study-8

Integrated Farming System for Sustainable Income (KVK, Kendrapara, Odisha)

Background

Kendrapara, where farmers are faced with poor yield and low income, could well take cues from the success story of a farmer who is earning a net annual income of Rs. 1.5 lakh from 3 acres of land by adopting integrative farm techniques and optimum resource utilization. Shri Bipin Bihari Sethy is a young farmer (34 years) hailing from Sanamoolabasant of Kendrapara district. After completing his graduation Shri Bipin Bihari worked as a private Amin involved in mapping and measuring of lands. His earning was not enough to support his 6 membered family. In spite of several try outs in various business he failed to establish himself and finally returned to his village. With the left over money he tried to grow green gram, black gram, and some vegetables (brinjal, bottle gourd and tomato) after the rice in order to get sufficient income to maintain his family.

KVK Intervention

In a training programme he came in contact with KVK, Kendrapara and discussed about his problems. After several interactions with the scientists he learnt about integrated farming system but he was in dilemma how to implement it. However, Krishi Vigyan Kendra helped him to go for integrating high yielding varieties of rice, vegetables with pisciculture, duckery, poultry and goatry.

Output

Shri Bipin Bihari continued rice farming in 0.4 ha and converted the rest to other crop components and cultivated IMC in his 1.5 acre pond with 45 numbers of ducks, 50 backyard poultry, 5 goats with 6 kids in the dyke of the pond. He was trained at Krishi Vigyan Kendra, Kendrapara in scientific methods of vegetable, fish and poultry farming which boosted his self confidence and growing crops, fish with duckery, poultry and goatry became an easy task.

Outcome

Bipin's business grew, now he owns a well established IFS unit with an average income of Rs.12,000 from rice and Rs 20000/- of vegetables during *kharif,* Rs 50,000/- from vegetables during *rabi* and Rs 85,000/- from pisciculture Rs. 28,000 from poultry, duckery and goatry. His annual earning is Rs. 1.95 lakhs. With this he has taken on lease 16 number of ponds in which in cultivates IMC, fresh water prawn with great ease.

Farmers with fishes and kids from IFS

4 TRAINING AND CAPACITY BUILDING

Training has been a key component for updating the knowledge and imparting the new skill to the participants. There was great emphasis on organizing training both for the farmers as well as for the trainers. During the year 2016-17, 7676 courses benefitting to 1,92,822 participants (including farmers and farm women, rural youth, extension personnel and sponsored from different agencies) were organised (Table 4.1).

A. Training organized by KVK

Table 4.1: State wise, category wise training programmes conducted by KVKs in Zone IX during 2016-17

Training	No. of courses				No. of participants			
	CG	MP	Odisha	Total	CG	MP	Odisha	Total
Farmers & Farm women	1163	2585	1209	4957	30049	70749	32291	**133089**
Extension personnels	109	275	164	548	2212	7587	2603	**12402**
Rural youth	201	131	192	524	4647	3212	3190	**11049**
Sponsored	271	380	552	1203	5244	18033	2377	**25654**
Vocational	91	232	121	444	2700	6481	1447	**10628**
Total	**1835**	**3603**	**2238**	**7676**	**44852**	**106062**	**41908**	**192822**

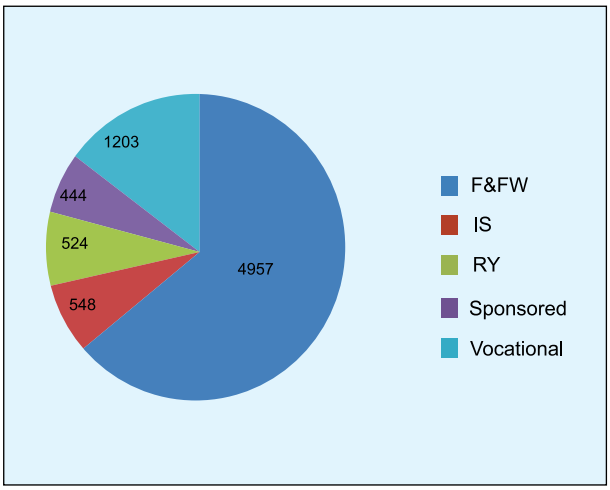


Figure 1. No. of courses

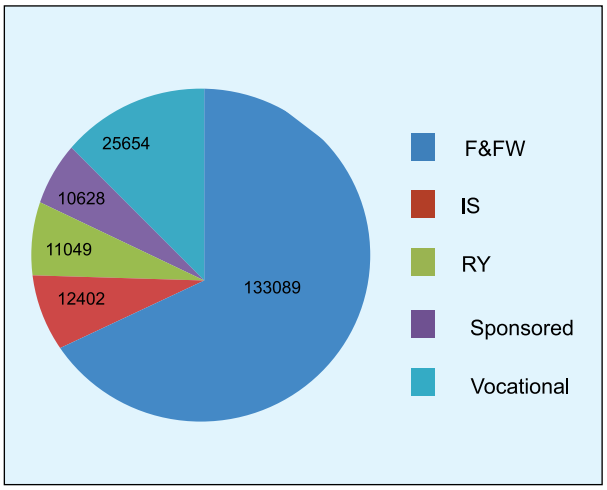


Figure 2. No. of participants

Table 4.2: Training for Farmers and Farm women in Zone IX during 2016-17

Thematic area	No of Courses	Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Agri. Engineering	224	660	1018	124	1142	531	214	745	1237	345	1582	1857	350	2207	4643	1033	5676
Agro-forestry	70	71	431	55	486	143	38	181	304	153	457	399	54	453	1277	300	1577
Bee keeping	2	2	15	0	15	9	0	9	0	0	0	23	13	36	47	13	60
Capacity building and group dynamic	301	614	1281	222	1503	793	301	1094	1879	497	2376	2865	563	3428	6818	1583	8401
Crop production	839	1681	3907	314	4221	2090	356	2446	6444	1424	7868	8217	816	9033	20658	2910	23568
Drudgery reduction	7	32	0	27	27	0	67	67	17	14	31	26	1	27	43	109	152
Entrepreneurship development	3	3	11	2	13	4	0	4	44	14	58	25	0	25	84	16	100
Farm machanization	9	10	78	3	81	26	5	31	67	8	75	187	20	207	358	36	394
Fisheries	129	125	634	154	788	198	119	317	517	117	634	777	221	998	2126	611	2737
Fodder management	2	2	11	0	11	10	0	10	0	0	0	17	0	17	38	0	38
Fruits and Vegetables	9	24	27	6	33	14	13	27	30	35	65	62	20	82	133	74	207
Plantation crop	16	18	60	14	74	73	10	83	94	21	115	165	28	193	392	73	465
Horticulture-fruits	122	222	390	42	432	349	76	425	562	103	665	1405	194	1599	2706	415	3121
Horticulture-medicinal	8	29	33	0	33	19	1	20	70	4	74	85	2	87	207	7	214
Horticulture-ornamental	14	14	64	19	83	21	9	30	5	1	6	153	57	210	243	86	329
Horticulture-spice	54	65	93	14	107	134	19	153	277	64	341	712	73	785	1216	170	1386
Horticulture-vegetable	398	842	1188	233	1421	849	202	1051	2219	636	2855	4301	707	5008	8557	1778	10335
Income generation	13	16	43	20	63	36	10	46	121	48	169	44	48	92	244	126	370
Information & communication technology	11	15	47	8	55	35	13	48	133	7	140	67	10	77	282	38	320
Integrated crop management	74	122	645	53	698	176	127	303	318	158	476	686	186	872	1825	524	2349
Integrated farming system	16	14	31	5	36	24	2	26	107	22	129	78	11	89	240	40	280
Integrated nutrient management	135	165	611	85	696	351	117	468	816	285	1101	1049	178	1227	2827	665	3492
Intercropping	2	1	6	0	6	1	2	3	12	4	16	0	0	0	19	6	25
IPNM	8	32	69	15	84	52	22	74	72	67	139	111	41	152	304	145	449
Livestock production and management	366	439	1682	423	2105	944	352	1296	1867	567	2434	2833	743	3576	7326	2085	9411
Micro irrigation	8	30	37	4	41	14	4	18	33	11	44	78	9	87	162	28	190
Mushroom production	15	18	32	55	87	25	40	65	79	145	224	57	126	183	193	366	559
Nursery management	14	14	73	18	91	26	8	34	124	30	154	100	21	121	323	77	400
Nutrition security	7	13	15	62	77	0	21	21	2	18	20	0	38	38	17	139	156
Organic farming	50	40	154	4	158	88	29	117	372	80	452	286	27	313	900	140	1040
Plant protection	879	1405	4103	531	4634	1996	649	2645	5932	2095	8027	7493	1364	8857	19524	4639	24163
Post harvest management	29	78	96	23	119	54	6	60	217	105	322	190	31	221	557	165	722
Production of Inputs at Site	42	52	176	38	214	138	13	151	320	65	385	399	105	504	1033	221	1254
Rain water harvesting	2	2	7	0	7	4	1	5	0	2	2	27	7	34	38	10	48
Resource conservation techniques	25	31	155	47	202	146	57	203	201	90	291	345	131	476	847	325	1172
Seed production	19	19	88	12	100	38	3	41	103	22	125	159	12	171	388	49	437
Soil health and fertility management	397	562	1451	212	1663	921	133	1054	3277	522	3799	2997	377	3374	8646	1244	9890
Tuber crops	27	27	99	5	104	71	21	92	252	124	376	98	31	129	520	181	701
Value addition	8	34	24	29	53	19	8	27	68	18	86	38	13	51	149	68	217

Thematic area	No of Courses	Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Water management	37	70	178	13	191	155	40	195	162	53	215	277	29	306	772	135	907
Women empowerment	493	1113	492	2371	2863	337	1661	1998	901	2154	3055	759	5207	5966	2489	11393	13882
Other	73	77	257	20	277	216	60	276	278	123	401	770	171	941	1521	374	1895
Grand Total	4957	8803	19812	5282	25094	11130	4829	15959	29533	10251	39784	40217	12035	52252	100692	32397	133089

Table 4.3: Training for Extension Personnel in Zone IX during 2016-17

Thematic area	No of Courses	Sum of Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Agri. Engineering	19	117	91	10	101	49	5	54	71	8	79	134	31	165	345	54	399
Agro forestry	12	9	57	2	59	20	3	23	7	1	8	62	8	70	146	14	160
Capacity building and group dynamic	42	79	185	34	219	73	16	89	125	91	216	306	228	534	689	369	1058
Crop production	83	250	349	36	385	127	35	162	246	42	288	1042	206	1248	1764	319	2083
Entrepreneurship development	1	1	4	3	7	1	0	1	1	1	2	6	4	10	12	8	20
Farm machanization	1	1	6	0	6	3	0	3	3	0	3	4	0	4	16	0	16
Fisheries	12	16	94	10	104	9	0	9	112	0	112	45	3	48	260	13	273
Plantation crop	3	4	6	1	7	2	0	2	14	11	25	25	3	28	47	15	62
Horticulture-fruits	7	28	57	0	57	15	3	18	10	5	15	57	3	60	139	11	150
Horticulture-medicin	1	2	0	0	0	0	0	0	1	0	1	6	3	9	7	3	10
Horticulture-ornamental	3	3	4	1	5	2	1	3	2	0	2	10	30	40	18	32	50
Horticulture-spice	3	4	31	4	35	13	7	20	11	2	13	16	6	22	71	19	90
Horticulture-vegetable	36	41	163	83	246	92	54	146	45	85	130	188	98	286	488	320	808
Information & communication technology	9	11	47	9	56	16	3	19	8	4	12	36	12	48	107	28	135
Integrated crop management	6	8	49	10	59	4	0	4	16	4	20	21	1	22	90	15	105
Integrated farming system	1	1	0	0	0	0	0	0	0	0	0	21	5	26	21	5	26
Integrated nutrient management	12	14	61	8	69	25	4	29	61	6	67	59	35	94	206	53	259
Intercropping	3	2	53	0	53	5	1	6	14	2	16	0	0	0	72	3	75
IPNM	5	8	34	10	44	50	15	65	73	60	133	85	39	124	242	124	366
Livestock production and management	29	42	238	50	288	84	35	119	95	47	142	173	56	229	590	188	778
Mushroom production	5	48	0	14	14	12	22	34	0	32	32	7	69	76	19	137	156
Nutrition security	1	5	8	2	10	5	3	8	6	13	19	5	29	34	24	47	71
Organic farming	29	19	92	17	109	25	2	27	43	18	61	78	17	95	238	54	292
Plant protection	101	159	633	158	791	273	105	378	410	137	547	728	162	890	2044	562	2606
Production of Inputs in situ	3	4	30	0	30	7	2	9	4	1	5	10	2	12	51	5	56

Thematic area	No of Courses	Sum of Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Resource conservation techniques	3	4	33	6	39	11	8	19	15	11	26	16	6	22	75	31	106
Seed production	4	6	8	2	10	9	2	11	20	5	25	23	5	28	60	14	74
Soil health and fertility management	41	44	163	25	188	65	11	76	125	19	144	260	39	299	613	94	707
Tuber crops	1	1	11	3	14	1	0	1	0	0	0	0	0	0	12	3	15
Water management	4	6	19	0	19	18	1	19	39	0	39	30	1	31	106	2	108
Women empowerment	55	67	70	218	288	11	110	121	31	96	127	58	341	399	170	765	935
Other	13	15	84	8	92	25	3	28	58	1	59	152	22	174	319	34	353
Grand Total	**548**	**1019**	**2680**	**724**	**3404**	**1052**	**451**	**1503**	**1666**	**702**	**2368**	**3663**	**1464**	**5127**	**9061**	**3341**	**12402**

Table 4.4: Training for Rural youth + Vocational in Zone IX during 2016-17

Thematic area	No of Courses	Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Agri. Engineering	50	149	131	11	142	92	9	101	514	57	571	311	18	329	1048	95	1143
Agro forestry	7	12	2	3	5	4	5	9	41	10	51	43	3	46	90	21	111
Bee keeping	20	127	128	9	137	74	3	77	55	7	62	211	0	211	468	19	487
Capacity building and group dynamic	48	139	191	50	241	160	34	194	137	97	234	353	221	574	841	402	1243
Crop production	64	237	257	21	278	101	18	119	422	55	477	380	55	435	1160	149	1309
Dairy management	6	28	38	2	40	11	3	14	18	5	23	55	15	70	122	25	147
Drudgery reduction	4	6	0	0	0	0	3	3	0	0	0	12	30	42	12	33	45
Entrepreneurship development	13	82	86	11	97	48	14	62	61	17	78	78	53	131	273	95	368
Farm machanization	11	103	40	21	61	22	4	26	69	13	82	67	9	76	198	47	245
Fisheries	65	137	180	33	213	100	32	132	329	96	425	218	92	310	827	253	1080
Fodder management	1	5	21	7	28	9	3	12	4	3	7	34	13	47	68	26	94
Fruits and vegetables	3	10	0	14	14	1	2	3	0	0	0	40	13	53	41	29	70
Plantation crop	3	12	9	4	13	14	0	14	8	0	8	42	4	46	73	8	81
Horticulture-fruits	19	56	97	11	108	34	17	51	92	38	130	147	24	171	370	90	460
Horticulture-medicine	12	9	13	3	16	8	0	8	68	28	96	36	0	36	125	31	156
Horticulture-ornamental	7	14	21	2	23	5	0	5	37	11	48	51	3	54	114	16	130
Horticulture-spice	3	8	55	17	72	14	9	23	12	5	17	28	8	36	109	39	148
Horticulture-vegetable	54	232	166	31	197	116	16	132	240	28	268	389	59	448	911	134	1045
Income generation	49	390	102	109	211	46	54	100	97	250	347	218	203	421	463	616	1079
Information & communication technology	3	13	28	18	46	0	1	1	2	0	2	8	3	11	38	22	60
Integrated crop management	7	7	38	4	42	9	6	15	45	9	54	19	5	24	111	24	135
Integrated farming system	7	26	14	6	20	19	8	27	62	10	72	68	9	77	163	33	196
Integrated nutrient management	8	7	9	3	12	4	4	8	68	8	76	42	1	43	123	16	139

Thematic area	No of Courses	Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
IPNM	1	1	0	3	3	42	0	42	0	6	6	0	0	0	42	9	51
Lac cultivation	12	108	2	11	13	11	4	15	279	22	301	15	16	31	307	53	360
Livestock production and management	50	226	184	46	230	215	67	282	227	54	281	236	54	290	862	221	1083
Micro irrigation	3	12	1	3	4	10	8	18	14	4	18	38	9	47	63	24	87
Mushroom production	51	461	97	63	160	78	112	190	129	260	389	226	198	424	530	633	1163
Nursery management	29	125	84	17	101	61	13	74	89	24	113	179	38	217	413	92	505
Organic farming	13	34	11	9	20	49	13	62	52	17	69	47	29	76	159	68	227
Plant protection	54	169	171	72	243	100	23	123	346	87	433	386	110	496	1003	292	1295
Post harvest management	4	4	4	3	7	2	10	12	35	6	41	3	4	7	44	23	67
Poultry management	29	106	38	28	66	43	18	61	315	46	361	62	20	82	458	112	570
Production of Inputs in situ	54	372	151	33	184	151	42	193	368	60	428	352	129	481	1022	264	1286
Resource conservation techniques	8	10	21	6	27	13	13	26	13	11	24	44	15	59	91	45	136
Seed production	32	321	116	5	121	168	17	185	134	6	140	256	34	290	674	62	736
Soil health and fertility management	48	189	233	40	273	90	13	103	361	86	447	372	46	418	1056	185	1241
Tuber crops	4	5	4	3	7	2	9	11	77	14	91	0	9	9	83	35	118
Value addition	37	242	9	193	202	24	145	169	40	165	205	91	277	368	164	780	944
Water management	2	2	0	0	0	4	0	4	65	0	65	0	0	0	69	0	69
Women empowerment	63	228	65	168	233	25	243	268	45	311	356	206	431	637	341	1153	1494
Other	10	88	22	10	32	71	5	76	99	26	125	38	3	41	230	44	274
Grand Total	**968**	**4512**	**2839**	**1103**	**3942**	**2050**	**1000**	**3050**	**5069**	**1952**	**7021**	**5401**	**2263**	**7664**	**15359**	**6318**	**21677**

Table 4.5: Sponsored Training Programme in Zone IX during 2016-17

Thematic area	No of Courses	Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Agril. Engineering	22	40	251	32	283	262	152	414	322	190	512	288	183	471	1123	557	1680
Apiculture	1	7	0	0	0	0	0	0	15	0	15	0	0	0	15	0	15
Capacity building and group dynamics	235	118	1106	167	1273	500	252	752	319	302	621	297	699	996	2222	1420	3642
Crop production	112	95	596	25	621	1873	190	2063	769	137	906	1563	312	1875	4801	664	5465
Entrepreneurship	207	61	104	8	112	146	5	151	47	0	47	29	38	67	326	51	377
Farm mechanization	2	7	5	5	10	45	0	45	4	0	4	41	0	41	95	5	100
Fisheries	58	121	48	18	66	122	21	143	258	93	351	139	22	161	567	154	721
Fruits	28	7	0	0	0	1	4	5	2	0	2	9	1	10	12	5	17
Horticulture of fruits	5	5	3	0	3	18	5	23	47	0	47	17	10	27	85	15	100
Horticulture of spices	2	3	18	1	19	74	9	83	13	3	16	44	11	55	149	24	173
Horticulture of vegetables	6	13	5	2	7	32	73	105	70	21	91	9	8	17	116	104	220
Improved horticulture technology	15	15	25	10	35	200	250	450	150	262	412	300	305	605	675	827	1502
Income generation	2	7	10	0	10	47	0	47	7	0	7	0	0	0	64	0	64
Integrated farming system	19	71	58	0	58	52	0	52	107	14	121	5	1	6	222	15	237

Thematic area	No of Courses	Duration (Days)	Gen			SC			ST			Others			Grand Total		
			M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Integrated nutrient management	7	6	13	0	13	17	0	17	16	0	16	14	0	14	60	0	60
Lac cultivation	3	13	1	0	1	21	5	26	23	6	29	37	1	38	82	12	94
Livestock production and management	70	82	67	12	79	138	7	145	166	36	202	452	217	669	823	272	1095
Medicinal and aromatic Plants	1	2	1	0	1	2	0	2	5	40	45	0	0	0	8	40	48
Mushroom production	49	173	65	33	98	145	62	207	115	146	261	74	72	146	399	313	712
Nursery management	5	27	35	1	36	40	5	45	30	18	48	10	7	17	115	31	146
Organic farming	45	103	355	75	430	408	327	735	554	272	826	387	310	697	1704	984	2688
Ornamental plants	2	13	4	0	4	3	0	3	24	0	24	0	0	0	31	0	31
Plant protection	31	39	92	32	124	178	22	200	116	12	128	259	19	278	645	85	730
PPVFRA	16	10	526	10	536	575	25	600	243	40	283	551	110	661	1895	185	2080
Production of Inputs in situ	7	98	24	3	27	35	4	39	42	32	74	24	0	24	125	39	164
Resource conservation techniques	1	6	15	0	15	14	0	14	1	0	1	0	0	0	30	0	30
Seed production	4	58	3	0	3	16	2	18	57	21	78	19	2	21	95	25	120
Soil health and fertility management	36	26	63	6	69	99	16	115	117	26	143	144	65	209	423	113	536
Tuber crops	7	5	0	0	0	3	0	3	52	275	327	20	2	22	75	277	352
Value addition	7	17	17	53	70	12	1	13	12	13	25	4	62	66	45	129	174
Vegetable crops	2	7	0	0	0	0	0	0	0	30	30	27	0	27	27	30	57
Water management	32	10	68	0	68	7	0	7	6	37	43	44	0	44	125	37	162
Women empowerment	14	38	9	53	62	12	100	112	47	82	129	42	234	276	110	469	579
Others	150	655	425	45	470	399	34	433	277	21	298	253	29	282	1354	129	1483
Grand Total	**1203**	**1958**	**4012**	**591**	**4603**	**5496**	**1571**	**7067**	**4033**	**2129**	**6162**	**5102**	**2720**	**7822**	**18643**	**7011**	**25654**

Capacity Building Programmes

B. Capacity Building programmes by DES and ATARI

Table 4.6: Capacity bulding activities organized in identified area for KVK Staff by the Directorate of Extension Services 2016-17

Training Title	Date	Venue	No. of participants
Directorate of Extension Services, Jabalpur, M.P.			
Knowledge empowerment & technical backstopping to I/c Instructional Farm of KVKs	6 May, 2016	DES, JNKVV, Jabalpur	10
Pre-Zonal workshop of KVKs	23 to 24 May, 2016	DES, JNKVV, Jabalpur	28
Knowledge empowerment & technical backstopping to Scientist of KVKs	25 May, 2016	DES, JNKVV, Jabalpur	20
Knowledge empowerment & technical backstopping to KVK Scientists of I/c Cluster demonstration of Oilseeds and pulses	8 to 9 June, 2016	DES, JNKVV, Jabalpur	27
Knowledge empowerment & technical backstopping to KVK Scientists	1 October, 2016	DES, JNKVV, Jabalpur	18

Training Title	Date	Venue	No. of participants
Knowledge empowerment & technical backstopping to KVK Scientists (Soil Health)	25 October, 2016	DES, JNKVV, Jabalpur	8
Knowledge empowerment & technical backstopping cum review of seed hub programme		DES, JNKVV, Jabalpur	4
Orientation training of plant protection experts by WDRA	14 December, 2016	DES, JNKVV, Jabalpur	50
Technical backstopping cum review of Cluster demonstration on Oilseeds and Pulses	9 to 10 January, 2017	DES, JNKVV, Jabalpur	23
Total			**188**
Directorate of Extension Services, Gwalior, M.P.			
Enhancing farmers income under wheat based cropping system	January 5-6, 2017	College of Agriculture, Indore	27
Climate resilient technologies for sustain agricultural production under rain-fed conditions	January 12-14, 2017	College of Agriculture, Indore	26
Protected cultivation for high value crops	January 18-19, 2017	KVK, Jhabua	30
Agri-entrepreneurship development with special reference to Bee-keeping	February 28- March 01, 2017	KVK, Morena	27
Time and stress management for extension personnel	March 02-04, 2017	RVSKVV, Gwalior	24
Effective financial and administrative management in KVKs	March 09-10, 2017	RVSKVV, Gwalior	45
Utility of soil health card in managing soil health	March 27-28, 2017	ICAR-IISS, Bhopal	25
Total			**204**
Directorate of Extension Services, Raipur, C.G.			
Preservation, processing and value addition of agricultural and horticultural crops.	March 24-25, 2017	DES, IGKV, Raipur	30
Orientation workshop on Cluster demonstration on Oilseed and pulses.	June 02, 2017’	DES, IGKV, Raipur	25
Meeting for review workshop on Cluster frontline demonstration	February 16, 2017’	DES, IGKV, Raipur	30
Vision documents meeting	December 3, 2016’	DES, IGKV, Raipur	15
Fish Farmers- Scientist Interface and capacity building on processing and value addition of fishes	November 19-21, 2016	DES, IGKV, Raipur	30
Training of Trainers (ToT) programme for Krishi Vigyan Kendras (KVKs) Trainers & Scientists	November 17-19, 2016	DES, IGKV, Raipur	20
Total			**150**
Directorate of Extension Education, CGKV, Durg, C.G.			
Aadarsh gaopalan evam panchgavya utpadan	March 20-25, 2017	KVK, Anjora, Durg	30
Cash less training and digitalization	March 27, 2017’	KVK, Anjora, Durg	30
Total			**60**

Training Title	Date	Venue	No. of participants
Directorate of Extension Education, OUAT, Bhubaneswar, Odisha			
Project on NRM & Extension Division on CIMMYT	May 4', 2016	ICAR, New Delhi	1
Review-cum-action plan workshop for animal science	June 7-8, 2016	Durg	9
Review-cum-action plan workshop for extension scientists	June 27-29, 2016	IGKV, Raipur, Chhatisgarh.	18
Fishery discipline to participate in the review meeting	June 9-10, 2016	Kolkata	9
National Orientation workshop for the Fisheries	June 16-17, 2016	Hyderabad	8
Finalize KVK MIS system and compilation of annual report	June 20-30, 2016	Jabalpur	6
Developing agribusiness skills among farmers for maximising farm Income	July 11-20, 2016	IARI, New Delhi	3
KVK MIS and Online reporting system.	July 13-14, 2016	IASRI at New Delhi	1
Review-cum-action plan workshop for Cluster demonstration on Pulses & Oilseeds	August 10-11, 2016	RVSKVV, Gwalior	33
Recent advancess in Post harvest management of fruits, vegetables & flowers for minimization of quantitative & qualitative losses	November 2-22, 2016	IIHR, Bengaluru.	1
Fourth International Agronomy Congress on "Agronomy for sustainable management of natural resources, environment, energy and livelihood security to achieve zero hunger challenge"	November 22-26, 2016	ICAR-IARI, Pusa Campus, New Delhi	1
Empowerment of Farm women through livestock & poultry intervention"	November 21-30, 2016	Central Institute of Women in Agriculture, Bhubaneswar	6
Experts meet on case study preparation	November 30', 2016	ATARI, Jabalpur	3
4th National Symposium on "New Horizons in Pest Management for Sustainable Developmental Goals"	December 23-24, 2016	OUAT Bhubaneswar.	5
CAFT on "Advances in Rumen manipulation to improve livestock productivity"	February 1-21, 2017	ICAR-Indian Veterinary Research Institute(IVRI,) Izatnagar	1
National workshop on Skill Development	January 5', 2017	NASC Complex, New Delhi	2
5th MDP programme	January 2-17, 2017	KVK, Nimpith, W.B ICAR-ATARI, Jabalpur.	2
Home science workshop	January 9-10, 2017	Rabindra Bhawan, M.P. Nagar, Bhopal	20
ICAR sponsored Winter school on "Protected cultivation of commercial flowers and vegetables	January 5-25, 2017	UHS	1
Orientation of KVK trainers	January 6-8, 2017	GBPUA&T,Pantnagar	1
Programme Assistant (Computer) Workshop on "Digital KVK"	January 19-21, 2017	ZPD, Zone-IX, Jabalpur (MP)	30
National Workshop on Cluster frontline demontration on Oilseeds	February 17-18, 2017	IGKVV, Raipur, Chhattisgarh	2

Training Title	Date	Venue	No. of participants
Skill development training	February 20', 2017	NASC Complex, New Delhi	1
GRAMAYAN-An Agri-Expo	February 24-27, 2017	DRI, Chitrakoot, Satna, M.P.	2
ICT application training	February 18-27, 2017	IASRI, New Delhi	2
Workshop-cum-Training on "Germplasm Evalauation & *in vitro* cloning of Anthurium and Lilium"	March 14', 2017	Biju Patnaik Hall of OUAT.	13
National Workshop' Innovation Food Safety and Security	March 8-9, 2017	OUAT, Bhubaneswar.	5
"KVK Portal"	March 9', 2017	ICAR-New Delhi	1
Interaction for technology generation and adaption strategy	May 4-5, 2016	OUAT, Bhubaneswar.	127
Preparation of Action plan to enhance farmers income in the State	June 9-10, 2016	OUAT, Bhubaneswar.	72
Orientation training for Heads of KVK	July 4', 2016	OUAT, Bhubaneswar.	44
HRD on planning for ensuring *kharif* (2016)	August 6', 2016	OUAT, Bhubaneswar.	41
Operationalising community radio at KVKs of OUAT	September 24-26, 2016	OUAT, Bhubaneswar.	35
Financial progress so far made by KVKs	October 7', 2016	OUAT, Bhubaneswar.	41
Total			**547**
Grand Total Zone-IX			**1149**

Table 4.7: Capacity bulding activities organized by ATARI in collaboration with ICAR Institutes in identified areas for KVK staff during 2016-17

S. No.	Training/Workshop Title	Date	Venue	No. of Participants	Collaborating Institute
1.	Training-cum-workshop for Extension Scientist	27-29 June, 2016	DES, IGKV, Raipur	70	IGKV, Raipur
2.	Training-cum-workshop for Animal scientist	June 7-8, 2016	DES, CGKV, Durg	40	CGKV, Durg
3.	NICRA Review workshop	May 11-13, 2016	KVK Dewas	25	RVSKVV, Gwalior
4.	Action plan workshop RVSKVV KVKs	May 10-11, 2016	DES, Gwalior	35	RVSKVV, Gwalior
5	Action plan workshop JNKVV KVKs	April 28-29 2016	DES, JNKVV, Jabalpur	30	JNKVV, Jabalpur
6	Action plan workshop IGKV KVKs	May 4-5, 2016	DES, IGKV, Raipur	32	IGKV, Raipur
7	Action plan workshop Odisha KVKs	May 6-7, 2016	Dean, OUAT, Bhubaneswar	45	OUAT, Bhubaneswar
8	TSP Review workshop	June 2-4, 2016	IGNTU, Amarkantak	40	IGNTU, Amarkantak
9	Review meeting on Promising Fishery Technology	June 9-10, 2017	ICAR-CIFE, Kolkata	30	NFDB, Hyderabad & CIFE Kolkata
10	Interaction workshop of NICRA KVKs on climate vulnerability & technology adaptation	August 11-12, 2016	DES, Gwalior	25	CRIDA, Hyderabad

S. No.	Training/Workshop Title	Date	Venue	No. of Participants	Collaborating Institute
11	23rd Zonal workshop at KVK Khordha	September 3-5, 2016	KVK Khordha, Bhubaneswar	253	ICAR-CIFA, Bhubaneswar
12	Orientation workshop of Farmer First Project	November 18, 2017	DES, IGKV, Raipur	20	IGKV, Raipur
13	Fish Farmer- scientists interface cum capacity building on value addition	Nov. 19-20, 2016	IGKV, Raipur	25	CIFT, Cochin
14	Sensitization workshop of WDRA, New Delhi	December 14-15, 2016	DES, JNKVV, Jabalpur	70	WDRA, GOI, New Delhi
15	Workshop on Agriculture for Nutrition and Nutrition Literacy at Bhopal	January 9-10, 2017	Vatsalya Bhawan, Bhopal	560	Govt. of M.P.
16	Agri-Industry farmers interface at KVK Neemuch	January 11-12, 2017	KVK Neemuch	230	DES, Gwalior
17	Review workshop of CFLD in Oilseeds for JNKVV KVKs	January, 17, 2017	ATARI, Jabalpur	32	JNKVV, Jabalpur
18	Review workshop of CFLD in Oilseeds for RVSKVV KVKs	January, 27, 2017	DES, Gwalior	36	DES, Gwalior
19	Review workshop of CFLD in Oilseeds for IGKV KVKs	January, 23, 2017	DES, IGKV, Raipur	29	IGKV, Raipur
20	Review workshop of CFLD in Oilseeds for Odisha KVKs	January, 24, 2017	Dean, OUAT, Bhubaneswar	42	OUAT, Bhubaneswar
21	Interface on Agriculture for nutritional security	February 8, 2017	ATARI, Jabalpur	76	Govt. of M.P.
22	National Review workshop of CFLD in Oilseeds at Raipur	February 17-18, 2017	DES, IGKV, Raipur	180	DAE, ICAR & IGKV, Raipur
23	Interaction workshop on doubling farmers income for Chhattisgarh KVKs	March 23, 2017	DES, IGKV, Raipur	35	IGKV, Raipur
24	Five days 4th MDP for newly recruited PCs of KVKs	May 23-27, 2016	ATARI, Jabalpur	6	NAARM, Hyderabad
25	Five days 5th MDP for newly recruited PCs of KVKs	January 13-17, 2017	ATARI, Jabalpur	3	NAARM, Hyderabad
	Total			**1969**	**-**

Table 4.8: KVK Visit/Workshop/Training/Symposium attended by the ATARI Staff/Scientist

S. No.	Particulars	No. of Programmes
1	Training	5
2	Workshops	12
3	Conferences	2
4	Seminars	2
5	KVK Visits	61
6	Any other (Review workshop/Training conducted)	32
	Total	114

Table 4.9: Capacity building of ATARI Staff.

a. Participation in training

S. No.	Name of employee	Designation	Discipline/ Section	Name of training programme attended	Duration (days)	Organizing institution
1	Shri Sunil Kumar Gupta	AAO	Admin	E-procurment	2	ICAR-IASRI
2	Shri R.K.Soni	Prog Asstt.	Comp. Appl.	E-procurment	2	ICAR-IASRI
3	Shri Utpal Ghosh	JAO	Finance	E-procurment	2	ICAR-IASRI

b. Training organized for various category of Employee: NIL

c. HRD fund Allocation and Utilization

Particulars	Budget RE (Rs. in lakhs) allocated	Actual expenditure (Rs. in lakhs)	Utilization (%)
ATARI	15.0	14.95	99.67
Total	15.0	14.95	-

Table 4.10: Footfall in KVKs of Zone IX

State	No. of KVKs	No. of Foot falls			
		Farmers	Officials	VIPs	Total
MP	46	104301	4724	670	109695
CG	20	35569	3537	454	39560
Odisha	32	29551	2302	235	32088
Zone-IX	98	169421	10563	1359	181343

Farmers' visit to KVK demonstration units

Live MNREGA Training

5 SEED, PLANTING MATERIALS, BIO-PRODUCTS AND LIVESTOCK MATERIAL PRODUCTION

Seed and Planting Materials

Availability of quality seeds, at the right time in adequate quantity are the major constraints of farmers. Therefore, it was taken as challenge and appropriate steps were taken by KVKs for helping farmers. Considerable progress has been made and there is increase in seed quantity as well as other planting materials as shown in the following Tables 5.1 and 5.2. KVKs of the Zone produced 22048.35q of seed and 71.30 lakhs planting material of different crops (cereals, pulses, oilseeds, vegetables, medicinal plants, fruits, etc.) and distributed among farmers. KVKs of the Zone also produced bio-products and livestock products at their farms.

Table 5.1: State- wise seed and planting material produced by the KVKs in Zone-IX

State	2016-17	
	Seed (q)	Planting material (in lakhs)
Chhattisgarh	6352.97	13.45
Madhya Pradesh	10680.11	23.56
Odisha	5015.27	34.29
Total	**22048.35**	**71.30**

Table 5.2: State- wise details of seed production produced by the KVKs in Zone-IX

State	Quantity (q.)	Value (Rs.)	Provided to no. of Farmers	Expected area coverage (ha.)
Chhattisgarh	6352.97	9897955.45	3274	883.1
Madhya Pradesh	10680.11	65212634	10362	8403.32
Odisha	5015.27	7562998	1455	1194.12
Zone-IX	22048.35	82673587.45	15091	10480.54

Table 5.3: State- wise details of planting material produced by the KVKs in Zone-IX

State	Nos.	Value (Rs.)	Provided to no. of Farmers	Expected area coverage (ha.)
Chhattisgarh	1344643	923939	6274	90.414
Madhya Pradesh	2355964	1234061	22523	110.415
Odisha	3429336	3098422	37592	136.666
Zone-IX	7129943	5256422	66389	337.495

Table 5.4: Status of seed production in Zone-IX

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Cereal	Maize	Ajeet Vjra	4.52	0	0
Cereal	Maize	Hyb 4055	0.4	2000	40
Cereal	Maize	JM-216	102.8	75000	0
Cereal	Maize	Pusa Makka 3	25	0	0
Cereal	Rice	Chandrahashini	257.6	0	0
Cereal	Rice	Danteshwari	34.8	7200	18
Cereal	Rice	Durgeshwari	203.05	415237	0
Cereal	Rice	Gayatri	50	128000	0
Cereal	Rice	IGKV R-2, IGKV R-1	761.99	80960	150
Cereal	Rice	IGKV-1244	53.8	75320	0
Cereal	Rice	Indira Arobic	82.55	91960	100
Cereal	Rice	Indira Arobic-1	49.4	101023	0
Cereal	Rice	Indira Barani Dhan -1	214.69	386000	0
Cereal	Rice	Indira Rajeshwari	389	548490	600
Cereal	Rice	IR-64	290	879450	0
Cereal	Rice	Jeera Shanker	22	0	0
Cereal	Rice	Jogesh	32.2	0	0
Cereal	Rice	JR-201	2.52	10080	105
Cereal	Rice	Khandagiri	38.6	87622	0
Cereal	Rice	Kranti	22	0	0
Cereal	Rice	Lalat	244.7	412493	19
Cereal	Rice	Mahamaya	56.6	0	0
Cereal	Rice	Maheshwari	863.28	1182916	400
Cereal	Rice	Manaswini	147.8	413568	70
Cereal	Rice	Mandakini	133.2	213104	0
Cereal	Rice	Mrunalini	41	14000	0
Cereal	Rice	MTU-1001	23.2	58232	0
Cereal	Rice	MTU-1010	1137.93	5347701	1049
Cereal	Rice	MTU-7029	57.6	144576	16
Cereal	Rice	Naveen	275.8	0	0
Cereal	Rice	Pant - 10	25.65	102620	43
Cereal	Rice	Pant Basmati-1	5.56	17920	40
Cereal	Rice	PB-1121	115.4	0	0
Cereal	Rice	PB-1509	36.4	138414	11
Cereal	Rice	Pooja	250	640000	0
Cereal	Rice	Pratikshya	880.4	1806584	0
Cereal	Rice	PS-4, PS-3 SRI	7.2	12060	12

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Cereal	Rice	Pusa Basmati-1509	6.27	43960	80
Cereal	Rice	Rajeshwari	82	150000	0
Cereal	Rice	Ranidhan	161.6	237552	0
Cereal	Rice	Samleshwari	118.39	160330	440
Cereal	Rice	Swarna Sub-1	734.8	1883896	51
Cereal	Rice	Swarna Sub1, CR1009	260.6	482110	1210
Cereal	Rice	Upahar	52	133120	0
Cereal	Rice	Yogesh	15.2	41344	5
Cereal	Wheat	C306	45	270000	0
Cereal	Wheat	DBW-110	71	63600	34
Cereal	Wheat	GW-273	110.019	256700	25
Cereal	Wheat	GW-3211	0.015	0	0
Cereal	Wheat	GW-322	572.89	8760	4
Cereal	Wheat	GW-322, GW-366	175	280000	300
Cereal	Wheat	GW-366	302.639	474739	103
Cereal	Wheat	HD-1105	4.62	18480	6
Cereal	Wheat	HD-2932	5.044	19320	429
Cereal	Wheat	HD-2966	0.015	0	0
Cereal	Wheat	HD-2967	0.5	2000	16
Cereal	Wheat	HI-1531	0.3	900	1
Cereal	Wheat	HI-1544	144.056	82910	14
Cereal	Wheat	HI-8663	0.418	1200	3
Cereal	Wheat	HI-8713	144.5	112200	32
Cereal	Wheat	HI-8737	39.1	39680	14
Cereal	Wheat	HJPW-151	0.11	440	2
Cereal	Wheat	HJPW-168	0.81	3240	1
Cereal	Wheat	HJPW-8661	0.51	2040	12
Cereal	Wheat	JW 3173	113.25	0	0
Cereal	Wheat	JW 3336	32	0	0
Cereal	Wheat	JW-1203	1.58	6320	1405
Cereal	Wheat	JW-17	6.41	25640	11
Cereal	Wheat	JW-3211	882.4	3290794	280
Cereal	Wheat	JW-3288	75.4	0	0
Cereal	Wheat	K-9107	38	53200	0
Cereal	Wheat	Kanchan	30	0	0
Cereal	Wheat	LOK-1	10	0	0
Cereal	Wheat	MP-1106	0.023	0	0

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Cereal	Wheat	MP-1201	0.015	0	0
Cereal	Wheat	MP-1202	0.015	0	0
Cereal	Wheat	MP-1203	6.017	0	0
Cereal	Wheat	MP-3211	4.02	16080	5
Cereal	Wheat	MP-3288	2.38	9520	10
Cereal	Wheat	MP-3336	0.012	0	0
Cereal	Wheat	MP-4010	5.4	24000	10
Cereal	Wheat	MPO 1215	0.014	0	0
Cereal	Wheat	Pusa Mangal, Pusa Anmol	6.35	19050	15
Cereal	Wheat	Raj – 4238	0.8	2400	5
Cereal	Wheat	Ratan & GW-273	204.37	68694	164
Cereal	Wheat	RVW-4106	289.2	1032000	0
Flowers	Marigold	Pusa Basanti & Pusa Narangi	0.003	1500	9
Flowers	Marigold	Pusa Narangi	0.02	10000	100
Fodder	Berseem	JB-1	0.4	6000	4
Fodder	Dhanicha	Local	10.3	41200	20
Fodder	Oat	JHO – 822	0.08	390	0
Fodder	Oat	JHO – 851	0.21	1075	0
Fruits	Aonla	N-7	80	0	2
Fruits	Guava	G-27	150	0	4
Fruits	Jack fruit	Deshi	25	0	2
Fruits	Lemon	Kagzi	60	0	3
Fruits	Mango	Amrapali	50	20000	5
Fruits	Mango	Amrapali, Langra	888	26190	0
Green manuring	Sunhemp	K-12	31.6	6800	255
Green manuring	Sunhemp	Local	7.6	39900	0
Green manuring	Sunhemp	M-19	4.1	20500	68
Millet	Barley	BH 959	63.99	116486	30
Millet	Kodo	Indira kodo-1	20	44000	
Millet	Kodo	JK-41	5.8	0	0
Millet	Kodo	JK-439	4.7	68850	0
Millet	Kodo	JK-48	2.7	0	0
Millet	Little Millet	JK-8	4.7	18000	0
Millet	Ragi	GPU28	1.5	0	0
Mushroom	Mushroom	*Pleurotus florida*	0.7	7000	250
Mushroom	Oyster Mushroom	*P.sajarcaju*	168.8	11505	0

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Mushroom	Paddy straw mushroom	Straw (Lalaat and Naveen)	184	5140	5
Mushroom	Rice straw mushroom	*V.volvacea*	4.5	33750	0
Oilseed	Groundnut	Devi	3	24810	6
Oilseed	Groundnut	JGN-23	2.55	0	0
Oilseed	Groundnut	JGN-3	1.69	0	0
Oilseed	Groundnut	K-6	3.5	0	0
Oilseed	Groundnut	TAG-24	4	40000	10
Oilseed	Groundnut	TG-37	3.5	0	0
Oilseed	Linseed	Indira-32	2	6200	0
Oilseed	Linseed	JLS-27	24	212000	87
Oilseed	Linseed	JLS-66	34.15	252460	0
Oilseed	Linseed	JLS-67	0.8	7000	20
Oilseed	Linseed	JLS-9	10	81400	45
Oilseed	Linseed	KLS-218	0.5	2300	50
Oilseed	Linseed	RLC 92	3.85	14400	20
Oilseed	Mustard	Anuradha	1	5000	0
Oilseed	Mustard	Bharat -1	1.125	13500	135
Oilseed	Mustard	Bharat Sarso2	0.48	2400	30
Oilseed	Mustard	Chhattisgarh sarso-1	16.24	0	0
Oilseed	Mustard	Giriraj	2.7	32400	14
Oilseed	Mustard	IJ 31	5.15	30000	100
Oilseed	Mustard	JM-3	19.5	200000	100
Oilseed	Mustard	M-27	3	15900	14
Oilseed	Mustard	NRC-DR 2	4.81	26000	60
Oilseed	Mustard	NRCHB 101	6.96	36000	120
Oilseed	Mustard	PS – 30	0.25	1800	0
Oilseed	Mustard	Pusa Agrani	0.2	1600	0
Oilseed	Mustard	Pusa Jai Kisan	1.6	23250	50
Oilseed	Mustard	Pusa Swarnima	0.037	0	0
Oilseed	Mustard	Pusa Tarak	0.635	5640	25
Oilseed	Mustard	Pusa vijay	18.76	43200	100
Oilseed	Mustard	Pusa-28	0.71	3000	10
Oilseed	Mustard	RH 749	10.06	84000	280
Oilseed	Mustard	RVM-02	5.7	30000	200
Oilseed	Niger	GA-10	5.31	0	0
Oilseed	Niger	JNC-6	3.7	45600	0

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Oilseed	Niger	JNS-9	1.3	0	0
Oilseed	Niger	Utkal Niger-150	3.5	14700	12
Oilseed	Niger	VN3	1	0	0
Oilseed	Safflower	AKS-207	48	200000	0
Oilseed	Sesamum	GA-10	1.97	0	0
Oilseed	Sesamum	JT-7	0.6	7200	
Oilseed	Sesamum	JTS-08	0.91	18427	45
Oilseed	Sesamum	TKG - 308	5	0	0
Oilseed	Sesamum	TKG -8	1	11000	50
Oilseed	Sesamum	TKG-1	5	45000	0
Oilseed	Sesamum	TKG-22	1.24	0	0
Oilseed	Sesamum	TKG-55	2.3	0	0
Oilseed	Sesamum	Uma	7	30000	0
Oilseed	Soybean	JS 20-29	482.84	3024326	81
Oilseed	Soybean	JS 20-34	226.43	2070000	0
Oilseed	Soybean	JS 20-69	53.9	510300	55
Oilseed	Soybean	JS- 9305	424.15	4233950	0
Oilseed	Soybean	JS 95-60	772.73	7295050	122
Oilseed	Soybean	JS-335	263.18	3900	4
Oilseed	Soybean	JS-9752 /JS-2034	87	142585	45
Oilseed	Soybean	RVS-2001-04	479.34	4276375	312
Oilseed	Soybean	RVS-2001-04, JS 335	12	65000	43
Pulses	Black gram	Azad-1	7	78000	50
Pulses	Black gram	Birsa	6	51000	0
Pulses	Black gram	Indira Urd 1	1.11	9600	15
Pulses	Black gram	IPM-2-14	5	30000	0
Pulses	Black gram	JU-86	16	0	0
Pulses	Black gram	Ndra Urad-1I	6.79	0	0
Pulses	Black gram	OBG-17	3	0	0
Pulses	Black gram	PU-30	10.51	65000	33
Pulses	Black gram	PU-31	9.5	0	0
Pulses	Black gram	T-9	9.7	0	0
Pulses	Chick pea	Jaki-9218	1001.7	7923100	200
Pulses	Chick pea	JG-11	91.5	1060000	20
Pulses	Chick pea	JG-12	269.2	2799600	672
Pulses	Chick pea	JG-130	441.2	8950000	50
Pulses	Chick pea	JG-14	323.04	131400	25

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Pulses	Chick pea	JG-16	122.5	540000	0
Pulses	Chick pea	JG-226,JG-14	107.5	0	0
Pulses	Chick pea	JG-322	30	303750	0
Pulses	Chick pea	JG-6, JG-16, Kripa, JGK-3, PKV-4	11.75	150375	61
Pulses	Chick pea	JG-63	635.12	6173320	42
Pulses	Chick pea	JG-74	6.4	0	0
Pulses	Chick pea	PKV-4	2.4	24000	1
Pulses	Chick pea	RVG-202	183.42	1560149	35
Pulses	Chick pea	Vaibhav	24.1	76517.5	15
Pulses	Field pea	JM-6	50	275000	0
Pulses	Field pea	Paras	76.5	239470	0
Pulses	Field pea	Prakash	20	98200	40
Pulses	Field pea	Shubhra	9.4	29170	2
Pulses	Field pea	Vikas	32	156000	92
Pulses	Green gram	Hum	0.6	7500	65
Pulses	Green gram	Hum-12	28.493	12600	0
Pulses	Green gram	Hum-16	0.014	0	0
Pulses	Green gram	IPM-2-3	0	0	6
Pulses	Green gram	OBGG-52	2	0	0
Pulses	Green gram	PDM-139	24.015	211200	160
Pulses	Green gram	PDM-139 and HUM-12	33.4	270000	0
Pulses	Green gram	PUSA 9072	4	18000	0
Pulses	Green gram	Samrat	0	0	12
Pulses	Green gram	SML - 668	2.91	0	0
Pulses	Green gram	TARM-1	15.83	143002	6
Pulses	Green gram	TJM-3	4.5083	18000	5
Pulses	Green gram	TJM-37	6.5	0	0
Pulses	Lathyrus	Mahatiwra	8.91	23166	30
Pulses	Lentil	HUL-57	2	0	0
Pulses	Lentil	JL-3	71.3	233130	40
Pulses	Pigeon pea	Asha	56.014	83720	0
Pulses	Pigeon pea	BBM-711	40	280000	0
Pulses	Pigeon pea	ICPL-88039	0.8	1200	2
Pulses	Pigeon pea	ICPL-8863	0.017	0	0
Pulses	Pigeon pea	IPA 2010-30-5	0.45	0	0
Pulses	Pigeon pea	JKM-189	3.3	0	0
Pulses	Pigeon pea	Kashi Nandini	16	0	0

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Pulses	Pigeon pea	LRG-41	1.065	4732	3
Pulses	Pigeon pea	Maruti	2.6	8544	0
Pulses	Pigeon pea	Pusa-2002	0.365	5475	11
Pulses	Pigeon pea	Rajeev Lochan	30.33	101050	255
Pulses	Pigeon pea	TJT-401	0.675	10125	1
Pulses	Pigeon pea	TJT-501	151.384	1631000	516
Pulses	Pigeon pea	TT 401	1.5	0	0
Pulses	Pigeon pea	Upas-120	38.4	274854	0
Spices	Chillies	Kashi Anmol, PantC-1	0.026	5200	225
Spices	Coriander	CIMPO-33	0.75	29660	5
Spices	Coriander	Gujarat Dhania-1	10	0	5
Spices	Coriander	Hira moti	0.26	9100	14
Spices	Coriander	Pant Haritima	1.364	40920	45
Spices	Fenugreek	RMT-305	13	0	5
Spices	Garlic	G-282	53.31	197802	94
Spices	Ginger	Local	10	0	0
Spices	Ginger	Suprabha	11.5	106750	0
Spices	Ginger	Suruchi	300	0	10
Spices	Turmeric	Pant Pitambh, Shoruma, Barua Sagar	2.23	22300	108
Spices	Turmeric	Roma	101	252500	12
Spices	Turmeric	Suroma	0.63	6300	2
Spices	Zinger	Baruwa Sagar	4.37	52440	56
Sugarcane	Sugarcane	CO-82036	360	108000	250
Tuber crop	Elephant foot yam	Gajendra	162	810000	0
Tuber crop	Potato	Kufri pukhraj	179	346912	0
Tuber crop	Turmeric	Roma	12	48000	0
Tuber crop	Turmeric	Suroma	200	0	10
Vegetables	Amaranthus	Pusa Lal Chaulai	0.0085	1700	32
Vegetables	Bitter gourd	Priya	0.0223	4460	151
Vegetables	Bottle gourd	Pusa naveen	0.1496	14960	127
Vegetables	Brinjal	Kashi Taru	0.03	6000	105
Vegetables	Brinjal	Mahi-28 , Gaurav , Chita	1.45	0	0
Vegetables	Chinese cabbage	Chinese Cabbage	0.46	5410	0
Vegetables	Cow pea	K-5269	0.03	600	36
Vegetables	Cow pea	Kohinoor	0.1	500	8
Vegetables	Cucumber	Jaunpuri	0.028	560	27

Crop Category	Crop	Variety	Quantity (q.)	Value (Rs.)	Beneficiaries
Vegetables	Drum stick	PKM-1	0.005	0	0
Vegetables	Fenugreek	RMT-1	0.4	10000	4
Vegetables	Okra	Arka Anamika	0.035	2800	0
Vegetables	Okra	Kashi Pragati	0.67	13400	200
Vegetables	Okra	VRO-22	0.41	32800	7
Vegetables	Onion	Agri Found Light Red	0.26	39750	15
Vegetables	Papaya	Kughanidue	0.0214	10700	103
Vegetables	Pea	GS-10	0.269	4042	10
Vegetables	Pea	VRP-22	0.47	7050	20
Vegetables	Pea	VRP-9	0.415	6225	20
Vegetables	Potato	K. Surya	16.6	11600	70
Vegetables	Pumpkin	Azad Harit	0.289	289	30
Vegetables	Radish	Kashi Sweta, Pusa chetaki, Arka Nishant	0.49	17150	140
Vegetables	Spinach	All Green	0.25	5500	87
Vegetables	Sponge gourd	S-1	0.0655	6550	231
Grand Total			**22048.3506**	**82673587.5**	**15091**

Table 5.5: Status of planting material production in Zone-IX

Crop Category	Crop	Nos.	Value (Rs.)	Beneficiaries	Expected area coverage (ha.)
Cash Crop	Sugarcane	150	2000	8	10
Flower	Gallardia	30000	11000	2005	0.5
Flower	Glaedulues	150	10	20	1
Flower	Gudhal	17	170	7	0.01
Flower	Hibiscus	5000	100000	10	2
Flower	Jackfruit	300	10	10	2
Flower	Marigold	176203	115500	788	7.181
Flower	Mogra	1	20	1	0.001
Flower	Rose	3494	11845	487	1.031
Flower	Zinia	2000	500	13	0.027
Fodder	Azolla	12300	24700	20	0
Fodder	Hybrid Napier	30000	30000	0	0
Forest species	Acacia	650	4550	71	0
Forest species	Amltas	26	260	5	0.01
Forest species	Bamboo	506	2930	65	0.29
Forest species	Bottle palm	217	5425	28	0.09
Forest species	Durenta	210	2100	10	0.25

Crop Category	Crop	Nos.	Value (Rs.)	Beneficiaries	Expected area coverage (ha.)
Forest species	Eucalyptus	138	2070	20	0.12
Forest species	Ficus	162	4230	19	0.39
Forest species	Forest seedlings	1988	24430	20	0
Forest species	Gudachi	11	90	4	0.001
Forest species	Gulmohar	249	2990	37	0.73
Forest species	Imli	70	350	40	0.25
Forest species	Karonda	559	7180	100	0.36
Forest species	Kesiasama	38	380	19	0.05
Forest species	Mangium	400	2800	10	0
Forest species	Medicinal seedlings	24	270	10	0
Forest species	Neem	24	240	12	0.1
Forest species	Others	1645	9710	71	0
Forest species	Seasamum	252	2520	20	0.5
Forest species	Seven	150	1500	0	0.25
Forest species	Shisham	55	825	25	0.14
Forest species	Sisu	200	1200	5	0.2
Forest species	Teak	187	405	60	0.04
Fruits	Acid lime	980	22000	108	10
Fruits	Aonla, guava, lime, pomegranate, ber, bael, sweet orange, mandarin	2248	103560	112	2.62
Fruits	Apple	20000	0	500	0
Fruits	Banana	2600	5000	50	0
Fruits	Citrus seeded lime	200	4000	100	0
Fruits	Citrus Seedless lemon	200	8000	100	0
Fruits	Colocasia	120	3600	0	0.06
Fruits	Custard apple	3021	63585	161	4.89
Fruits	Guava, Ber, aonla, mulberry and vegetable	3037	87040	258	9.87
Fruits	Jackfruit	690	7610	127	2.35
Fruits	Jamun	646	6460	140	0.37
Fruits	Karonda	20000	0	500	0
Fruits	Lime	2486	62530	711	2.45
Fruits	Litchi	250	10000	125	0
Fruits	Mango	9221	241950	672	33.171
Fruits	Mango graft	755	22270	27	6
Fruits	Papaya	90741.03	502673	6095	49.66
Fruits	Papaya seedlings	895	8950	150	0
Fruits	Papaya seedlings	6500	1300000	50	1.2

Crop Category	Crop	Nos.	Value (Rs.)	Beneficiaries	Expected area coverage (ha.)
Fruits	Pomegranate	1599	28440	178	1.59
Fruits	Sindoor	500	5000	100	0
Medicinal	Brahmi	30	300	5	0
Medicinal	Karre Patta	500	5000	250	0
Medicinal	Meetha neem	14	140	7	0.01
Medicinal	Tulsi	501	5005	251	0.001
Mushroom	Mushroom	5728	81450	1285	24
Mushroom	Mushroom spawn	2670	40050	134	0
Mushroom	Oyster Mushroom	1200	14400	110	10
Mushroom	Paddy straw and oyster	5087	76305	5087	0
Ornamental crops	Ashok	134	1610	10	0.3
Ornamental crops	Chameli	218	3270	25	0.05
Ornamental crops	Chandani	221	3315	36	0.05
Ornamental crops	Croton	270	6750	25	0.06
Ornamental crops	Kachnar	650	11500	250	0.25
Ornamental crops	Madhukamini	2	80	2	0.001
Ornamental crops	Manokamani	308	4620	35	0.07
Ornamental crops	Others	1500	10000	215	0
Ornamental crops	Vidya	17	680	9	0.05
Spices	Black turmeric	5000	7510	250	0
Spices	Capsicum	10000	10400	205	0.7
Spices	Ginger	0	4232	0	0
Spices	Onion seedlings	72000	10800	75	4
Tuber crop	Elephant foot yam	88	1800	43	12.03
Vegetable seedling	Cabbage seedlings	6000	1500	10	0
Vegetable seedling	Cauliflower seedling	83500	78000	67	0.4
Vegetable seedling	Chilli Seedlings	45000	40000	60	1.4
Vegetable	Bitter gourd	224	1440	40	0
Vegetable	Bottle gourd	269.9	1690	74	0
Vegetable	Brinjal	790086	334887	2429	30.738
Vegetable seedling	Brinjal seedlings	17421	11692	4201	0
Vegetable	Brinjal, Tomato, Chilli, Cabage, Cauliflower	5000	4450	125	0.6
Vegetable	Broccoli	39150	60350	88	1.82
Vegetable	Bulk vegetables (brinjal, Papaya, ridge gourd , bitter gourd, cucumber, okra, cauliflower, bean etc)	825	17412	374	0

Crop Category	Crop	Nos.	Value (Rs.)	Beneficiaries	Expected area coverage (ha.)
Vegetable	Cabbage	180282	101146	6915	10.493
Vegetable	Capsicum	41145	36740	35	0.33
Vegetable	Cauliflower	153398	114463	3781	14.76
Vegetable	Chilli	714545	316381	8271	21.172
Vegetable	Cole crop	9000	2250	23	0.182
Vegetable	Cucumber	144	1440	10	0
Vegetable	Drumstick	73430	169960	2329	7.086
Vegetable	Knolkhol	9000	6600	290	0
Vegetable	Lotus seedling	664	664	1	0
Vegetable	Moringa	50800	8000	540	1.28
Vegetable	Okra	3	1975	3	0
Vegetable	Onion	3415915	273778	2794	10.69
Vegetable	Papaya, cauliflower, brinjal, cabbage, tomato, chilli, drumstick	4617	15417	0	0
Vegetable	Potato	729	5000	144	1
Vegetable	Red cabbage	200	100	7	0
Vegetable	Sponge gourd	249	1490	62	0
Vegetable	Tomato	765243	345082	10961	27.92
Vegetable	Tomato seedlings	117900	109200	122	2.5
Vegetable	Tomato, brinjal, chilli, papaya, moringa	40000	20000	15	0.8
Vegetable	Tomato, drum stick	25000	25000	25	1
Grand Total		**7129943**	**5256422**	**66389**	**337.495**

Production of Bio-products

Table 5.6: Production of bio-agents, pesticides, fertilizers by KVKs in Zone-IX

Major Group Bio agent/Bio fertilizers/ Bio Pesticides	Name of the product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No. of KVKs
Apiary	Honey	3159	0	28691	43	3
Apiary	Raj vijay honey	195	0	47890	0	1
Bio Agents	Azolla	223	125	14745	180	4
Bio Agents	Bio pesticides	50	0	2500	50	1
Bio Agents	Earth worms	1048.05	60	264325	256	10
Bio Agents	*Esenia foetida*	70	160	11200	0	1
Bio Agents	*Pseudomonas*	180	0	10800	13	1
Bio Agents	*Tricoderma*	232	0	13920	120	1

Major Group Bio agent/Bio fertilizers/ Bio Pesticides	Name of the product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No. of KVKs
Bio Agents	*Tricoderma viride*	4766.5	2213	117840	1812	10
Bio Agents	Vermiculture	23.2	0	42800	31	2
Bio Agents	Wormi wash	358	0	8250	41	1
Bio Fertilizer	*Azospirilium*	151	724	17270	424	2
Bio Fertilizer	*Azotobactor*	1634.8	8144	164080	4106	4
Bio Fertilizer	Blue green algae soil based	4920	2460	196800	400	1
Bio Fertilizer	NADEP Compost	1200	15	6000	46	1
Bio Fertilizer	Panchagavya	60	0	3000	18	1
Bio Fertilizer	PSB	4066	15124	409840	7329	4
Bio Fertilizer	Rhizobium	1878	7966	189480	7971	8
Bio Fertilizer	Tricho vermin compost	2835	0	368550	705	1
Bio Fertilizer	Vermicompost	225126	35383	1517728	1705	59
Bio Pesticide	Neemastra, Handidawa, Agnishastra etc.	2500	2500	25000	100	1
Compost	NADEP Compost	10000	0	25000	0	1
Manure	FYM	25	0	17940	4	2
Mushroom	Mushroom	1000	100	15200	6	2
Mushroom	Mushroom spawn	0	3130	44600	48	2
Mushroom	OSM-10	1081	0	12990	64	1
Mushroom	Oyster mushroom	80.76	0	4038	15	1
Mushroom	P. Sajorcaju	2	0	10000	0	1
Mushroom	Paddy straw mushroom	104.625	0	8570	22	2
Mushroom	*V.volvaceae & Pleurotus spp.*	102	1000	36000	225	3
Total		**267070.94**	**79104**	**3635047**	**25734**	**132**

Table 5.7: Production of bio-agents, pesticides, fertilizers by KVKs in Chhattishgarh

Major Group Bio agent/Bio fertilizers/Bio Pesticides	Name of the product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No of KVKs
Bio-agents	Azolla	20	0	5	20	1
Bio-agents	Bio pesticides	50	0	2500	50	1
Bio-agents	Earth worms	64	60	48500	22	2
Bio-agents	*Esenia foetida*	70	160	11200	0	1
Bio-agents	*Pseudomonas*	180	0	10800	13	1

Major Group Bio agent/Bio fertilizers/Bio Pesticides	Name of the product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No of KVKs
Bio-agents	*Tricoderma*	232	0	13920	120	1
Bio-agents	*Tricoderma viride*	4241.5	1163	65340	1107	8
Bio fertilizer	*NADEP Compost*	1200	15	6000	46	1
Bio fertilizer	Tricho vermin compost	2835	0	368550	705	1
Bio fertilizer	Vermicompost	24289	3866	188290	831	14
Bio pesticide	Neemastra, Handidawa, Agnishastra etc.	2500	2500	25000	100	1
Manure	FYM	25	0	17940	4	2
Mushroom	Mushroom spawn	0	130	2600	6	1

Table 5.8: Production of bio-agents, pesticides, fertilizers by KVKs in Madhya Pradesh

Major Group Bio agent/Bio fertilizers/Bio Pesticides	Name of the product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No of KVKs
Apiary	Honey	3141	0	22991	5	1
Apiary	Raj vijay Honey	195	0	47890	0	1
Bio-agents	Azolla	125	125	12500	125	1
Bio-agents	Earth worms	952.05	0	208825	208	5
Bio-agents	*Tricoderma viride*	525	1050	52500	705	2
Bio-agents	Vermi wash	358	0	8250	41	1
Bio-fertilizer	*Azospirilium*	151	724	17270	424	2
Bio-fertilizer	*Azotobactor*	1634.8	8144	164080	4106	4
Bio-fertilizer	Blue green algae soil based	4920	2460	196800	400	1
Bio-fertilizer	PSB	4066	15124	409840	7329	4
Bio-fertilizer	Rhizobium	1878	7966	189480	7971	8
Bio-fertilizer	Vermicompost	168828	2017	904920	388	18
Compost	NADEP compost	10000	0	25000	0	1

Table 5.9: Production of bio-agents, pesticides, fertilizers by KVKs in Odisha

Major Group Bio agent/Bio fertilizers/ Bio Pesticides	Name of the Product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No of KVKs
Apiary	Honey	18	0	5700	38	2
Bio agents	Azolla	78	0	2240	35	2
Bio agents	Earth worms	32	0	7000	26	3
Bio agents	Vermiculture	23.2	0	42800	31	2

Major Group Bio agent/Bio fertilizers/ Bio Pesticides	Name of the Product	Qty (kg)	Qty (No.)	Value (Rs.)	Beneficiaries	No of KVKs
Bio fertilizer	Panchagavya	60	0	3000	18	1
Bio fertilizer	Vermicompost	32009	29500	424518	486	27
Mushroom	Mushroom	1000	100	15200	6	2
Mushroom	Mushroom spawn	0	3000	42000	42	1
Mushroom	OSM-10	1081	0	12990	64	1
Mushroom	Oyster mushroom	80.76	0	4038	15	1
Mushroom	*P. sajorcaju*	2	0	10000	0	1
Mushroom	Paddy straw mushroom	104.625	0	8570	22	2
Mushroom	*V.volvaceae & Pleurotus spp.*	102	1000	36000	225	3

Production of Livestock Materials

Table 5.10: Status of livestock production in KVKs in Zone-IX

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/ q/litre)	Value (Rs.)	Beneficiaries	No. of KVK
Buffalo	Murrah	Milk	4335.5	151742.5	16	1
Cattle	Geer, Sahiwal, HF	Milk	10456.35	450000	26	1
Cattle	Gir	Milk	4500	173430	13	4
Cattle	HF	Milk	10625	403750	65	1
Cattle	Sahiwal/Gir	Milk	15922.25	581920	254	4
Cattle	Shahiwal	Milk	26314.65	1516168	191	11
Duck	Andhra runner	Ducklings	200	10805	40	1
Duck	Khahki Cambel	Ducklings	300	30000	15	1
Duck	Khakhi Cambel, White Peain	Ducklings	120	0	0	2
Duck	Khakhi Cambel, White Peain	Ducklings	905	34628	54	4
Duck	Khakhi kembal	Eggs	2500	12500	23	1
Duck	Naghans	Meat	26	26000	10	1
Duck	Nagraj	Ducklings	35	8750	0	1
Duck	White peckin	Ducklings	283	13140	30	1
Duck	White peckin X Khaki Campbell	Ducklings	346	15820	35	1
Fish	carp	Spawns	600000	4200	8	1
Fish	Catla, Rahu, Mrigal, Common carp	Fingerlings	320000	49950	30	2
Fish	Grass carp	Fingerlings	2000	8000	0	1
Fish	IMC	Fingerlings	4000	64000	0	2
Fish	IMC	Spawns	35	31500	6	1

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/ q/litre)	Value (Rs.)	Beneficiaries	No. of KVK
Fish	IMC	Stunted yearlings/ fingerlings	66200	71640	14	1
Fish	Indian & exotic major carp	Table Fish	300	42000	228	1
Fish	Indian major carps	Fingerlings	264780	236175	70	1
Fish	Java Punti	Juveniles	4000	4000	14	1
Fish	Jayantirohu	Fingerlings	7200	28800	0	1
Fish	Jayantirohu	Fish	50	10000	0	1
Fish	Molly & Platy	Ornamental fish	6000	15000	1	1
Fish	Molly, Guppy, Platy and Swordtail	Fingerlings	1428	8050	137	1
Fish	Nile Tilapia	Fish	670	1340	1	1
Fish	Packing cost	Oxypolypacks	154	2310	0	1
Fish	Roghu/Mrigal/Katla/Mradula	Fish	560.6	130275	248	6
Fish	Roghu/Mrigal/Katla/Mradula	Seed	300	136000	12	2
Fish	Tilapia & Pangas	Advanced fingerlings	39	14850	19	1
Fodder	Azolla	Seed (Planting material)	203.5	11875	18	1
Goat	Barbari	Animal for breeding purpose	462	207950	31	2
Goat	Barbari	Doe/Buck/Kid	40	120000	0	1
Goat	Barbari	Live animal	193.3	46934	95	2
Goat	Osmanabadi	Breeding	136	28832	12	2
Goat	Sirohi	Doe/Buck/Kid	33	0	0	1
Goat	Sirohi	Meat	22	110000	0	1
Poultry	Banaraja	Chicks	3748	201308	385	6
Poultry	Banaraja	Dual purpose	1171	62895	269	1
Poultry	CARI,Virat, Beltzvielle	Broilers/Eggs	80	14500	11	1
Poultry	Coloured breed (black rock, red carnish, Kaveri, Chhabro)	Dual purpose	1540	90350	42	1
Poultry	Kadaknath	Breeding	9	1800	5	1
Poultry	Kadaknath	Broilers/Eggs	34	24000	10	1
Poultry	Kadaknath	Broilers/Meat	201	118100	185	1
Poultry	Kadaknath	Chicks	53840	3300630	592	7

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/ q/litre)	Value (Rs.)	Beneficiaries	No. of KVK
Poultry	Kadaknath	Egg, hen & chicks	2365	164746	35	1
Poultry	Kadaknath	Eggs	52217	9381	174	4
Poultry	Kadaknath	Live animal	70	42000	50	1
Poultry	Kadaknath	Meat	609.94	216641	235	5
Poultry	Kadaknath	Parent poultry bird	85	34000	0	1
Poultry	Kadaknath and Narmada Nidhi	Meat	100	20000	60	1
Poultry	Kuroiler	Chicks	350	12240	50	1
Poultry	Pallishree	Meat	196	19600	7	1
Poultry	Pearl, lavender	Backyard poultry	100	4000	10	1
Poultry	Rainbow rooster	Chicks	1650	96400	107	2
Poultry	Rainbow rooster, Vanaraja, Chhabro, Black rock,	Developed chicks	10587	506742	500	1
Poultry	Table bird	Broilers/Meat	461.9	0	0	1
Poultry	Turkey	Broilers/Meat	114	0	0	1
Poultry	Vanaraja & rainbow rooster	Chicks	2075	68030	0	1
Poultry	Vanaraja, Necked Neck	Chicks	400	15100	30	1
Poultry	Vanraja, Black rock, White leghorn cross	Egg, hen & chicks	404	100000	0	1
Quail	CARI (Ujjawal, white breasted), CARI Sweta (white), CARI (Brown), CARI (Uttam)	Backyard poultry	50	2000	8	1
Sheep and Goat	Back bengal	Breeding	10	50000	0	1
Sheep and Goat	Jamunapari	Breeding	12	0	0	1
Sheep and Goat	Sirohi	Breeding	21	147000	2	1

Table 5.11: Status of Livestock production in KVKs under Chhattishgarh during 2016-17

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/q/ litre)	Value (Rs.)	Beneficiaries	No. of KVK
Cattle	Gir	Milk	4500	173430	13	4
Cattle	HF	Milk	10625	403750	65	1
Cattle	Sahiwal/Gir	Milk	15922.25	581920	254	4
Cattle	Shahiwal	Milk	22793.25	1158816	169	8
Duck	Khahki Cambel	Ducklings	300	30000	15	1
Duck	Khakhi Cambel, White Peain	Duck Chicks	120	0	0	2

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/q/ litre)	Value (Rs.)	Beneficiaries	No. of KVK
Duck	Khakhi kembal	Eggs	2500	12500	23	1
Duck	Naghans	Meat	26	26000	10	1
Duck	Nagraj	Ducklings	35	8750	0	1
Fish	Catla, Rahu, Mrigal, Common carp	Fingerlings	320000	49950	30	2
Fish	Indian & Exotic Major Carp	Table Fish	300	42000	228	1
Fish	Indian Major Carps	Fingerlings	264780	236175	70	1
Fish	Roghu/Mrigal/Katla/ Mradula	Fish	556.5	79275	30	2
Fish	Rohu/katala	Fish	300	36000	12	1
Goat	Barbari	Breeding	462	207950	31	2
Goat	Barbari	Doe/Buck/Kid	40	120000	0	1
Goat	Barbari	Live animal	193.3	46934	95	2
Goat	Osmanabadi Goat	Breeding	136	28832	12	1
Goat	Sirohi	Doe/Buck/Kid	33	0	0	1
Goat	Sirohi	Meat	22	110000	0	1
Poultry	Kadaknath	Breeding	9	1800	5	1
Poultry	Kadaknath	Chicks	31186	1612050	412	3
Poultry	Kadaknath	Eggs	51309	1080	24	2
Poultry	Kadaknath	Live animal	70	42000	50	1
Poultry	Kadaknath	Meat	150.94	66776	118	2
Poultry	Kadaknath	Parent poultry bird	85	34000	0	1
Poultry	Vanraja, Black rock, White laghorn cross	Egg, hen & chicks	404	100000	0	1
Sheep & Goat	Back bengal	Breeding	10	50000	0	1

Table 5.12: Status of Livestock production in KVKs under Madhya Pradesh during 2016-17

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/q/ litre)	Value (Rs.)	Beneficiaries	No. of KVK
Buffalo	Murrah	Milk	4335.5	151742.5	16	1
Cattle	Geer, Sahiwal, HF	Milk	10456.35	450000	26	1
Cattle	Shahiwal	Milk	3521.4	357352	22	3
Fish	Roghu/Mrigal/Katla/ Mradula	Fish	0	3000	4	2
Fish	Roghu/Mrigal/Katla/ Mradula	Seed	0	100000	0	1

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/q/ litre)	Value (Rs.)	Beneficiaries	No. of KVK
Fodder	Azolla	Seed (Planting material)	203.5	11875	18	1
Poultry	Kadaknath	Broilers/Eggs	34	24000	10	1
Poultry	Kadaknath	Broilers/Meat	201	118100	185	1
Poultry	Kadaknath	Chicks	22654	1688580	180	4
Poultry	Kadaknath	Egg, hen & chicks	2365	164746	35	1
Poultry	Kadaknath	Eggs	908	8301	150	2
Poultry	Kadaknath	Meat	459	149865	117	3
Poultry	Kadaknath and Narmada Nidhi	Meat	100	20000	60	1
Sheep & Goat	Jamunapari	Breeding	12	0	0	1
Sheep & Goat	Sirohi	Breeding	21	147000	2	1

Table 5.13: Status of Livestock production in KVKs under Odisha during 2016-17

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/q/ litre)	Value (Rs.)	Beneficiaries	No. of KVK
Duck	Andhra runner	Ducklings	200	10805	40	1
Duck	Khakhi Cambel, White Peain	Ducklings	905	34628	54	4
Duck	White peckin	Ducklings	283	13140	30	1
Duck	White peckin X Khaki Campbell	Ducklings	346	15820	35	1
Fish	carp	Spawns	600000	4200	8	1
Fish	Grass carp	Fingerlings	2000	8000		1
Fish	IMC	Fingerlings	4000	64000		2
Fish	IMC	Spawns	35	31500	6	1
Fish	IMC	Stunted yearlings/ fingerlings	66200	71640	14	1
Fish	Java Punti	Juveniles	4000	4000	14	1
Fish	Jayantirohu	Fingerlings	7200	28800		1
Fish	Jayantirohu	Fish	50	10000		1
Fish	Molly & Platy	Ornamental fish	6000	15000	1	1
Fish	Molly, Guppy, Platy and Swordtail	Fingerlings	1428	8050	137	1
Fish	Nile Tilapia	Fish	670	1340	1	1
Fish	Packing Cost	Oxypolypacks	154	2310		1
Fish	Roghu/Mrigal/Katla/ Mradula	Fish	4.1	48000	214	2

Name of the animal / bird / aquatics	Breed	Type of produce	Qty. (kg/q/ litre)	Value (Rs.)	Beneficiaries	No. of KVK
Fish	Tilapia & Pangas	Advanced fingerlings	39	14850	19	1
Poultry	Banaraja	Chicks	3748	201308	385	6
Poultry	Banaraja	Dual purpose	1171	62895	269	1
Poultry	CARI,Virat, Beltzvielle	Broilers/Eggs	80	14500	11	1
Poultry	Coloured breed(black rock, red carnish, Kaveri, Chhabro)	Dual purpose	1540	90350	42	1
Poultry	Kuroiler	Chicks	350	12240	50	1
Poultry	Pallishree	Meat	196	19600	7	1
Poultry	Pearl, lavender	Broilers/Eggs	100	4000	10	1
Poultry	Rainbow rooster	Chicks	1650	96400	107	2
Poultry	Rainbow rooster, Vanaraja, Chhabro, Black rock,	Developed chicks	10587	506742	500	1
Poultry	Table bird	Broilers/Meat	461.9	0	0	1
Poultry	Turkey	Broilers/Meat	114	0	0	1
Poultry	Vanaraja & rainbow rooster	Chicks	2075	68030		1
Poultry	Vanaraja, Necked Neck	Chicks	400	15100	30	1
Quail	CARI (Ujjawal, white breasted), CARI Sweta (white), CARI (Brown), CARI (Uttam)	Backyard poultry	50	2000	8	1

6 SOIL, WATER AND PLANT ANALYSIS

Soil and water testing is an important activity of KVK for improving the soil fertility and sustainability of agricultural production in the region. During the reporting year, KVKs of analyzed 191232 soil samples and 745 water samples benefitting 559113 farmers of 5607 villages (Table 6). The highest numbers of samples were tested in the state of Madhya Pradesh followed by Chhattisgarh and Odisha. The KVK wise details of soil and water samples tested are given in Table 6.

Table 6: Summary of soil and water samples tested by the KVKs in Zone-IX during 2016-17

State	Details	No. of		
		Samples	Farmers	Villages covered
Chhattisgarh	Soil samples	30235	168893	1157
	Water Samples	11	11	2
Madhya Pradesh	Soil samples	148703	352867	3371
	Water samples	28	28	12
Odisha	Soil samples	12294	35931	882
	Water samples	706	1383	183
Total	**Soil samples**	**191232**	**557691**	**5410**
	Water samples	**745**	**1422**	**197**
	Total	**191977**	**559113**	**5607**

7 EXTENSION ACTIVITIES

Transfer of technology holds key to rapid development and transformation of rural society. Krishi Vigyan Kendras having district as jurisdiction, are playing crucial role in transfer of technology and thereby enhancing productivity and income of the farming community. The various extension activities include demonstration for farmers group and exhibition reaching large number of famers. To reach to wider masses, different means of information dissemination from traditional ones like poster exhibition to new ICT tools like mobile messaging and social media are used. Broadly, extension activities conducted by KVK include – (i) Advice based like farm advisory services; lectures delivered as resource person; method demonstration, etc. (ii) Animal related like animal health and vaccination camp (iii) Literature based like exhibition, extension literature and popular article (iv) Media based like production of CD/DVD, Film show, Newspaper coverage, radio talks and TV talks (v) Meeting based like ex-trainee sammelan, celebration of important days, club meet, farmers' seminar, field day, group meet, gosthi, mela, SHG meeting and workshops (vi) Soil related activities like soil health camp and soil test campaign (vii) Visit based activities like diagnostic visits, exposure visits, farmers visit to KVK and scientists visits to farmers fields. In all, 1,40,558 activities were conducted and 19,03,974 farmers, farm women, rural youth and extension workers were benefited (Table 7.1 & 7.2).

Table 7.1 : Details of extension activities organized by the KVKs of Zone-IX during 2016-17

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Agri mobile clinic	181	2458	69	1358	143	108	35	3924	247	4171
Awareness programme (Clean India campaign, Parthenium day)	59	1815	20	225	63	228	3	2268	86	2354
Celebration of important days	6	176	66	166	70	18	6	360	142	502
Celebration of important days *	403	22904	6344	11902	5281	1372	434	36178	12059	48237
Diagnostic visits	2961	11025	2329	9739	2192	1066	256	21830	4777	26607
Exhibition	8457	110295	22012	46378	15492	4878	1264	161551	38768	200319
Exposure visits	364	3351	617	3308	986	236	85	6895	1688	8583
Ex-trainees sammelan	181	2746	689	1931	624	352	107	5029	1420	6449

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Farm advisory services	8413	358334	20900	208118	42229	4194	4001	570646	67130	637776
Farm Science Club conveners meet	110	1260	182	597	182	93	55	1950	419	2369
Farmers seminar	3170	9176	1595	5750	2060	540	146	15466	3801	19267
Farmers visit to KVK	78134	76054	10653	56730	14799	3330	970	136114	26422	162536
Field day	1015	19210	3534	11435	3714	1365	340	32010	7588	39598
Film show	2387	19919	4224	10507	4046	3047	993	33473	9263	42736
Group meetings	1036	10582	3339	5606	2242	684	283	16872	5864	22736
Interface with farmers/ scientist	36	315	53	439	140	102	17	856	210	1066
Kisan ghosthi	1675	33529	4988	29634	3409	1432	372	64595	8769	73364
Kisan mela	217	100010	14523	58287	16329	3982	852	162279	31704	193983
Krishi mahotsava	216	1200	0	2220	50	576	50	3996	100	4096
Lectures delivered as resource persons	11610	57322	8199	31860	13716	3694	834	92876	22749	115625
Mahila Mandals conveners meetings	117	955	1144	901	701	178	85	2034	1930	3964
Method demonstrations	781	9721	1913	5411	1559	2111	171	17243	3643	20886
Publication of literature	32	4000	0					4000	0	4000
Scientific visit to farmers field	13380	40025	7870	26724	7215	1551	508	68300	15593	83893
Self Help Group conveners meetings	229	1142	2090	900	1050	146	128	2188	3268	5456
Soil health Camp	211	6909	1034	5274	1370	462	172	12645	2576	15221
Soil test campaigns	147	26085	2570	16930	1133	269	73	43284	3776	47060
Technology week	8	1381	165	188	53	70	12	1639	230	1869
Workshop	263	3816	710	2834	897	1756	311	8406	1918	10324
World environment day	2	1226	156					1226	156	1382
World food day	1	79	25	26	12	2	0	107	37	144
World Soil day	1	89	12	15	3	4	2	108	17	125
Total	**135803**	**937109**	**122025**	**555393**	**141760**	**37846**	**12565**	**1530348**	**276350**	**1806698**

Note: M-Male, F-Female

*Important days- International women's day, Soil Health day, Jay kisan jay vigyan day, Plantation day, Swachata Abhiyan etc.

Table 7.2 : Details of other extension activities

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension Personnel		
		M	F	M	F	M	F	M	F	Total
Animal health camp	209	3604	581	2836	598	252	46	6692	1225	7917
Extension literature	702	49430	5125	14791	2184	1238	395	65459	7704	73163
Newspaper coverage	2354	227	6	157	5	56	16	440	27	467
Popular articles	538	3075	568	5487	434	300	108	8862	1110	9972
Radio talks	478	300	5	150	10	5	1	455	16	471
TV talks	441	330	60	80	35	8	2	418	97	515
Other	33	2144	228	1819	152	388	40	4351	420	4771
Total	**4755**	**59110**	**6573**	**25320**	**3418**	**2247**	**608**	**86677**	**10599**	**97276**

Note: M-Male, F-Female

Table 7.3 : Details of extension activities organized by the KVKs of Chhattisgarh during 2016-17

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Agri mobile clinic	24	95	33	375	99	73	32	543	164	707
Animal health camp	95	443	263	876	263	62	15	1381	541	1922
Celebration of important days	105	2111	517	2259	779	307	119	4677	1415	6092
Diagnostic visits	830	1211	329	3564	835	371	93	5146	1257	6403
Exhibition	120	7008	2281	5076	1244	327	135	12411	3660	16071
Exposure visits	105	1171	191	1718	497	63	16	2952	704	3656
Extension literature	173	9457	1139	8906	527	582	244	18945	1910	20855
Ex-trainees Sammelan	29	271	56	446	105	51	15	768	176	944
Farm advisory Services	725	80041	11702	91083	8951	1183	398	172307	21051	193358
Farm Science Club conveners meet	9	92	10	131	19	15	8	238	37	275
Farmers seminar	28	395	92	738	175	69	22	1202	289	1491
Farmers visit to KVK	15029	6748	1618	13330	3116	671	280	20749	5014	25763
Field day	116	3565	1165	3413	1127	256	92	7234	2384	9618
Film show	173	639	217	1939	634	155	66	2733	917	3650
Group meetings	109	822	170	1101	354	148	68	2071	592	2663
Kisan ghosthi	172	1724	621	3751	943	233	135	5708	1699	7407

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Kisan mela	49	6210	1856	12480	2861	728	295	19418	5012	24430
Lectures delivered as resource persons	579	2001	737	4409	1621	295	186	6705	2544	9249
Mahila Mandals conveners meetings	18	12	239	3	282	8	11	23	532	555
Method demonstrations	113	631	204	1532	479	111	53	2274	736	3010
Newspaper coverage	529	0	0	0	0	0	0	0	0	0
Popular articles	144	1321	300	5200	300	200	100	6721	700	7421
Radio talks	65	0	0	0	0	0	0	0	0	0
Scientific visit to farmers field	1189	1955	450	2947	578	400	115	5302	1143	6445
Self Help Group conveners meetings	62	90	238	164	298	54	28	308	564	872
Soil health Camp	48	732	176	2056	587	209	75	2997	838	3835
Soil test campaigns	39	371	95	1470	376	94	36	1935	507	2442
TV talks	35	0	0	0	0	0	0	0	0	0
Workshop	150	855	225	1709	611	1321	222	3885	1058	4943
World environment day	2	1226	156	0	0	0	0	1226	156	1382
Total	**20864**	**131197**	**25080**	**170676**	**27661**	**7986**	**2859**	**309859**	**55600**	**365459**

Note: M-Male, F-Female

Table 7.4: Details of extension activities organized by the KVKs of Madhya Pradesh during 2016-17

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Agri mobile clinic	146	2189	7	868	11	24	1	3081	19	3100
Animal health camp	66	2080	147	918	104	112	10	3110	261	3371
Awareness programme(Clean india compaign,Parthenium day)	59	1815	20	225	63	228	3	2268	86	2354
Celebration of important days	204	17951	4644	8122	3424	926	242	26999	8310	35309
Diagnostic visits	859	5831	633	3034	302	565	93	9430	1028	10458

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Exhibition	8220	81002	15349	33249	10724	3450	739	117701	26812	144513
Exposure visits	189	1509	299	989	247	126	63	2624	609	3233
Extension literature	364	29507	2224	3120	926	521	106	33148	3256	36404
Ex-trainees Sammelan	108	2012	359	1045	285	272	69	3329	713	4042
Farm advisory Services	5025	264043	6097	90529	31059	2790	3407	357362	40563	397925
Farm Science Club conveners meet	42	401	66	181	55	41	25	623	146	769
Farmers seminar	3126	8029	1277	4796	1761	441	109	13266	3147	16413
Farmers visit to KVK	39112	60148	6824	34398	8349	2447	557	96993	15730	112723
Field day	694	9492	1076	5128	1368	788	116	15408	2560	17968
Film show	1583	11806	2379	5775	2183	831	264	18412	4826	23238
Group meetings	439	5733	1467	1848	694	260	90	7841	2251	10092
Interface with farmers/ scientist	34	310	50	407	130	102	17	819	197	1016
Kisan ghosthi	1438	30521	4064	25527	2294	1169	221	57217	6579	63796
Kisan mela	113	84431	10662	41395	11490	2627	351	128453	22503	150956
Krishi mahotsava	216	1200	0	2220	50	576	50	3996	100	4096
Lectures delivered as resource persons	10348	46333	4946	21557	9622	2760	433	70650	15001	85651
Mahila Mandals conveners meetings	82	884	721	862	263	157	63	1903	1047	2950
Method demonstrations	332	6644	1056	2245	557	1861	75	10750	1688	12438
Newspaper coverage	1515	227	6	157	5	56	16	440	27	467
Popular articles	302	1640	223	257	113	86	6	1983	342	2325
Publication of literature	32	4000	0					4000	0	4000
Radio talks	280	300	5	150	10	5	1	455	16	471
Scientific visit to farmers field	6008	27823	2137	13164	2694	805	260	41792	5091	46883
Self Help Group conveners meetings	115	746	1222	592	259	71	42	1409	1523	2932
Soil health Camp	139	5038	674	2534	540	180	57	7752	1271	9023
Soil test campaigns	82	25152	2271	14770	615	155	30	40077	2916	42993

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Technology week	8	1381	165	188	53	70	12	1639	230	1869
TV talks	265	300	50	75	30	2	1	377	81	458
Workshop	99	2200	215	843	173	388	75	3431	463	3894
Other	12	2134	226	1817	150	165	27	4116	403	4519
Total	**81656**	**744812**	**71561**	**322985**	**90603**	**25057**	**7631**	**1092854**	**169795**	**1262649**

Note: M-Male, F-Female

Table 7.5 : Details of extension activities organized by the KVKs of Odisha during 2016-17

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Agri mobile clinic	11	174	29	115	33	11	2	300	64	364
Animal health camp	48	1081	171	1042	231	78	21	2201	423	2624
Celebration of important days	6	176	66	166	70	18	6	360	142	502
Celebration of important days	94	2842	1183	1521	1078	139	73	4502	2334	6836
Diagnostic visits	1272	3983	1367	3141	1055	130	70	7254	2492	9746
Exhibition	117	22285	4382	8053	3524	1101	390	31439	8296	39735
Exposure visits	70	671	127	601	242	47	6	1319	375	1694
Extension literature	165	10466	1762	2765	731	135	45	13366	2538	15904
Ex-trainees Sammelan	44	463	274	440	234	29	23	932	531	1463
Farm advisory Services	2663	14250	3101	26506	2219	221	196	40977	5516	46493
Farm Science Club conveners meet	59	767	106	285	108	37	22	1089	236	1325
Farmers seminar	16	752	226	216	124	30	15	998	365	1363
Farmers visit to KVK	23993	9158	2211	9002	3334	212	133	18372	5678	24050
Field day	205	6153	1293	2894	1219	321	132	9368	2644	12012
Film show	631	7474	1628	2793	1229	2061	663	12328	3520	15848
Group meetings	488	4027	1702	2657	1194	276	125	6960	3021	9981
Interface with farmers/scientist	2	5	3	32	10			37	13	50
Kisan ghosthi	65	1284	303	356	172	30	16	1670	491	2161
Kisan mela	55	9369	2005	4412	1978	627	206	14408	4189	18597

Activity	No. of activities (Achieved)	Detail of participants								
		Farmers (Others)		Farmers (SC/ST)		Extension personnel		Total of Farmers and Extension personnel		
		M	F	M	F	M	F	M	F	Total
Lectures delivered as resource persons	683	8988	2516	5894	2473	639	215	15521	5204	20725
Mahila mandals conveners meetings	17	59	184	36	156	13	11	108	351	459
Method demonstrations	336	2446	653	1634	523	139	43	4219	1219	5438
Newspaper coverage	310	0	0	0	0	0	0	0	0	0
Popular articles	92	114	45	30	21	14	2	158	68	226
Radio talks	133	0	0	0	0	0	0	0	0	0
Scientific visit to farmers field	6183	10247	5283	10613	3943	346	133	21206	9359	30565
Self Help Group conveners meetings	52	306	630	144	493	21	58	471	1181	1652
Soil health Camp	24	1139	184	684	243	73	40	1896	467	2363
Soil test campaigns	26	562	204	690	142	20	7	1272	353	1625
TV talks	141	30	10	5	5	6	1	41	16	57
Workshop	14	761	270	282	113	47	14	1090	397	1487
World food day	1	79	25	26	12	2	0	107	37	144
World Soil day	1	89	12	15	3	4	2	108	17	125
Other	21	10	2	2	2	223	13	235	17	252
Total	**38038**	**120210**	**31957**	**87052**	**26914**	**7050**	**2683**	**214312**	**61554**	**275866**

Note: M-Male, F-Female

8 TECHNOLOGY WEEK

Technology week concept is promoted among KVKs for showcasing the available technologies to the district level extension functionaries and farmers. During technology week, farmers could directly interact with KVK experts, technology generators and extension personnel which results in higher adoption of the technology. Status of Technology week organized by KVKs in Zone IX is given in Table 8.

Table 8 : Details of Technology week by the KVKs of Zone-IX during 2016-17

Type of Activities	No. of activities	No. of participants	Related crop/livestock technology
Animal health camp	10	574	Awareness of animal health
Awareness programme	20	1821	Vaccination of animals, insect pest and disease control
Bio Product distribution (kg)	1929	472	Vermicompost
Cashless transaction week	6	525	Cashless transaction
Celebration of important days (Parthenium eradication week, Swachhata Abhiyan and Soil Health Day)	3	177	
Demonstration	19	470	Demonstration of power weeder for weeding in cauliflower, uses of eco-friendly techniques for pest control
Diagnostic practical's	132	2459	Demonstrations of implements, tractor mounted sprayers, seed grader etc.
Distribution of Literature	4260	15041	*Kharif* –*Rabi* crop/goatry and Poultry management/ fodder production.
Exhibition	54	6220	Implements, Seed samples, Organic Inputs, Technological Charts, Models etc.
Exposure visit	3	60	Hybrid Maize Production & Organic Farming
Extension activity	18	790	Importance of agriculture meteriological for agricultural crops
Ex-trainees Meet	1	106	Discussed on disease pest management, high value crop, off season cultivation
Farm visit	2511	10316	Crop cafeteria, Green house & vermi compost unit
Farmer fair	21	14667	Production technology of *kharif* and *Rabi* crop
Farmer scientist interaction	4	240	Oil seed and pulse crops
Farmers training	65	2759	Crop Production, Horticulture, live stock & Women empowerment
Field day	7	154	Gram, Wheat, Lentil, Tomato
Field visit	1	7	

Type of Activities	No. of activities	No. of participants	Related crop/livestock technology
Film show	94	4294	Drudgery Reduction, Soybean Cultivation and Importance of Green House, Water Management
Gajarghas unmulan pakhwada	7	410	
Gosthies	87	4082	Improved technology of agril. allied fields
Group meeting	2	34	Plant protection and soil testing
Hindi diwas pakhwada	16	809	Use of Hindi language
International women day	2	1205	Women welfare awareness
Jai kisan jai vigyan sangoshthi	35	3798	Improved technology of crop
Lectures organized	179	5896	Various aspects on agricultural, IPN, IWM, INM, vermi compost & farm implements
Narmada sewa Yatra	1	77	
National integrity day	1	86	Creation of Harmonious relation among the people
News paper/mass media	2	0	DD Programme on Oilpalm cultivation
Number of farmers visited the technology week	723	80887	
Parthenium day	9	370	Parthenium decomposed as compost
Plant health camp	3	170	
Plant protection week	7	135	Rice , Pigeon pea, Blackgram
Scientists visits in farmers field	2	38	
Seed treatment campaign	2	100	*Rabi* crops
Self Help Group convener meet	2	141	Agro entrepreneurship
Soil health awareness programme	2	37	Soil health
Soil health Camp	4	212	
Swachha bharat abhiyan	93	5005	Programme celebrated on vermin composting, Health and nutrition for women and children, Animal health etc
Technology week	16	453	Crops/vegetables/livestock etc
Van mahotsava	1	45	
World environment day	2	56	Plantation of Agroforestry and Fruit plants
World forestry day	2	72	Awareness about importance of forest
World soil health day	4	1056	Awareness about importance of Soil Health Card
World water day	2	81	
Distribution of fingerlings (No)	4	42	
Distribution of Livestock specimen (No.)	528	13	
Distribution of Planting materials (No.)	44222	2510	Mango & Cashew grafts, papaya seedlings, mushroom spawn, chilli seedlings
Distribution of Seed (q)	444	2603	Soybean, Wheat, Chickpea, Mustard, Coriander
Total	**55562**	**171575**	

9 TECHNOLOGICAL BACKSTOPPING THROUGH LITERATURE AND MEDIA

9.1. Newsletter

Table 9.1: State wise Newsletter published by the KVKs during 2016-17

State	No. of KVKs	No. of issues	Number of copies printed	Number of copies distributed
Chhatisgarh	20	4	46850	46016
Madhya Pradesh	45	4	125100	125092
Odisha	30	4	39550	36950
Grand Total	**95**		**211500**	**208058**

9.2. Publications

Table 9.2: Category wise literatures published and distributed by the KVKs of Zone IX during 2016-17

S.No	Type	Number of copies	No. of KVKs
1	Abstracts	1007	57
2	Book/Book Chapter/Booklets	71670	98
3	Case studies	1	1
4	Leaflets & bulletins	8500	9
5	Leaflets / Folders	202317	94
6	Literatures	44500	44
7	News Letters	11000	10
8	News paper coverage	101	65
9	Other	3535	10
10	Pamphlets	6720	11
11	Popular articles	9224	94
12	Research papers	1325	29
13	Technical Bulletins/ reports/manuals	45282	98
14	Year planners	1486	8

10 FLAGSHIP PROGRAMMES

1. Kisan Mobile Advisory (KMA)

Incharge : Shri Tushar Athare, Scientist (AE)

Kisan Mobile Advisory (KMA) is the easiest ICT tool working successfully for dissemination of latest information to the farmers and farm women in the States of Madhya Pradesh, Chhattisgarh and Orissa. This ICT based alternate agricultural information and rural delivery mechanism through mobile phone was initiated during 2007 in ZPD Zone IX, Jabalpur. It is based on the linear model of communication. This is the unique programme for making linkages between different stakeholders who are key players for making Indian agriculture sustainable in the coming future through intensive use of ICT tools like mobile phone. Short

Message Service (SMS) is being provided by KVKs to the farmers. KVKs implemented the programme and during 2016-17, total 6287 text messages were sent which benefitted 2377361 users in 49427 villages by the operational KVKs in the Zone.

2. Climate Resilience Agriculture through KVKs under NICRA

Project: Technology Demonstration Component under National Initiative on Climate Resilient Agriculture (NICRA)

Nodal Scientist: Dr. S.R.K.Singh, Principal Scientist (AE)

NICRA is operational in 17 KVKs in States of Madhya Pradesh, Chhattisgarh and Odisha in Zone IX. ATARI, Zone IX monitor the performance of NICRA KVKs namely Balaghat, Chhattarpur, Datia, Guna, Morena, Satna, Tikamgarh, Jhabua and Ratlam in Madhya Pradesh; Bhatapara, Bilaspur and Dantewada in Chhattisgarh; Kendrapara, Ganjam -I, Jharsuguda, Sonepur and Kalahandi in Odisha. During 2016-17, through various planned activities, total 34686 farmers' were benefitted including 16140 by technological interventions and 18546 by capacity building and extension activities.

Under **Natural Resource Management Module,** total 3715 farmers were benefited covering an area of the 1606.6 ha area. Demonstrations were focused on in-situ moisture conservation, water harvesting and recycling for supplemental irrigation, improved drainage in flood in prone areas, etc.

In **Crop Production Module,** a total of 4462 farmers were benefitted through demonstrations conducted on 1587.69 ha area focused on drought tolerant varieties, advancement of planting dates of *rabi* crops to escape for terminal heat stress, etc on chickpea, wheat, barley, moong, arhar and vegetable crops.

In **Livestock and Fisheries Module,** a total of 5099 farmers were benefitted by the demonstrations conducted focusing on preventive vaccination, de-worming of animals, animal health camps and nutrition management for their 9932 animals.

In **Institutional Interventions Module**, total 2864 farmers were benefitted through showcasing

Table 10.1: Details of KMA during 2016-17 by KVKs of Zone IX

State	No. of KVK	No. Of villages	No. of messages sent	No. of Farmers	No. of Ext. Pers.	Beneficiaries
MP	46	27248	2886	1227694	12921	1240615
CG	20	15110	1004	426815	5111	431926
Odisha	33	7069	2397	722852	6653	729505
Total	99	49427	6287	2377361	24685	2402046

Glimpses of NICRA activities by concerned KVKs

of technology, custom hiring, community nursery, community fodder production, vermi-compost production and covered 1534.72 ha.

Under **Capacity building programme,** total 259 training courses were organized benefiting 6922 participating farmers.

In order to create awareness among the farmers in region, various **Extension Activities** were organized by KVK at the farms and the farmers' fields. During the year, total 783 activities were organized benefitting 11624 farmers and farm women.

3. National Initiative for Fodder Technology Demonstration

Incharge : Shri Tushar Athare, Scientist (AE)

The programme was implemented in 11 KVKs of ATARI, Jabalpur with technical guidance from IGFRI, Jhansi. 11 KVKs are implementing this programme namely Datia, Sagar, Panna, Chhattarpur,Ratlam, Neemuch from Madhya Pradesh and Deogarh, Angul, Sundergarh, Kalahandi and Nuapara from Odisha. The programme includes various Technology Demonstration Modules as mentioned below:

Technology Demonstration Modules (TDMs)

In order to address the feed resources related issues of the selected villages under different districts, different interventions are planned under three modules. However, the specific intervention under each module for a particular village is need based and decided upon according to categories of livestock and farming resource situation of that village. The demonstrations under three modules are as follows:

Table 10.2: Demonstrations during 2016-17

Modules	Nos. of demonstrations
Technology Demonstration Module –I **(TDM-I Forage production from arable lands)**	56
Technology Demonstration Module –II **(TDM-II Forage production from non-arable lands)**	4
Technology Demonstration Module –III **(TDM-III Forage utilization and processing for balanced diets)**	31
Total Demonstrations (Nos.)	91

4. Tribal Sub Plan (TSP) on Pulses

Incharge: Dr. A.P. Dwivedi/Dr. A.A. Raut

Tribal Sub Plan (TSP) scheme is aimed for 'Enhancing Pulses Production for Food, Nutritional Security and livelihoods of Tribal Community

FLD on Black gram: Variety PU-31

FLD on Chickpea: Variety JG -226

through Demonstration and Training'. TSP is operational in 10 KVKs namely Dindori, Shahdol, Dhar, Jhabua and Badwani in Madhya Pradesh and Kanker, Jagdalpur, Dantewada, Kawardha and Balrampur in Chhattisgarh located in the tribal region.

During *Kharif* 2016, a total of 230 demonstrations with 90 in pigeon pea (JKM- 189, TJT 501) and 140 in black gram (Azad 3, TAU-1, TAU-2, PU-31) were conducted in pulse crops. During *Rabi* 2016-17 pulse crops 860 demonstrations were conducted in different pulse crops in an area with chick pea, field pea, lentil. Improved varieties of chickpea namely JG -130, JAKI-9218, JG-130, JG-226; field pea Arkel and lentil HUL-57, JL-3 were demonstrated under this programme. KVKs also organized training and field days for enhancing production of pulses.

Regarding the average demonstrated yield of important pulse crops like pigeon pea the yield was reported between 8.4 to 14.5 q/ha. The average demonstrated yield of black gram ranged between 3.65 to 11.9 q/ha. In *Rabi* crops the average demonstrated yield of chick pea was reported between 8.5 to 12.6 q/ha. The average demonstrated yield of black gram ranged between 3.65 to 11.9 q/ha. The average demonstrated yield of field pea ranged between 8.6 to 12.6 q/ha. In case of lentil average demonstrated yield ranged between 6.5 to 12.3 q/ha.

5. PPV & FRA Awareness

Incharge: Dr. A.P. Dwivedi/Dr. A.A. Raut

ICAR-ATARI, Jabalpur and PPV & FRA, New Delhi jointly launched the programme for creation of awareness among the farmers' and other stakeholders about the provision of Protection of Plant Varieties & Farmers' Right Act, 2001 in 45 KVKs. During the Plant Genome Saviour Award function held on April 19, 2017 at Champaran, Bihar, Shri Radha Mohan Singh, Hon'ble Union

Plant Genome Saviour Award function awardees with Hon'ble Union Minister of Agriculture and Farmers Welfare at Champaran, Bihar

Minister of Agriculture and Farmers Welfare gave Plant Genome Saviour Farmers Award 2014-15 of Rs. 10 lakh to Ahinsa Club, Bhutibahal, Gaisilat, Raisalpadar, Bargarh, Odisha. The Plant Genome Saviour Farmers Reward 2015 for Rs. 1.5 lakh each was given to Shri Chaitram Yadav, Bilaspur, Chhattisgarh, Shri Dwarikesh Pandey, Bilaspur, Chhattisgarh. The Plant Genome Saviour Farmers Recognition 2015 for Rs. 1 lakh each was given to 19 farmers from Tikamgarh and Chhatarpur in Madhya Pradesh and Kabir Dham in Chhattisgarh.

Outcome of the Programme

The programme outcome are 1136 farmers' planting materials including 497 in Cereals, 347 in Vegetable, Fruits and Spices, 122 in Oilseeds, 170 in pulses applied for registration in PPV & FRA .

Table 10.3: Participants attending the programme during 2016-17

KVK Name	No. of farmers	No. of Scientist	No. of State govt. Officers/Officials	No. of NGO person and other participants
JNKVV, Jabalpur				
Dindori	327	3	2	3
Harda	300	3	6	4
Jabalpur	136	10	16	24
Narsinghpur	80	2	2	-
Panna	416	2	16	4
Sagar	250	7	4	-
Shahdol	356	4	7	2
Sidhi	241	3	7	2
Tikamgarh	150	9	7	3
Umaria	405	6	8	14
RVSKVV, Gwalior				
Badwani	112	5	5	2
Datia	173	11	7	2
Dhar	131	8	25	5
Jhabua	217	15	14	4
Khargone	101	7	10	-
Mandsaur	162	12	14	-
Shajapur	191	7	9	-
NGO				
Raisen	130	10	3	2
Sehore	138	7	15	2
Satna	2000	12	52	9
IGKV, Raipur				
Balrampur	160	5	3	1
Bijapur	112	7	10	2
Bilaspur	127	8	2	2
Dantewada	117	17	5	12
Dhamtari	111	4	1	3
Janjgir Champa	102	7	1	2
Jashpur	450	4	10	10
Kanker	105	8	3	1
Kawardha	150	6	6	0
Korea	110	7	3	1
Rajnandgaon	200	17	8	5

KVK Name	No. of farmers	No. of Scientist	No. of State govt. Officers/Officials	No. of NGO person and other participants
Surguja	142	9	5	-
OUAT, Bhubaneswar				
Gajapati	115	6	1	3
Jagatsinghpur	100	8	2	1
Jajpur	100	8	15	24
Kalahandi	100	14	23	3
Kandhamal	101	9	4	2
Koraput	100	10	8	2
Malkangiri	100	3	20	2
Mayurbhanj	100	8	2	4
Rayagada	105	5	10	7
Sambalpur	100	8	5	1
Sundargarh	100	6	6	3
ICAR				
Cuttack	100	5	4	15
Total	**9123**	**332**	**386**	**188**

Cluster Frontline Demonstrations in Oilseeds

Incharge : Dr. Prem Chand/Dr. S.R.K.Singh

Cluster Demonstration of Oilseeds 2016-17 under the National Mission of Oilseed and Oil palm (Mini Mission I) was implemented to all eight zones of ICAR through Agricultural Technology Application Research Institute. Zone–IX is the nodal office of the project. Under the project, major crops undertaken were soybean, groundnut, sesame, niger, sunflower, rapeseed & mustard, and linseed in all three seasons in the operational states of Chhattisgarh, Madhya Pradesh & Odisha.

In Madhya Pradesh, major crops soybean and sesame were taken under *kharif* season. Under soybean crop, total 2017 demonstrations covering an area of 847 ha was conducted, whereas 129 demonstrations and 75.4 ha area was covered by sesame crop. Niger was demonstrated in 105 ha area through 262 demonstrations. Groundnut covered 30 ha area with 45 demonstrations at farmers' fields. In *Rabi* season, under rapeseed crop, 1129 demonstrations were conducted covering in 525 ha area. Linseed crop was demonstrated in 252 ha area through 592 demonstrations.

In Chhattisgarh, under *Kharif* season, major crops niger, sesame and soybean was grown. In soybean crop, 235 demonstrations were conducted in 60 ha area. A total of 168 demonstrations in 80 ha area were conducted in sesame crop. Niger crop was demonstrated in 120 ha with 246 demonstrations. Under groundnut total 95 demonstrations in 35 ha area was organized. In *Rabi* season, under Rapeseed Mustard total 913 demonstrations covering 480 ha area ws laid out. Linseed crop was demonstrated in 270 ha area with 527 demonstrations. Under sesame, total 75 demonstration with coverage of 30 ha area was conducted. In summer groundnut, 30 ha area was covered by 75 demonstrations.

In Odisha, major crops groundnut, sesame sunflower and rapeseed & mustard were taken. In *Kharif*, under groundnut crop total 270 ha area 594 demonstration and area was covered whereas 180 demonstrations and 50 ha area was covered by niger crop and 415 demonstrations and 150 ha area was covered by sesame crop. In *Rabi*, 1021 demonstrations and 497 ha area covered by mustard crop and 499 demonstrations and 208 ha area covered by sesame crop where as 1517 demonstration and 683 ha area covered by groundnut crop as well as 109 ha area and 264 demonstrations covered by sunflower crop. In Summer 167 demonstration and 60 ha area covered by groundnut crop and 80 ha area and 200 demonstrations covered by sesame crop where as 107 demonstration and 50 ha area covered by Sunflower crop.

Table 10.4 : State-wise result of Cluster Frontline Demonstation of *Rabi* oilseeds

State	Season	Crop	Conducted		Productivity (q/ha)	Net return (Rs./ha)	B:C ratio
			Area (ha)	Demo nos.			
MP	*Kharif*	Soybean	847	2017	11.59	27578	2.1
		Sesame	57.4	129	2.70	11670	3.1
		Niger	105	262	2.64	28338	4.4
		Groundnut	30	45	12.23	38804	2.7
		Total	**1039.4**	**2453**			
	Rabi	Rapeseed & Mustard	525	1189	17.21	41135	2.7
		Linseed	252.4	592	11.0	29599	3.0
		Total	**777.4**	**1781**			
CG	*Kharif*	Soybean	60	135	9.90	24000	1.3
		Sesame	80	168	1.45	27533	4.1
		Niger	120	246	3.80	11356	2.1
		Groundnut	30	95	9.40	58400	3.5
		Total	**290**	**644**			
	Rabi	Rapeseed & Mustard	480	913	7.31	19512	2.4
		Linseed	270	527	7.15	19983	2.2
		Sesame	30	75	2.50	11600	3.0
		Total	**300**	**602**			
Odisha	*Kharif*	Sesame	150	415	5.70	17014	1.8
		Niger	50	180	5.12	14302	1.91
		Groundnut	276	594	16.28	41783	2.26
		Total	**476**	**1189**			
	Rabi	Rapeseed & Mustard	497	1021	7.60	16908	1.97
		Sesame	208	499	5.92	15360	2.1
		Groundnut	683	1517	24.75	64428	2.75
		Sunflower	109	264	10.83	23418	2.62
		Total	**1497**	**3301**			
	Summer	Groundnut	60	167	19.15	33000	1.66
		Sunflower	50	160	15.80	45000	2.3
		Sesame	80	200	6.80	25800	2.16
		Total	**190**	**527**			

Scientists visiting demonstration plots at farmers field

Cluster Frontline Demonstration on *Rabi* Pulses

Incharge: Dr. Prem Chand/Dr. A.A. Raut

Performance of Demonstrations

Black gram, Pigeon pea, Chickpea, Field pea and lentil are the major pulses in the states of Madhya Pradesh and Chhattisgarh, while it is Greengram in Odisha. Among these three states, Madhya Pradesh produced Chickpea in large areas. Lathyrus and Horse gram crops are covered in limited areas. Clustered demonstration was organized in 7191.96 ha covering these three states. The state wise performance is given below in Table No. 1 (*kharif* season) & 2 (*Rabi* & summer)

Table 10.5 : State-wise result of Cluster Frontline Demonstration during *kharif* 2016

State	Particulars	Black gram	Green gram	Horse gram	Pigeon pea
Chhattisgarh	Area (ha)	450	66	130	389.04
	Demonstration (ha)	1036	304	282	939
	Productivity (q/ha)	7.25	4.04	5.91	12.64
	Net return (in Rs.)	28740	14634	18859	42822
	B:C ratio	2.95	2.16	2.76	3.42
Madhya Pradesh	Area (ha)	308.80	120	-	701
	Demonstration (ha)	729	350	-	1727
	Productivity (q/ha)	9.32	8.37	-	15.38
	Net return (in Rs.)	40366	32389	-	51826
	B:C ratio	3.43	3.00	-	5.72
Odisha	Area (ha)	240	20	-	230
	Demonstration (ha)	579	50	-	576
	Productivity (q/ha)	7.15	5.53	-	11.88
	Net return (in Rs.)	25843	10000	-	33760
	B:C ratio	2.26	1.50	-	2.17

Table 10.6: State-wise results of Cluster Frontline Demonstration during *rabi* & summer 2016-17

State	Particulars	Black gram	Chick pea	Field pea	Green gram	Lathyrus	Lentil	Pigeon pea
Chhattisgarh	Area (ha)	20	598.20	180	111.60	76	150	55
	Demonstration (ha)	33	1188	474	254	153	277	73
	Productivity (q/ha)	5.21	11.81	8.63	7.04	6.21	8.96	10.40
	Net return (in Rs.)	10900	36709	18438	27545	18050	25712	35507
	B:C ratio	1.87	2.98	2.36	2.67	2.87	2.62	3.04

State	Particulars	Black gram	Chick pea	Field pea	Green gram	Lathyrus	Lentil	Pigeon pea
Madhya Pradesh	Area (ha)	3.6	832.96	40	176	-	261.20	20
	Demonstration (ha)	9	2141	90	506	-	627	40
	Productivity (q/ha)	6.70	40.04	20.31	11.95	-	11.74	14.34
	Net return (in Rs.)	21960	56551	33936	42674	-	38388	54936
	B:C ratio	3.15	3.42	2.87	3.33	-	3.33	3.44
Odisha	Area (ha)	170	80	70	896	-	-	-
	Demonstration (ha)	602	200	197	2134	-	-	-
	Productivity (q/ha)	7.63	13.37	17.13	7.26	-	-	-
	Net return (in Rs.)	16840	40577	32312	19890	-	-	-
	B:C ratio	1.42	2.70	2.14	2.02	-	-	-

Drip irrigation in pigeon pea

IPM on green gram

11 NEW INITIATIVES

With the changing scenario, new initiatives are required to tackle emerging problems of the farming community with the latest technological solutions vis-à-vis methodological blending for providing the real benefits of the scientific endaevours. KVK is performing well in the farmers' condition through its planned mandated activities under the guidance of Division of Agricultural Extension and monitoring system of the ICAR-ATARI with Director Extension of SAUs. As a result, KVK efforts are being recognised and appreciated at various platforms.

Some of the important initiatives taken/ continued during the period are being presented here.

a. Mera Gaon Mera Gaurav

Nodal Scientist: *Dr. S.R.K. Singh, Principal Scientist (AE)*

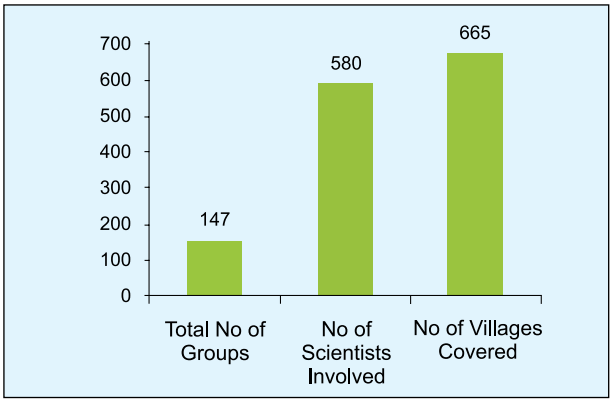
Mera Gaon Mera Gaurav is operational in 18 institutions including ICAR institutes (12) and SAU's (06) under Zone IX. It is monitored by ATARI, Jabalpur. DWR, Jabalpur, IISS, Bhopal, CIAE, Bhopal, IISR, Indore, CIFA, Odisha, NRRI, Cuttuck, CIWA, Bhuwaneshwar, IIWM, Bhubaneshwar, CTCRI, Bhubaneshwar, NIBSM, Raipur, CARI, Bhubaneshwar, NIHSAD, Bhopal, JNKVV, Jabalpur and NDVSU, Jabalpur, IGKVV, Raipur, OUAT, Odisha, CGKV, Raipur, RVSKVV, Gwalior are institutes working under MGMG programme.

Different activities by ICAR institutes and SAUs under MGMG programme are as follows:

During 2016-17, total 147 group formed by involving 580 scientists under ICAR institutes and SAUs. Through training, demonstration, literature distribution, general awareness and linkages created with other Departments/ Organizations total of 68573 farmers of 665 villages were benefited under MGMG programme.

Four groups involving 12 scientists of the ICAR-DWR, Jabalpur conducted total 22 demonstrations, trainings and field activities by covering 20 villages. Training, demonstration, literature distribution, general awareness and linkages created with other Departments/ Organizations benefited total 2120 farmers.

In IISS, Bhopal, 11 groups were formed in which 44 scientists were involved by covering 55 villages. Total 9696 farmers were benefited through



237 demonstration and trainings conducted by the different groups.

In CIAE, Bhopal, 16 groups were formed in which 66 scientists were involved covering 80 villages. Total 8973 farmers were benefitted through 162 extension activities conducted by different groups.

In IISR, Indore, a total of 1917 farmers of 55 villages were benefited through 257 demonstrations and 19 trainings by 05 groups involving 44 scientists.

Under MGMG in CIFA, Bhubaneswar, 15 groups involving 60 scientists conducted 46 field extension activities in 75 villages; total 1807 farmers were benefited.

NRRI, Cuttack conducted 149 Interface meeting/ Goshthies in the adopted villages to establish the direct interface with farmers and to solve the problems of farmers'. The institute also conducted 28 demonstrations and 29 training

programme on carp seed rearing, carp culture, farm made feed preparation and literature distribution for farmer awareness and benefited 2408 farmers of 100 villages.

ICAR- CIWA and ICAR-IIWM institutes covered the 20 and 30 villages respectively in which total 12975 farmers were benefited by participating in 286 trainings programmes, demonstrations and other extension activities.

Similarly, CTCRI, Bhubaneswar, conducted 35 demonstrations and 10 trainings in 11 villages involving 09 scientists in 2 groups, total 1905 farmers were benefited under MGMG programmes.

NIBSM, Raipur laid out 03 demonstrations, two training programme and conducted other extension activities, involving 3 groups of 13 scientists in 15 villages and total 5287 farmers were benefited.

CARI, Bhubaneswar, make 6 groups of scientists for awareness programmes among farmers.

JNKVV, Jabalpur conducted total 06 demonstration and other extension activities in 06 adopted villages by which 450 farmers were benefited under MGMG programme.

NDVSU, Jabalpur made 26 visits to different villages and conducted 05 Ghoshties by which, total 800 farmers of 11 villages were benefited in involving 02 groups of 14 scientists.

IGKVV, Raipur conducted total 12 extension activities by which 2275 farmers were benefited under MGMG programme.

OUAT, Odisha, conducted total 13 demonstrations and other extension activities in 25 adopted villages involving 15 groups of 60 scientists by which 2265 farmers were benefited under MGMG programme.

CKVV, Raipur made 02 groups of 06 scientists for creating awareness among farmers.

RVSKVV, Gwalior, undertake 39 extension activities viz. demonstrations, trainings etc. involving 41 groups of 159 scientists in 193 villages and total 15695 farmers were benefited.

Table 11.1: Institute- wise progress under *Mera Gaon Mera Gaurav*

S. No	Name of Institute	Total No of Groups / team formed	No. of				
			Scientists Involved	Villages covered	Field activities conducted	Messages/ advisory sent	Farmers benefited
1	ICAR-Directorate of Weed Research (DWR), Jabalpur (MP)	4	12	20	22	30	2120
2	ICAR-Indian Institute of Soil Science Nabibagh, Bhopal (MP)	11	44	55	237	648	9696
3	ICAR- Central Institute of Agriculture Engineering, Bhopal (MP)	16	66	80	162	171	8973
4	ICAR-Indian Institute of Soybean Research, Indore (MP)	5	5	25	570	939	1917
5	ICAR- Central Institute of Freshwater Aquaculture, Bhabuneswar, Odisha	15	60	75	46	-	1807
6	ICAR-National Rice Research Institute, Cuttack, Odisha	20	78	100	57	1824	2408
7	ICAR-Central Institute for Women in Agriculture, Bhabuneswar, Odisha	4	16	20	238	14	12259
8	ICAR – Indian Institute of Water Management, Bhubaneswar	6	27	30	48	37	716
9	Regional Centre, ICAR-CTCRI, Bhubaneswar, Odisha	2	9	11	35	50	1905

S. No	Name of Institute	Total No of Groups / team formed	No. of				
			Scientists Involved	Villages covered	Field activities conducted	Messages/ advisory sent	Farmers benefited
10	ICAR- National Institute of Biotic Stresses Management (NIBSM), Raipur (CG)	3	13	15	34	32	5287
11	Central Avian Research Institute (CARI), Bhubaneswar, Odisha	-	6	-	-	-	-
12	ICAR-National Institute of High Security Animal Diseases*, Bhopal (MP)	-	-	-	-	-	-
13	Jawaharlal Nehru Krishi Vishwa Vidhyalaya, Jabalpur (MP)	1	5	5	10	160	450
14	Nanaji Deshmukh Veterinary Science University, Jabalpur (MP)	2	14	11	39	44	800
15	Indira Gandhi Krishi Vishwavidyalaya, Raipur (CG)	-	-	-	12	-	2275
16	Orrisa University of Agriculture Technology, Bhubaneswar	15	60	25	30	-	2265
17	Chhattisgarh Kamdhenu Vishwavidyalaya, Raipur (CG)	2	6	-	-	-	-
18	Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior (MP)	41	159	193	39	-	15695
	Total	147	580	665	1579	3949	68573

**Field work not done due to protocol problem*

Glimpses of *Mera Gaon Mera Gaurav*

b. Attracting and Retaining Youth in Agriculture (ARYA)

Nodal Officer: Dr. Prem Chand, Scientist (Agril. Economics)

ICAR has launched a project ARYA for entrepreneurship skill development among rural youth which is operational in three KVKs viz. Gwalior, Dantewada and Nayagarh under Zone-IX. Each KVK has Agro-Technology Park having different demonstration units viz. Vermi-compost unit, poultry unit, net house, mushroom unit, hatchery unit, and BGA Unit for demonstration of improved agricultural technologies for rural youth. In convergence modes linkages were established with various line departments, Govt. organizations & NGOs for effective implementation of the programme.

i. KVK Gwalior

Selection of Villages: KVK has selected (11) villages having rural youth in cluster form viz. Amrol, Banwar, Mauchh, Kheriya, Nikodi, and Girwai, Panihar, Himmatgarh, Gadajar, Santhri, Billaua and Badki sarai.

Selection of youths: KVK Gwalior has selected 200 rural youths in different villages of Gwalior district under 4 types of entrepreneurship i. e. vermi composting, nursery management, mushroom production and poultry production.

Table 11.2 : Activities and youth selected under ARYA

S. No	Enterprises	No. of beneficiary / Youths
1	Vermi compost production	60
2	Nursery management	50
3	Mushroom production	40
4	Poultry production	50
	Total	200

ii. KVK Dantewada

Selection of youths: KVK selected 200 youths having age less than 35 years, the selection of the youth shall be made on the basis of gender and social status. The entrepreneurial activities i.e. mushroom, poultry (Kadaknath), lac cultivation and processing and value addition of NTFPs etc. were taken by KVK.

Table 11.4: Activities and youth selected under ARYA

S. No	Enterprises	No. of beneficiary /Youths
1.	Mushroom Production	50
2.	Processing and value addition of NTFP's	40
3.	Processing and value addition of Lac	60
4.	Backyard poultry management	50
	Total	200

Table 11.5: Details of training programme under ARYA

S. No.	Enterprises	No of Training	No. of beneficiary / Youths
1.	Mushroom production	02	50
2.	Processing and value addition of NTFP's	02	40
3.	Processing and value addition of Lac	02	60
4.	Backyard poultry management	02	50
	Total		**200**

Table 11.3: Economic Impact of ARYA project

S. N.	Name of activities	No. of beneficiaries	Economic Impact (Rs./Farmer / Month)		% Change in Income
			Before Intervention	After Intervention	
1	**Vermi Compost Production**	18	2267.00	3867.00	70.56
2	Nursery management	20	4425.00	6990.00	57.96
3	Mushroom production	21	3725.00	6890.00	84.96
4	Poultry production	20	2700.00	5150.00	90.70

Table 11.6: Economic Impact of ARYA project

S.N.	Name of activities	No. of Beneficiaries	Economic Impact (Rs./Farmer / Month)		% Change in Income
			Before Intervention	After Intervention	
1.	Mushroom production	50	1500	3000	200.00
2.	Processing and value addition of NTFP's	40	1400	3000	214.28
3.	Processing and value addition of lac	60	1800	4000	222.22
4.	Backyard poultry management	50	2000	4500	225.00
	Total	**200**			

Exposure visits

Mushroom production

Value addition of Honey

iii. KVK Nayagarh

Selection of villages: Based upon enterprise taken, villages were selected from eight blocks. For the enterprise on backyard poultry, six blocks were taken. Similarly, for enterprise on mushroom production, six blocks are also taken. At micro level, villages are selected on the basis of baseline survey, resource availability and easy approach to marketing. Joint visit of scientists of KVK and line department officials were done to ensure selection of proper villages.

Selection of youths:. Youth mass were selected on the basis of age group, education, gender interest & social categories. Total 200 youths were selected from following three approved enterprises.

Table 11.7: Activities and youth selected under ARYA

S. No	Enterprises	No. of beneficiary /Youths
1.	Mushroom production	75
2.	Backyard poultry rearing	75
3.	Stunted fingerlings production	50
	Total	200

Table 11.8: Details of training programme under ARYA

S. No	Enterprises	No. of Training	No. of beneficiary /Youths
1.	Mushroom production	3	75
2.	Backyard poultry rearing	3	75
3.	Stunted fingerlings production	2	50

Table 11.9: Economic Impact of ARYA project

S.N.	Name of activities	No. of beneficiaries	Economic Impact (Rs./Farmer / Month)		% Change in Income
			Before Intervention	After Intervention	
1.	Mushroom production	23	4800/60 beds	9000/60 beds	87.5
2.	Backyard poultry rearing	22	3200/20 birds	5250/-/20 bird	64
3.	Stunted fingerlings production	15	4300/-	6966/-	62

Training on stunted fingerling production

District level workshop on ARYA

Training on Backyard poultry

c. Farmer FIRST

Nodal Scientist: Dr. S.R.K. Singh, Principal Scientist (AE)

'Farmer FIRST' programme is an ICAR initiative to move beyond the production and productivity, to privilege the smallholder agriculture and complex, diverse and risk prone realities of majority of the farmers through enhancing farmers-scientist interface. The programme is operational in 06 ICAR institute and 05 SAUs under zone IX which is monitored by ATARI, Jabalpur. The following are the institutes working under this programme:

Table: Institute-wise progress under Farmer-First

S. No	Institute	Project title	Work done
1	DWR, Jabalpur, M.P	Enhancing crop productivity and livelihood security through improved technological interventions in Jabalpur district of Madhya Pradesh.	Efforts are underway to complete the baseline survey of the selected villages and individual farmers.
2	JNKVV, Jabalpur, M.P	Refinement of farm specific technologies in cluster of villages of Balaghat District, M.P. (Chhattisgarh Plain).	A total of 50 farm families were benefitted under backyard poultry module, 20 vaccinated chicks along with 100 g feed material/ chick were provided to adopted farmers. Under ICT module nine trainings were organized and 1768 farmers were benefitted.
3	RVSKVV-ZARS, Morena, M.P	Participatory location specific research and technology application through optimizing resources for livelihood security of small holders of Madhya Pradesh.	Undertaken trials on Assessing effect of dry sowing by zero tillage after harvest of cluster bean under late sown condition; Assessing effect of INM of wheat; Assessing effect of bed planting after harvest of pigeon pea; Assessing effect of zero tillage after harvest of pigeon pea, etc.
4	NDVSU, Jabalpur, M.P	Farmers Empowerment through Improved Integrated Farming Practices.	Organized two awareness cum animal health treatment camp, one mega deworming camp and one orientation programme for farmers and one exposure visit of farmers.
5	IISS, Bhopal, M.P	Ensuring Food Security, Sustainability and Soil health through Resource Conservation based Farmer FIRST approach in Central India.	Efforts are underway to complete the baseline survey of the selected villages .

S. No	Institute	Project title	Work done
6	NIBSM, Raipur, C.G	Socio-economic upliftment of tribal farmers through suitable agricultural enterprises integration in rice fallow pulse cropping system - A farmer participatory approach.	Participatory Rural Appraisal (PRA) of selected sites, Selection of project sites, Orientation programmes of participants to Farmers FIRST programme, Agro Ecosystems Analysis (AESA), benchmark survey and launching of the programme. Group formed based on the commodity/ enterprise. Farmer FIRST Portal developed to address the information need of the farmers.
7	IGKV- SKS College of Agriculture and Research Station, Rajnandgaon, C.G	Enriching Knowledge and Participatory Development of Technologies for Optimizing Resource Use and Livelihood Security of Smallholders in Tribal Area of Chhattisgarh.	Ten trainings were also organized in the selected villages. One field day was organized in which large number of farmers participated and visited the technology testing fields.
8	OUAT, Bhubaneswar, Odisha	Enhancing Farm Productivity & Profitability with 'Farmer-First' focus in Khordha district of Odisha.	Introduction of new rice varieties Ranidhan/Hasant/ Upahar/Mrunalini in Low land or Tejaswini in medium land during *kharif* and green gram(TARM-1/ IPM 02-3/IPM 02-14/Kamdev) crop in rice fallow.
9	CIFA, Bhubaneswar, Odisha	Promoting improved agriculture and allied sector technologies in Khordha District, Odisha.	Undertaken the different technological interventions in which 400 farmers were benefitted.
10	IIWM, Bhubaneswar, Odisha	Enhancing Water and Livelihoods Security and Improving Water Productivity in Tribal Dominated Paddy Fallow Rainfed Agro Eco System of Odisha.	Improving crop & water productivity through rainwater conservation & use pressurized irrigation & scientific crop planning.
11	NRRI, Cuttack, Odisha	Increasing Productivity and Sustaining the Rice-based Production System through Farmer FIRST approach.	Organized two livestock health camp for the cluster, one Orientation –cum- Launching workshop one training programme, six awareness /village meetings and provide improved spawn/fingerlings for pisciculture.


Launching cum training programme


Distribution of seed


Chicks & Feed distribution

Demonstration on effect of INM of wheat


Farmers' sensitization programmes organized at cluster of villages


Participatory Rural Appraisal , Surveys

Showcase of modern agricultural technologies/interventions

Farmers-Scientists Interface technologies/ interventions

Agricultural film show

d. *Pre-Rabi* Campaign at Krishi Vigyan Kendra

Nodal Scientist: Shri Tushar Athare, Scientist (AE)

Promoting cashless transaction for input purchase among farmers: KVK initiative on World Soil Health Day

To promote cashless transaction among farmers and make them aware about the process of cashless transaction, ICAR-ATARI, Jabalpur took initiative along with KVKs to promote cashless transaction for input purchase among farmers on the occasion of World Soil Health Day on December 5, 2016. The farmers were made aware by bank officials and KVK scientists about the benefits of cashless transaction for sale of farm produce and purchase of agro products. Farmers purchased inputs varying from pesticides, seeds planting material and farm machinery including tractor from input dealers using swap card/ POS machines, aadhaar enabled cashless transaction, ATM/debit card and online payment apps etc. 75 KVKs organised the programme benefitting 25432 farmers with participation 249 input dealers.

Shri Sudarshan Bhagat Ji, Hon'ble Minister of State for Agriculture & Farmers Welfare at KVK Sundargarh

Cashless transaction for agro input by women farmer at Sonepur

e. World Soil Health Day Celebration

Nodal Scientist: Dr. S.R.K. Singh, Principal Scientist (AE)

World Soil Health Day 2016 was celebrated on December 5, 2016 in 99 KVKs of Zone IX in Madhya Pradesh, Chhattisgarh and Odisha. Hon'ble Chief Minister, Madhya Pradesh Sh. Shivraj Singh Chouhan was the Chief Guest in World Soil Day programme at Burhanpur. The World Soil Day programme was attended by five State Ministers, Smt. Archana Chitnis Minister of Women and Child Development at Burhanpur, Sh. Brijmohan Agrawal, Minister of Agriculture, Animal Husbandry, Fish Rearing and Water Resources, Chhattisgarh at Raipur, S. Pradeep Maharathy, Minister of Agriculture, Farmers' Empowerment, Fisheries and Animal Husbandry, Odisha at Puri. Shri Bhaiya Lal Rajwade, Minister for Labour Dept, Youth Welfare and Sports, Chhattisgarh at Korea, Smt. Ramsheela Sahu, Minister for Women & Child development, Chhattisgarh at Durg, Four Hon'ble Member of Parliament, 17 MLAs, 92 Zila Panchayat Chairman and other dignitaries.

Exhibitions were organized by KVKs on this occasion showing seeds, planting material and various soil health conservation technologies. The KVKs received support from other line departments of State Governments for organization of World Soil Health Day Programme.

Smt. Savita Bai Deepak receiving soil health card by Hon'ble Chief Minister Madhya Pradesh, Shri Shivraj Singh Chouhan

Shri Brijmohan Agrawal, Minister of Agriculture, Animal Husbandry, Fish Rearing at Raipur

Smt. Archana Chitnis Minister of Women and Child Development at Burhanpur

Shri Pradeep Maharathy, Minister of Agriculture, Farmers' Empowerment, Fisheries and Animal Husbandry, Odisha at Puri

Table 11.10: Summary of KVK wise World Soil Health Day programmes in Zone IX

State	No. of		
	KVKs	Participants	Cards distributed at venue
Chhattisgarh	21	1647442	164742
Madhya Pradesh	46	379702	381684
Odisha	33	24970	25595
Total	100	2052114	572021

f. Pradhan Mantri Fasal Beema Yojana Programme

Nodal Scientist: Shri Tushar Athare, Scientist (AE)

Awareness campaign on Pradhan Mantri Fasal Bima Yojna was organised in the three states of Madhya Pradesh, Chhattisgarh and Idisha as per the directions of Hon'ble Minister for Agriculture and Farmers Welfare, Government of India. Programmes were organised by Krishi Vigyan Kendra's campuses involving farmers and other stakeholders. The public representatives, government officials and agricultural scientists attended the programmes and contributed significantly in making the programme successful. The programme focused on creation of awareness on various provisions of the scheme. Interactive sessions facilitated interface between farmers and the experts in resolving various concerns of farmers. The Programme was organised in 94 KVKs with participation of 53095 farmers in states of Madhya Pradesh, Chhattisgarh and Odisha. The Hon'ble Union Minister Shri Vishnudev Sai, Union Minster of State for Steel & Mining participated as chief guest in programme on April 7, 2016 at KVK Raigarh, Chhattisgarh. Sh. Jual Oram, Union Cabinet Minister for Tribal Affairs also participated as Chief Guest on April 16, 216 at KVK Sundergarh, Odisha.

Shri Jualoram, Union Minister of Tribal Affairs at Sundergarh

Shri Vishnu Deo Sai, Union Minister of State for Mines, Steel, Labour & Employment at Raigarh

Table 11.11: Summary of Pradhan Mantri Fasal Beema Yojana Zone IX

	Number of					
State	**KVKs**	**Union Ministers**	**State Govt Ministers**	**MPs**	**MLAs**	**Farmers**
Chhattisgarh	19	01	01	10	18	13044
Madhya Pradesh	45	0	05	28	33	31025
Odisha	30	01	02	21	19	9026
Total	94	2	8	59	70	53095

Pradhan Mantri Fasal Beema Yojana Programme was attended by eight Hon'ble State Government Ministers, 59 Hon'ble Member of Parliaments as Chief Guest. The programme was also attended by 70 Member of Legislative Assembly from three states along with Chairman/ member of Zilla Panchayat. District Collectors, Bank Officers, line departments also participated in the programme.

g. Seed Hubs for Increasing Production of Pulses

Nodal Scientist: Dr. Prem Chand, Scientist (Agril. Economics)

Augmenting the availability of quality seeds of pulses, the Department of Agriculture, Cooperation and Farmers' Welfare, Government of India, has sanctioned a project on "Creation of seed hubs for increasing indigenous production of pulses in India". This project aims at establishing 93 seed hubs across the country in State Agricultural Universities/Krishi Vigyan Kendras/ /ICAR Institutes and will be coordinated and monitored by ICAR-Indian Institute of Pulses Research (IIPR), Kanpur. Kanpur will act as the Nodal Agency for implementation of project on creations of seed hubs and will provide the technical support for seed production at each hub.

Under ICAR-Agricultural Technology Application Research Institute (ATARI), Zone IX, Jabalpur fifteen districts were selected from three States i.e., Madhya Pradesh, Chhattisgarh and Odisha during first phase for pulses seed Hub. After that 7 KVKs were selected in second phase. Total 22 districts were selected in this zone. This programme was implemented through Krishi Vigyan Kendras of selected districts. The following are the 22 districts which were selected for pulse seed hub:

KVK Betul, Narsinghpur, Damoh, Harda, Ujjain, Dewas, Datai, Morena and Tikamgarh in Madhya Pradesh. In Chhattisgarh, KVK Bhatapara, Surguja, Rajnandgaon, Kawardha, Kanker, Janjgir-Champa and in Odisha KVK Kalahandi, Mayurbhanj, Bhadrak, Cuttack, Baragarh, Deogarh, Keonjhar

Achievements under seed hub *Kharif* 2016

Table 11.12: State-wise area and production

State	Area (ha)		Production (q)	
	At KVK	At farmers' field	At KVK	farmers' field
Chhattisgarh	3	57	28	280
Odisha	-	75	-	1000
Total	3	132	28	1280

Table 11.13: Achievements under seed hub *Rabi* 2016-17

State	Area (ha)		Production (q)	
	At KVK	At farmers' field	At KVK	At farmers' field
MP	39	160.1	582	1499.54
CG	28	259.1	175	1782.21
Odisha	-	78.8	-	112
Total	67	498	757	3393.75

Table 11.14: Achievements under seed hub Summer 2016-17

State	Area (ha)		Production (q)	
	At KVK	At farmers' field	At KVK	At farmers' field
MP	15	109	150	807.63
CG	1	17	5	110
Odisha	2	95	3	216.8
Total	18	221	158	1134.43

h. Skill Development Programme

Nodal Scientist: Dr. A. A. Raut, Scientist (AE)

Skill development programme is the flagship scheme of ICAR being implemented at KVK. The Agriculture Skill Council of India (ASCI) have

prepared 142 Qualification Packs (QPs) & Model Curricula in agriculture and allied areas. The objective of this programme is to enable a large number of Indian youth to take up agriculture related skill training that will help them in securing a better livelihood. The programme is operational in 13 Krishi Vigyan Kendras namely Indore, Morena, Bhopal, Jhabua, Satna and Jabalpur in Madhya Pradesh; Surguja, Dantewada, Janjgir-Champa, Kanker and Korea in Chhattisgarh and Jagatsinghpur and Kalahandi in Odisha, under ATARI, Jabalpur. The orientation programme of master trainers at KVK was held at IGKVV Raipur during November 17-19, 2016, the assessment of master trainers in respective QPs was conducted by ASCI.

The skill training was provided in 12 QPs viz. Quality seed producer, Mushroom producer, Beekeeper, Vermi-compost producer, Biofertilizer producer, Lac producer, Biofertilizer producer, Organic growers, Green House Operator, Small poultry farmers, Tractor operator, and Agriculture Extension Service Provider were the identified job roles by KVKs as per the skill needs of farmers, rural youth and women in their districts. The training programmes were conducted at KVKs as per National Occupational Standards (NOS) developed by ASCI.

Skill development training by ASCI at Raipur

Training on green house operator at KVK Bhopal

12 INSTITUTE PROJECTS AND PUBLICATIONS

A. Institute Research Projects

S. No.	Title	Name of Scientist	Designation	Responsibility
1	Assessing the efficacy of mobile messaging by KVK-KMA to the farmers in operational states of Zone IX	Dr. S.R.K. Singh	Principal Scientist	Principal Investigator
2	Adoption dynamics and impact of Improved production technology disseminated by KVK	Dr. S.R.K. Singh	Principal Scientist	Principal Investigator
3	Assessment of Sowing techniques for soybean in Madhya Pradesh	Dr. A.P Dwivedi	Sr. Scientist	Principal Investigator
4	Growth and activities of earthworm species under different combination of Bio-wastes	Dr. A.P. Dwivedi	Sr. Scientist	Principal Investigator
5	Estimation of yield gap and its factors affecting in major crops of Madhya Pradesh, Chhattisgarh and Odisha	Dr. Prem Chand	Scientist (SS)	Principal Investigator
6	Impact assessment of KKVs: Standardizing methodologies and its estimation	Dr. Prem Chand	Scientist (SS)	Principal Investigator
7	Participatory approach for management of community grazing land through KVKs	Sh. Tushar Athare	Scientist	Principal Investigator

Salient Achievements:

Project: Assessing the efficacy of mobile messaging by KVK-KMA to the farmers in operational states of Zone IX

Highlights:

In this project, data was collected from 531 respondents. As source of information, results showed that KVK ranked first followed by State Deptt. and Input dealers. The efficacy of the mobile messaging was measured in terms of needful and timely messaging; understanding ability, applicability and technological impact.

- Timely and needful: Farmers (82%), extension personnel (88.0%) and input dealers (67.0%) opined that messages were timely and needful.
- Understandability: 45.0 percent farmers, 82.0 percent extension personnel and 60.0 percent input dealers opined that messages have high understandability, while 49% of the farmers opined it is medium.
- Applicability: considerable proportion (42.0%) of the farmers, extension personnel (80.0 %) and input dealers (53.33 %) supported that messages are highly applicable. However, 48.0 percent of the farmers expressed that it is medium applicable.
- Technological impact was perceived as high by the majority of the farmers (62.0 %), extension personnel (80.0 %) and input dealers (60.0 %).

Besides, it has been found helpful in the contingent situation alerts, market price information, training information, etc.

Some indicators were developed and their status is as follows:

- Message Readability Index (MRI): 85.70 %
- Message Understanding Index (MUI): 72.5 %
- Message Application Index (MAI): 51.2 %

On the basis of the above results it is inferred that for enhancing the efficacy of the messages sent by KMA to the farmers and other stakeholders there is need to have periodical observation on the MRI, MUI and MAI so that efficacy of the mobile messaging could be enhanced. Also the powerful messages could be promoted at wider scale and

can benefit the farmers at mass scale. Further, sending the alert messages could sensitize the farmers about the contingent situation and having preparedness to cope with them well on time.

Project: Adoption dynamics and impact of improved production technology disseminated by KVK

Highlights:

- Information is the powerful tool in the decision making for full adoption of any technology. Apropos flow of information from various sources, KVK ranked first followed by RAEO; friend, and neighbor; University; and NGO.
- Change in milk production was observed among the beneficiary farmers. Before intervention, milk production was 3.51 whereas after intervention it was observed as 4.30 litre per day.
- Average change in calving period was observed as 168 days after intervention whereas before intervention it was 265 days.
- Average change in the level of worm load (endo parasite) was 36 %.
- Before intervention of the programme average intake of feed/fodder was 6.6 Kg/animal/day, whereas after intervented was it is 9.16 Kg/ day/ animal.
- Change in herd & flock populations observed in before intervention as 5 whereas after intervention it was 7.

Besides, data are being analyzed regarding adoption and impact of technological interventions of farm mechanization and home science.

Project: Growth and activities of earthworm species under different combination of bio-wastes

Highlights:

Major objective was determining the efficiency of earthworm species for converting substrata into compost; assessing the nutrient content of vermicompost over traditional compost; and determining the effect of various substrate on the growth and development of earthworm species.

Under this project, three species of earthworm were selected

1. *Eisenia foetida,*
2. *Eudrillus eugenia,*
3. *Pheretima elongate*

On the basis of two year data, the findings showed that in substrate -soybean straw + cow dung-the conversion rate (g/day) was 55.83, Gross return from 1 Kg was 10.37, Cost of Production was Rs. 3.30/- Kg, Net Return Rs.7.07/-Kg. Hence, it was concluded that soybean straw+cowdung is most appropriate substrate for faster decomposition and getting quality vermicompost as compared to other substrate used for the vermicompost.

Project: Assessment of sowing techniques for soybean in Madhya Pradesh

Highlights:

Major objective of the project is to assess suitable sowing technique for soybean and evaluate most economic technique of sowing for soybean. The project was initiated in *Kharif* 2014 and on the basis of two year result data, sowing by furrow irrigated raised bed (FIRB) planter was observed to the most suitable method for soybean.

Project: Participatory approach for management of community grazing land through KVKs

Highlights:

Grazing Preferences of cattle are being collected season wise under this project and being analysed. Results revealed that during April to June, grass preferred by grazing animals are M.P. Chari, deenanath grass, barseem, cynodan, doob, maize chary, hybrid napier, dhaman, paddy straw, wheat straw, maize stover, kasa, paragrass, chilika, hatghi 7 gini grass, marvel grass, humidi cola, sudan, sanwa.

During July to September sawan (Echinoclova), deenanath grass, cynodon, lucern, doob, anjan, guinea, rhodes, m.p. chari, jowar, phulkara, sama, motha grass, napier grass, cenchrus ciliries , dichantihium annulatum, marvel grass, humidi cola, motha, sava grass are preferred.

During cotober to december quarter preferred grasses are berseem , lucern, napier, doob, dry pea, anjan, cynodon, deenanath, rhodes, paddy straw, bhond, karta, paragrass, bathua, stylo, wild pea, sweet swan, humidi cola, krishna neel, sava grass.

During January to March quarter berseem, wild oat, bathua, doob, maize chary, lucern, napier, m.p. chari, dudh mogra, kail, paragrass, bathua,

akri grass, stylo, chilika, maize stover, wild oat, chinopodium, ucrene are preferred.

Project: Estimation of yield gap and its factors affecting in major crops of Madhya Pradesh, Chhattisgarh and Odisha

Highlights:

The study estimated the yield gap in major crops of Madhya Pradesh, Chhattisgarh and Odisha and identified the factors affecting yield gap. The major findings of the study are given below.

Yield gap of major crops

Madhya Pradesh: Rice, soybean, wheat and gram were the major crops selected for identifying the yield gap. The study found that in case of rice the overall gap was 61.14 in the State ranging from 37 per cent in Sheopur district to 83 per cent in Indore district. The high gap in Malwa region is mainly attributed to high potential in the region. Soybean being another major crop was selected and it was found that the overall gap of 63 per cent exists in the State with high variability ranging from 41 per cent to 92 per cent. High gap was found in low lying areas. The Yield Gap-I was found to be higher as compared to yield gap-I. However, the variability was higher in YG-II. In wheat crop, the gap was relatively low (38.76%) as compared to other crops. In case of gram, the gap was found to be 52.20 per cent of potential yield and in some of the district, the actual yield of the district was approaching to the potential yield. The gap was comparatively higher in Northern Hill districts.

Chhattisgarh: Rice and maize were the two important crops selected for the study. In case of rice, the overall yield gap in the State was found to the tune of 67.71 per cent varying from 48.62 to 75.07 per cent. The YG-II was higher (57.23%) than the YG-I (24.41%). The lowest gap was found in Janjgir-Champa while it was highest in Narayanpur district. In maize crop, the total yield gap was 65.67% with comparatively low variability (ranged from 51.07% to 79.78%). Similar to rice, the YG-II was higher in maize also.

Odisha: Rice and groundnut were the two important crops taken for the study. The total yield gap in paddy was estimated to be 79. per cent of potential yield ranging from 69 to 84 per cent. Yield Gap-II was found higher than YG-I. The gap was higher in Southern and Eastern districts as compared to other districts. In case of groundnut, yield gap was estimated to be 39 per cent. District yield in some of the districts was approaching to the potential yield while in some of the districts; gap was up to 69 per cent. In 1/3rd districts, the gap was estimated to be more than 50 per cent.

Factors affecting yield gap

The result of study highlighted that disease and pest management (captured through seed treatment, pest and disease control measures) quality seed (captured through source of seed) and method of sowing is most important determinant of production in these States. The other determents found were distance from market (negatively associated), size of holding (positively associated), balance dose of fertilizer, i.e. yield was negatively related with dose of nitrogen application and method of sowing (improved method of sowing increased the yield). The study suggests promoting preventive measures of pest and disease control such as seed treatment and light trap should be promoted. The study also suggested increasing the use of ICT application for enriching source of information use of market strategies for providing input as well as selling of output. It emphasizes the expansion of area under short duration varieties. The paper also emphasizes on increase in area under *Rabi* pulse crops to increase pulses production.

Project: Impact assessment of KKVs: Standardizing methodologies and its estimation

Highlights:

To assess the impact of KVKs following analytical tools were used in this project:

- TFP using Malmquist index for the period 1970-71 to 2012-13.
- To assess the determinants of TFP, the TFP indices being regressed against different variables :

Model 1 TFP = f (RES_STOK, IFEXT (KVK), LIT_R, NARI, INF, DUMMY)

Model 2 TFP = g (RES_STOK, IFEXT (KVK), LIT_R, CI, NPRATIO, IRR_GW, ROAD, ELECT_AG, DUMMY)

Results indicate that due to establishment of KVK, the productivity level of the concerned

districts were changed significantly and it was supported by the shifting of the districts from low to high productivity regime.

B. Publications

a) Research Articles in International Journals

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2. D.V.Singh, A.Mishra, S.R.K.Singh (2016). The extent of adoption of the market intelligence among the summer cabbage growers. *International Journal of Humanities and Social Science Invention*. Vol. 5 (7): pp 67-70.
3. N.Soni, S.K.Pandey, S.S.Singh, S.R.K.Singh, A.Mishra, S.S.Baghel, P.K.Kaurav (2016). Propagation of guava through cottage under net house condition at Jabalpur, Madhya Pradesh, India. *Flora & Fauna,* Vol. 22 (1), Pp. 36-40.
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7. S.Singh, M.M.Patel, and S.R.K.Singh (2016). Mining the knowledge of farm women apropos production technology of the major rainfed crops – a case of Madhya Pradesh, India. *Ecology and Environment Conservation*, 22 (April Suppl.): 2016, S217-S220.
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10. Patel, N., Dwivedi, A., Chouhan S., Sharma, R. and Singh, S.R.K. (2016). Adoption dynamics of environment friendly practices in vegetable cultivation in Madhya Pradesh. *International Journal of Agricultural Sciences*. Vol 8(52), pp. 2577-2580.
11. R.Sharma, N.B.Yadav, S.Chouhan and S.R.K.Singh (2016). Appropriateness of training among the organic farming growers in Gujarat State. *International Journal of Agricultural Science*, 8 (26), 1540-1542.

b) Research Articles in National Journals

1. R.Sharma, N.B.Yadav, S.Chouhan, S.R.K.Singh and Tushar Athare (2016). Relational analysis of knowledge and adoption of organic farming practices in Gujarat State. *Indian Research Journal of Extension Education*. 16 (3), Sept., 2016. pp. 33-38.
2. S.Kushwah, Sushil Kumar and S.R.K.Singh (2016). Adoption of Improved late sown mustard cultivation practices – a case study of Bihar. *Journal of Community Mobilization and Sustainable Development*, Vol. 11 (1), Pp. 19-23.
3. A.K.Dixit, D.S.Tomar, S.R.K.Singh and A.Saxena (2016). Influence of rate, source and mode of sulphur application on soybean (Glycine max L.) in Vertisols of Madhya Pradesh. *Indian Journal of Fertilizers*, Vol. 12 (2), pp. 44-47.
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malformation (*Mangifera indica* L.) under Jabalpur conditions. TECHNOFAME, Vol.5 No. 2, Pp. 63-67.

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ii) Technical Bulletins/ Manuals

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2. Anupam Mishra, S.R.K.Singh, L.Chakravarti and D.C.Srivatava (2016). Nutri Guide. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 40.
3. S.R.K.Singh, Anupam Mishra, A A Raut, A.P.Dwivedi, Prem Chand and Tushar Athare (2016). XXIII Zonal Workshop of KVKs-Proceedings. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 24.
4. Tushar Athare, S.R.K.Singh, Anupam Mishra, V.P.Chahal and Prem Chand (2016). *Pradhan Mantri Fasal Bima Yojana. Division of Agricultural Extension, ICAR, New Delhi. Pp. 57.*
5. S.R.K.Singh, and Anupam Mishra (2017). Cluster Frontline Demonstration of *Kharif* Oilseeds. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 37.
6. Anupam Mishra, S.R.K.Singh and Ajeet Singh (2016). A development gateway by KVK for enhancing pace of agriculture through active involvement of public representatives and line departments in M.P. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 16.
7. S.R.K. Singh Anupam Mishra, and Nitin Soni (2016). Impact of fisheries in central and eastern part of India. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 54.
8. S.R.K. Singh Anupam Mishra and M. Khaparde (2016). Skill development on integrated profitable aquaculture. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 74.
9. Anupam Mishra, S.R.K. Singh, M.P. Thakur and S. Pattnaik(2016).Training manual on tropical mushroom production and value addition. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp.20.
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11. A.P.Dwivedi, Anupam Mishra, S.R.K. Singh, Tushar, Athare (2016). Agrobiodiversity Conservation in Odisha. ICAR-ATARI, Zone-IX, Jabalpur, Madhya Pradesh. Pp. 40.
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iii) Book Chapters

1. S.R.K.Singh, Anupam Mishra and Prem Chand (2016). Strategic role of KVKs for empowering farmers through market-led extension. *In*: Extension Innovation for Agricultural development. Eds. B.Singh, M.M.Patel, S.Gupta, Y.D. Mishra and R.N. Padaria. Pp. 213-222.
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3. Dwivedi, A.P., Mishra, Anupam, Gautam, U.S., Singh, S.R.K., Prem Chand and Athare, Tushar(2017) System of Rice Intensification : Principles , Policy Concern and scientific controversies IN K.N.Bhatt and Pradeep Bhargava (Edt.). System of Rice Intensification. published by;Studian Press Pvt. Ltd, New Delhi.

iv) Presentations in Conferences/Symposia/ Seminars/Other forums

1. S.R.K.Singh, A.Mishra, T Athare, A.A.Raut and Prem Chand, (2017). Promoting *Women-led Agriculture* for Livelihood Security and Empowerment. Paper presented in 8th National Extension Education Congress, Jan. 28-31, 2017 at ICAR-NAARM, Hyderabad.
2. A.A.Raut, Tushar Athare, Prem Chand and S.R.K.Singh (2017). ICT application in livestock management and animal husbandry. Paper presented in National Conference on Advances in Global Research in Agriculture and technology (AGRAT 2017) during March 19-20, 2017.
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v) Technical/ Popular Articles

A.P. Dwivedi, A. Mishra, H.S. Yadav, S.R.K. Singh and N. Vishwakarma (2016). *Mrida awam Jal Sanrakhika, IISWC, Dehradun,* pp. 86-89.

13 SCIENTIFIC ADVISORY COMMITTEE MEETINGS

Scientific Advisory Committee meetings were conducted by KVKs to get advice and feedback on the mandated activities of KVK in planned and systematic manner by the participating members from ICAR institutions, ATARI, line department, farmers, etc. The Committee monitors progress and facilitate exchange of views on the specific tasks. The Committee reviews periodically and takes further course of action deemed fit for further validation on application by the KVK. Therefore, all KVKs were mandated to conduct the meetings on the periodical basis (twice in a year).

Total 122 SAC meetings were conducted during 2016-17 in a 100 functional KVKs (Table 14)

Table 14: Status of SAC conducted by KVKs during 2016-17

S. No.	Name of KVKs	No. of SACs conducted
Indira Gandhi Krishi Vishwa Vidyalaya, Chhattisgarh		
1.	Balrampur	1
2.	Bastar	1
3.	Bhatapara	1
4.	Bijapur	1
5.	Bilaspur	1
6.	Dantewada	1
7.	Dhamtari	1
8.	Durg	1
9.	Gariyaband	1
10.	Janjgir-Champa	1
11.	Jashpur	1
12.	Kanker	1
13.	Kawardha	1
14.	Korba	1
15.	Korea	1
16.	Mahasamund	1
17.	Narayanpur	1
18.	Raigarh	1
19.	Rajnandgaon	1
20.	Surguja	1
	Total	**20**
Jawahar Lal Nehru Krishi Vishwa Vidyalaya, Jabalpur		
1.	Balaghat	1
2.	Betul	1
3.	Chhatarpur	1
4.	Chhindwara	1
5.	Damoh	1
6.	Dindori	1
7.	Harda	1
8.	Hoshangabad	1
9.	Jabalpur	1
10.	Katni	1
11.	Mandla	1
12.	Narsinghpur	1
13.	Panna	1
14.	Sagar	1
15.	Seoni	1
16.	Sidhi	1
17.	Tikamgarh	1
18.	Umaria	1
19.	Raisen (NGO)	2
20.	Satna (NGO)	1
	Total	**21**
Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior		
1.	Ashoknagar	2
2.	Barwani	2
3.	Bhind	2
4.	Datia	2
5.	Dewas	2
6.	Dhar	2
7.	Guna	2

S. No.	Name of KVKs	No. of SACs conducted
8.	Gwalior	2
9.	Jhabua	2
10.	Khandwa	2
11.	Khargone	2
12.	Mandsaur	2
13.	Morena	2
14.	Neemuch	2
15.	Rajgarh	2
16.	Shajapur	2
17.	Sheopur	2
18.	Shivpuri	2
19.	Ujjain	2
20.	Bhopal (ICAR)	1
21.	Burhanpur (NGO)	2
22.	Indore (NGO)	2
23.	Ratlam (NGO)	2
24.	Sehore (NGO)	2
	Total	**47**
Orissa University of Agricultural Technology, Bhubaneswar, Odisha		
1.	Angul	1
2.	Balasore	1
3.	Bargarh	1
4.	Bhadrak	1
5.	Bolangir	1
6.	Boudh	1
7.	Cuttack (ICAR)	1
8.	Deogarh	1
9.	Dhenkanal	1
10.	Gajapati	1
11.	Ganjam-I	1
12.	Ganjam-II	1
13.	Jagatsinghpur	1
14.	Jajpur	1
15.	Jharsuguda	1
16.	Kalahandi	1
17.	Kandhamal	1
18.	Kendrapara	1
19.	Khordha (ICAR)	1
20.	Keonjhar	1
21.	Koraput	1
22.	Malkangiri	1
23.	Mayurbhanj-I	1
24.	Mayurbhanj II	1
25.	Nabarangpur	1
26.	Nayagarh	1
27.	Nuapada	1
28.	Puri	1
29.	Sonepur	1
30.	Sundergarh-I	1
31.	Rayagada	1
32.	Sambalpur	1
33.	Sundargarh-II	2
	Total	**34**
	Grand Total	**122**

14 AWARDS AND RECOGNITIONS

Mahindra Samridhi India Agri Award

KVK Kanker, Chhattisgarh received best KVK Mahindra Samridhi India Agri Award 2017 and Pandit Deen Dayal Upadhyay Krishi Vigyan Protshahan Puraskar (National) 2015-16. KVK has demonstrated proven technologies on the farmers' field for need base activities and enterprices like nutritional garden which benefited the farming community.

Pandit Deendayal Upadhaya Rashtriya Krishi Protshana Puraskar

KVK Mayutbhanj-I, Odisha received Protshana Puraskar of Pandit Deendayal Upadhaya Rashtriya Krishi Protshana Puraskar for their contribution in the field of technology dissemination.

Award from PPVFRA

Dr. Anupam Mishra, Director, ATARI received Award from PPVFRA for agro biodiversity conservation.

Cashless KVK Award

KVK Khordha, Odisha and KVK Bhopal, Madhya Pradesh received Cashless KVK Award on 14 February 2017 by Indian Council of Agricultural Research, New Delhi.


Indian Council of Agricultural Research

Certificate

CASHLESS KRISHI VIGYAN KENDRA AWARD

is presented to

Krishi Vigyan Kendra, Bhopal, Madhya Pradesh

Zone VII

Young Scientist Award

Dr. A. A. Raut, Scientist (AE) awarded for best young scientist by the Society of Human Resource and Innovation during National Conference on Advances in Global Research in Agriculture and Technology held at Agra during March 19-20 2017.


SOCIETY OF HUMAN RESOURCE AND INNOVATION

AGRA (U.P.) INDIA

CERTIFICATE

The Executive Committee of Society Confers its

Young Scientist Award

to

15 DISTINGUISHED VISITORS

KVK Rewa: Hon'ble Union Minister of Agriculture and Farmers Welfare Sh. Radha Mohan Singh Visited KVK Exhibition

Sh. Radha Mohan Singh, Hon'ble Union Minister of Agriculture and Farmers Welfare inaugurated exhibition of agricultural technologies organised by eight KVKs of Madhya Pradesh at Rewa on 3 June 2016. Eight KVKs displayed various agricultural technologies for showcasing to the farmers. He also interacted with KVKs along with district administration and asked them to equip farmers with latest agricultural technologies. A Farmer Scientist Interaction was also organised on the occasion, Progressive farmers were felicitated on the occasion.

Cuttack: KVKs participated in Farmers Fair and Exhibition at NRRI Cuttack on 9 May 2016

Ten KVKs from Odisha participated in farmers fair at NRRI Cuttack on 9 May 2016. KVKs participated in the exhibition displaying various agricultural technologies, farmers' varieties, literature etc. Progressive farmers from KVKs have also participated in the programme. Shri Radha Mohan Singh, Union Minister for Agriculture and Farmers Welfare inaugurated Farmers fair organized by ICAR-National Rice Research Institute, Cuttack in presence of Shri Dharmendra Pradhan, Minister of State (with Independent charge) for Petroleum and Natural Gas, Shri Bhartruhari Mahtab, Member of Parliament (Lok Sabha), Cuttack, Dr. Trilochan Mohapatra, Secretary (DARE) and Director General (ICAR) and other dignitaries. In his address, he explained benefits of different Centrally Sponsored Schemes viz. Pradhan Mantri Fasal Bima Yojana, Pradhan Mantri Krishi Sinchai Yojana, Soil Heath Card, e-NAM (National Agriculture Market), Gram Uday Se Bharat Uday Abhiyan, Mera Gaon, Mera Gaurav, Organic Farming etc. He emphasized on adoption of villages under 'Mera Gaon Mera Gaurav' programme for demonstration of new technologies.

Bhubaneswar: Interactive Meeting with Hon'ble Union Minister of Agriculture, Sh. Radha Mohan Singh at IIWM, Bhubaneswar

An interactive meeting with officials of ICAR-ATARI, Jabalpur, KVKs of Odisha, ICAR institutes located in Odisha, State Departments, Odisha University of Agriculture and Technology was organized to discuss about the progress of work done in different sectors of agriculture. The meeting was chaired by Hon'ble Union Minister of Agriculture, Sh. Radha Mohan Singh at IIWM, Bhubaneswar on 2nd September 2016. Minister urged on synergy among State Agricultural Universities, ICAR institutes, KVKs and State departments for increased pace of agricultural development in the region. Shri Chhabilendra Roul, Additional Secretary, DARE & Secretary ICAR welcomed the dignitaries. Shri B.K. Panda, MLA (Nuapada), Shri S.K. Pattanayak, Secretary Agriculture and Farmers Welfare (GoI), Prof. Dr. S. Pasupalak, Vice Chancellor, OUAT, Shri Manoj Ahuja, Principal Secretary, Agriculture & Farmers Empowerment (GoO), Dr. S.K. Chaudhari, ADG (S&WM), ICAR graced the occasion. Dr. Anupam Mishra, Director ICAR-ATARI, Jabalpur briefed about KVK activities, infrastructure status and linkages with State departments and ICAR Institutes. Thirty three KVKs from Odisha's scientists from ICAR-ATARI, Jabalpur also participated in the meeting.

KVK Raipur: Inauguration of KVK Raipur by Hon'ble Union Minister of Agriculture, Sh. Radha Mohan Singh

Krishi Vigyan Kendra Raipur was inaugurated on 12th September, 2016, by Hon'ble Governor of Chhattisgarh Shri Balramji Das Tandon, Union Minister of Agriculture Shri Radha Mohan Singh, Chief Minister of Chhattisgarh Dr. Raman Singh, Sh. Brij Mohan Agrawal, Agril. Minister of the Chhattisgarh, Sh. Dayaldas Baghel, Minister for Cooperative, Sanskrit and Tourism, Shri Ramesh Bais, Member of Parliament ,Dr. S.K. Patil, Hon,ble Vice-Chancellor, IGKV, Raipur, Dr. M.P. Thakur, Director Extension, and other dignitaries were present during this ceremony.

KVK Khordha : 23rd Zonal KVK Workshop of ATARI Jabalpur organised at KVK-Khordha

Shri Dharmendra Pradhanji, Hon'ble Minister, of State (Independent Charge), Petroleum and

Natural Gas inaugurated 23rd Zonal Workshop of KVKs under ATARI, Jabalpur in presence of Dr. A. K. Singh, DDG (Agricultural Extension); Dr. Anupam Mishra, Director ATARI Zone-IX; Dr. S. Pasupalak, Vice-Chancellor, OUAT; Dr. U.K. Mishra, Vice-Chancellor, CGKV Durg; Dr. A, K. Singh, Vice-Chancellor RVSKVV Gwalior; Shri Abhay Mahajan, DRI Chitrakoot and Dr. P. Jayasankar, Director, ICAR-CIFA. Hon'ble Minister also inaugurated the exhibition laid out by KVKs on the occasion highlighting the success stories at the farmers' fields. He launched the web portal on Management Information System of KVK. In his presidential address Hon'ble Minister mentioned about the significance of KVK and how KVKs can transform the livelihood of farming activities through innovative approaches. He encouraged the farmers to use the space of 5500 petrol pump across the country for knowledge dissemination. Hon'ble Minister also felicitated innovative farmers benefitted by KVK Khordha, Angul and Deogarh. Dr. A. K. Singh, DDG (Agril. Extn) explained the objective of the workshop. Prior to inaugurating the workshop, the Hon'ble Minister visited the farm facilities of ICAR-CIFA, Bhubaneswar, Odisha. Dr. S. Pasupalak, VC of OUAT pointed out the salient achievements of KVKs made in Odisha and expressed the challenges of the agriculture in the State. Dr. Anupam Mishra, Director (ATARI) opined that KVKs are front line extension institution working in the vicinity of the farming community and supporting in their profitable farming. Dr. P. Jayasankar, Director, ICAR-CIFA thanked all the dignitaries on their visit to the institute and interactions. The workshop was attended by more than 250 participants including DIrector Extension from SAUs and Veterinary Universities, 100 Senior Scientists and Heads of KVKs from Madhya Pradesh, Chhattisgarh and Odisha; 16 ICAR Institutes, 4 NGO Chairmen/ Heads; 120 progressive farmers and corporate representatives. Dr. Anupam Mishra, Director, ATARI, Zone IX, Jabalpur in his presentation gave brief overview of activities and accomplishments of ICAR-ATARI.

Bhopal: ICAR-ATARI organizes Exhibition on International Women Day Programme in Madhya Pradesh Vidhan Sabha

An exhibition was jointly organized by ICAR-ATARI Jabalpur and Women and Child Development Department, Madhya Pradesh on occasion of International Women's Day on March 8, 2017. The exhibition was based on theme 'Nutrition for women and child' to sensitize the public representatives on importance of nutrition and its role in overall health of family members. The exhibition was inaugurated by Hon'ble Chief Minister of Madhya Pradesh Sh. Shivraj Singh Chouhan which has participation of 25 Krishi Vigyan Kendras from Madhya Pradesh. Dr Anupan Mishra, Director ICAR-ATARI, Jabalpur briefed the Hon'ble Chief Minister, Shri Shivraj Singh Chouhan, Shri Sitasharan Sharma, Speaker Madhya Pradesh Vidhan Sabha and Smt. Archana Chitnis Minister for Women and Child Development about KVK initiatives in providing nutritional security to women and children.

The Cabinet and State Ministers, Members of Legislative Assembly and officials of different departments of MP Govt. visited the KVK Stalls. During the programme, 'Nutritional Calendar' jointly developed by ICAR-ATARI Jabalpur and Women and Child Development Department, Madhya Pradesh was also released by the Hon'ble Chief Minister Sh. Shivraj Singh Chouhan. KVKs of ICAR-ATARI, Jabalpur displayed posters and value added products, organic products and processed food products.

KVK Durg: Shri Radha Mohan Singh, Hon'ble Union Minister of Agriculture, Govt. of India inaugurated KVK Durg

An additional Krishi Vigyan Kendra at Durg was inaugurated on 27 January, 2017, by Hon'ble Union Minister of Agriculture Shri Radha Mohan Singh in presence of Hon'ble Chief Minister of Chhattisgarh Dr. Raman Singh, Sh. Brij Mohan Agrawal, Minister of Agriculture, Animal Husbandry, Fishery And Water Resources Govt of Chhattisgarh, Hon'ble ministers from Govt. of Chhattisgarh, Shri Ramesh Bais, Hon'ble Member of Parliament , Raipur, Dr. S.K. Patil, Hon,ble Vice-Chancellor, IGKV, Raipur, Sh. Ajay Singh, APC, Chhattisgarh, Dr. Anupam Mishra, Director, ICAR-ATARI, Jabalpur, Dr. M.P. Thakur, Director Extension, and other dignitaries were present during this ceremony. A National Agricultural Fair was organised at Raipur from 27-31 January 2017 showcasing technologies by KVKs, IGKV, Raipur and various ICAR institutes. Shri Radha Mohan Singh dwelt upon various pro-farmer initiatives of Union government like doubling of farmers income, availability of market facilities through National Agriculture Market, neem coated urea for regular availability of fertilisers, soil testing and distribution of Soil Health Cards to farmers etc.

Satna: Exhibition by KVKs from ICAR-ATARI, Jabalpur in Gramodaya Mela at Chitrakoot

Gramodaya Mela was organized at Chitrakoot during February 24-27, 2017 as part of celebrating the birth centenaries of great social reformers Shri Nanaji Deshmukh and Shri Deendayal Upadhyaya. The KVKs from Madhya Pradesh, Chhattisgarh and Odisha under ICAR-ATARI Jabalpur participated in the three day exhibition at Chitrakoot. The KVKs exhibited the latest technologies in agriculture, value added products and craft material during the exhibition. The exhibition was visited by several distinguished dignitaries and guest which included Hon'ble Governor of Haryana Sh. Kaptan Singh Solanki, Hon'ble Union Minister of Panchayati Raj, Rural Development, Drinking Water and Sanitation Sh. Narendra Singh Tomar, Hon'ble Union Minister of State, Ministry of Micro, Small and Medium Enterprises Sh Giriraj Singh, Hon'ble Union Minister of State for Skill Development and Entrepreneurship Sh. Rajiv Pratap Rudy, Sh. Rajendra Shukla, Hon'ble Industry Minister M.P. Govt., Smt. Archana Chitnis, Hon'ble Minister of Women and Child Development M.P. Govt., Dr A. K. Singh, DDG (Agril Extension) ICAR,New Delhi. Farmers from Madhya Pradesh and Uttar Pradesh participated in the exhibition and one day seminar cum Kisan Sangoshti organized on the occasion.

Bhopal: Workshop on Agriculture for Nutrition and Nutritional Awareness Organized by ICAR-ATARI, Zone-IX at Bhopal

A two days workshop on "Agriculture for Nutrition & Nutritional Awareness" was organized on January 9-10, 2017 at Bhopal by ICAR-ATARI, Zone-IX, Jabalpur & Women & Child Development Department (Madhya Pradesh). In the inaugural Session, Shri Gauri Shankar Bisen, Minister for Agriculture and Farmer Welfare, Madhya Pradesh said that the nutritional security exists in locally available food material. There is need to explore and make the societies aware about its consumption and also to yoga. Smt. Archana Chitnis, Minister, Women & Child Development, Madhya Pradesh announced

Visit of dignitaries to KVK exhibtion stall in Gramodaya Mela

Hon'ble Governor of Haryana Shri Kaptan Singh Solanki at KVK stall

Shri Giriraj Singh, Hon'ble Union Minister for State at KVK Stall

Shri Narendra Singh Tomar, Hon'ble Minister for Rural Development

Shri Giriraj Singh, Hon'ble Union Minister for State at KVK Stall

to developed one nutritional smart village in each block of Madhya Pradesh for dissemination of traditional and scientific knowledge among society. She also assured that nutritional calendar will be provided to each family for increasing level of nutritional education. Sri Surya Prakash Meena, Minister, Horticulture & Food Processing, Madhya Pradesh committed for all kind of support for production and processing of vegetable and fruits for nutritional security. The objectives and outline of the workshop was presented by Dr. Anupam Mishra, Director, ICAR-ATARI, Zone–IX, Jabalpur. The gathering was also addressed by Sri P. C. Meena, Agriculture Production Commissioner, Sri Rajesh Rajora, Principal Secretary, Agriculture, Smt, Pushplata Singh, Commissioner, ICDS, Smt. Jayshri Kiyawat, Commissioner, Women Empowerment, Sri R. K. Rokde, Director, Animal Husbandry and Sri Mohan Lal Meena, Director, Agriculture, Madhya Pradesh.

Jabalpur: Secretary DARE and DG ICAR inaugurated Interface on Agriculture for Nutrition at ICAR-ATARI, Jabalpur

Hon'ble Secretary DARE & Director General, ICAR, New Delhi Dr. Trilochan Mohapatra inaugurated an Inteface on 'Agriculture for Nutritional Security' on 8.2.2017 organised at ICAR-ATARI, Jabalpur in presence of Prof. V.S. Tomar, VC, JNKVV, Jabalpur, Prof P.D. Juyal, VC, NDVSU, Jabalpur, Prof. Kapil Deo Mishra, VC, RDVV, Jabalpur, Dr. Anupam Mishra, Director, ICAR-ATARI, Jabalpur. Higher officials from Government of Madhya Pradesh viz; Smt. Pushpalata Singh, Commissioner, ICDS, Bhopal, Smt Jayashree Kiyawat, Commissioner, Women empowerment, Bhopal, Project officers of ICDS, Assistant Directors Agriculture, Scientists from KVKs also participated in the programme. Dr. A.P.J. Abdul Kalam Conference hall of ICAR-ATARI, Jabalpur was inaugurated by the dignitaries.

Dr. Trilochan Mohapatra emphasised the importance of food fortification as well as nutri gardens for nutrition secure nation. Dr. Anupam Mishra highlighted various initiatives of KVKs of ICAR-ATARI Jabalpur towards fulfilling nutritional requirements through joint efforts of agriculture and allied departments. An exhibition

was also organized by KVKs from Madhya Pradesh to sensitize the mass on the nutritional security through nutri-rich agriculture vis-à-vis nutrition literacy for inclusion of the same in the daily diet.

16 PROGRESS REPORT OF ATIC

A. Details on ATIC

S. No	Name of the ATIC	Name of the Host Institute	Name of the ATIC Manager
1.	ATIC, Jabalpur	JNKVV., Jabalpur (M.P.)	Dr. Dinkar Sharma
2.	ATIC, Raipur	IGKV, Raipur	Dr. S.S. Tuteja
3.	ATIC, Bhubaneswar	OUAT, Bhubaneswar	Dr. M.P. Nayak
4.	ATIC, CIFA, Odisha	Central Institute of Freshwater Aquaculture (CIFA) Kausalyaganga, Bhubaneswar, Odisha	H. K. De
5.	ATIC, CIAE, Bhopal	Central Institute of Agricultural Engineering, Bhopal, M.P.	Dr. Uday R. Badegaonkar

B. Details of Farmers Visit

S. No	Purpose of visit	Number of farmers visited
1	Technology information	43024
2	Technology products	1080
3	Diagnostic services	427
4	Others, if any (VIP Visitors/Diganitaries)	202
	Total	**44733**

C. Facilities in the ATIC

S. No	Particulars	Availability (Please √ mark)	Number of ATICs
1	Reception counter	√	5
2	Exhibition / technology museum	√	4
3	Touch screen Kiosk	√	3
4	Cafeteria	√	4
5	Sales counter	√	5
6	Farmers' feedback register	√	5
7	Others (Visitors register, Stock store register, Telephone etc.)	√	5

D. Technology Information Provided

D.1. Details on technology information

S. No	Information category	Number of ATICs	Total number of farmers benefitted	Category of information						
				Varieties / hybrids	Pest management	Disease management	Agro-techniques	Soil and water conservation	Farm Mechanization and Value addition	Animal Husbandry and fisheries
1	Crop & Livestock	2	33549	-	-	-	-	-	-	49
2	Fish culture	2	3350	-	-	-	-	-	-	3350
3	Kisan Call Centre / other Phone calls from farmers	3	1782	290	365	260	232	50	493	92
4	Letters received	1	10	6	-	-	4	-	-	-
5	Letters replied	1	10	6	-	-	4	-	-	-
6	Training to farmers / technocrats / students	2	829	-	-	-	-	-	29	-
7	Video shows	2	5935	450	1560	1470	2120	0	335	-
8	Others if any: Exhibitions & Farmers Fair	1	16	-	-	-	-	-	16	-
	Total		**45481**	**752**	**1925**	**1730**	**2360**	**50**	**873**	**3491**

D.2 . Publications (Print & Electronic media)

S. No	Particulars	Numbers sold	Revenue generated (in Rs. lakh)	Number of farmers benefited
1	Books & Technical Bulletins	32941	20.74985	-
2	Cost of Cultivation	11	0.0055	-
3	DVDs	176	0.088	50000
4	Pulse Production	5	0.00075	-
5	Rearing of Emu Bird	9	0.0009	-
6	Scientific cultivation of Sugarcane	3	0.0003	-

S. No	Particulars	Numbers sold	Revenue generated (in Rs. lakh)	Number of farmers benefited
7	**Others if any** (Krishi Panchang-2017,IGKV Telephone directory ,DVDs (Video film of different technologies)	120547	44.34439	100000
	Total	**153692**	**65.18969**	**150000**

E. Technology Products Provided

S. No	Particulars	Quantity	Unit of quantity	Value in Rs. lakh	Number of farmers benefited
1	Prototypes of Improved Agricultural Machinery (Manual, Animal, Power Tiller and Tractor Drawn Implements)	7610	nos.	44.67	-
2	Hand tools-equipment, Agro processed products including soy-products, feed products, plant material, energy products etc are sold through ATIC. (Maize Sheller & Agro processed products- Wheat Flour, Turdal, Cattle Feed, Gram Flour, Maize Flour, Jowar Flour, Gram, Plant Sapling)	27788 & 9000	kg & no.	9.26	7000
3	Bio pesticides (Trichoderma & Pseudomonas powder)	41	kg	6150	
4	Bio pesticides (Trichoderma capsule	23	packet	460	
5	Multigrain aata & Ragi malt	103	kg	4120	
6	Organic rice	1146	kg	74360	
7	Process material (Jam jally and other)		kg	2085	
8	Table size fish	5252.7	kg	627491	
9	Other product (varmi compost, Kodo rice and maize saller)	23	kg/no.	1330	
	Total	**41963.7/ 9000 /23**	**Kg/nos./ packet**	**61.09**	**7000**

F. Technology Services Provided

S. No	Particulars	Number of farmers benefited
1	Details about the services to line Departments	8365
2	Farmers' visited ATIC	43105
3	Mechanization Planning Advisory	275
4	Plant diagnostics	370
5	Soil and water testing	325
6	Soil Health Cards issued & Farmers' training conducted in KVKs & NGOs	

S. No	Particulars	Number of farmers benefited
	(i) No. of Soil sample tested by KVKs	11293
	(ii) No. of Soil Health Card distributed	22004
	(iii) Farmers/Farm Women trained	26022
	(iv) Rural Youths	3424
	(v) Extension Personnel	2164
7	Technologies on freshwater aquaculture (hatchery management, grow out culture and post harvest technology)	16
8	Through Kisan Call Centre	1382
9	Through Letters	
10	Others (Krishi Gyan Portal)	3461
	Total	**1,22,206**

G. Additional Information, if any:- Nil

17 SCIENTIFIC, TECHNICAL AND ADMINSTRATIVE STAFF OF ATARI

Director

Dr. Anupam Mishra

Scientific

Dr. S.R.K. Singh, Principal Scientist (Agrl. Extension)
Shri T.R. Athare, Scientist (Agrl. Extension)
Dr. A.A. Raut, Scientist (Agrl. Extension)

Technical

Shri Ashok Kumar Dubey, Driver (T2)

Adminstration

Assistant Adminstrative Officer

Shri Sunil Kumar Gupta

Finance and Accounts Section

Dr. Prem Chand, I/C AF&AO
Shri Utpal Ghosh, Junior Accounts Officer

PS to Director

Shri A.K. Bhowal

Programme Assistant

Shri R.K. Soni

Supporting

Shri Sukhchain Das

Transfered

Dr. A.P. Dwivedi, Sr. Scientist (Agronomy) transferred to ICAR-IISR, Lucknow on 21.11.2016.

Dr. Prem Chand, Scientist, Sr. Scale (Agrl. Econ.) transferred to ICAR-NIAP, New Delhi on 31.3.2017.

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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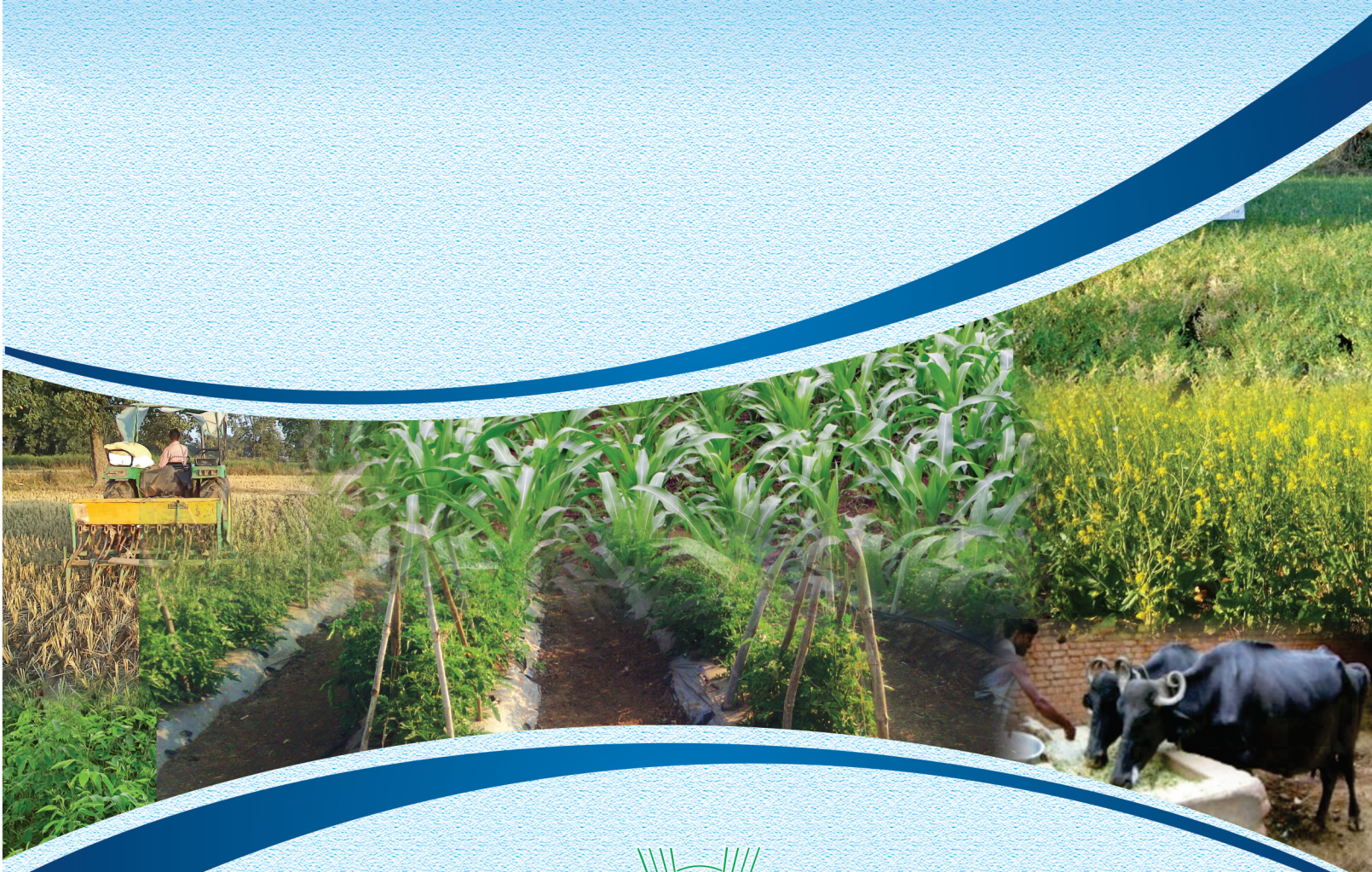

भाकृअनुप
ICAR

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