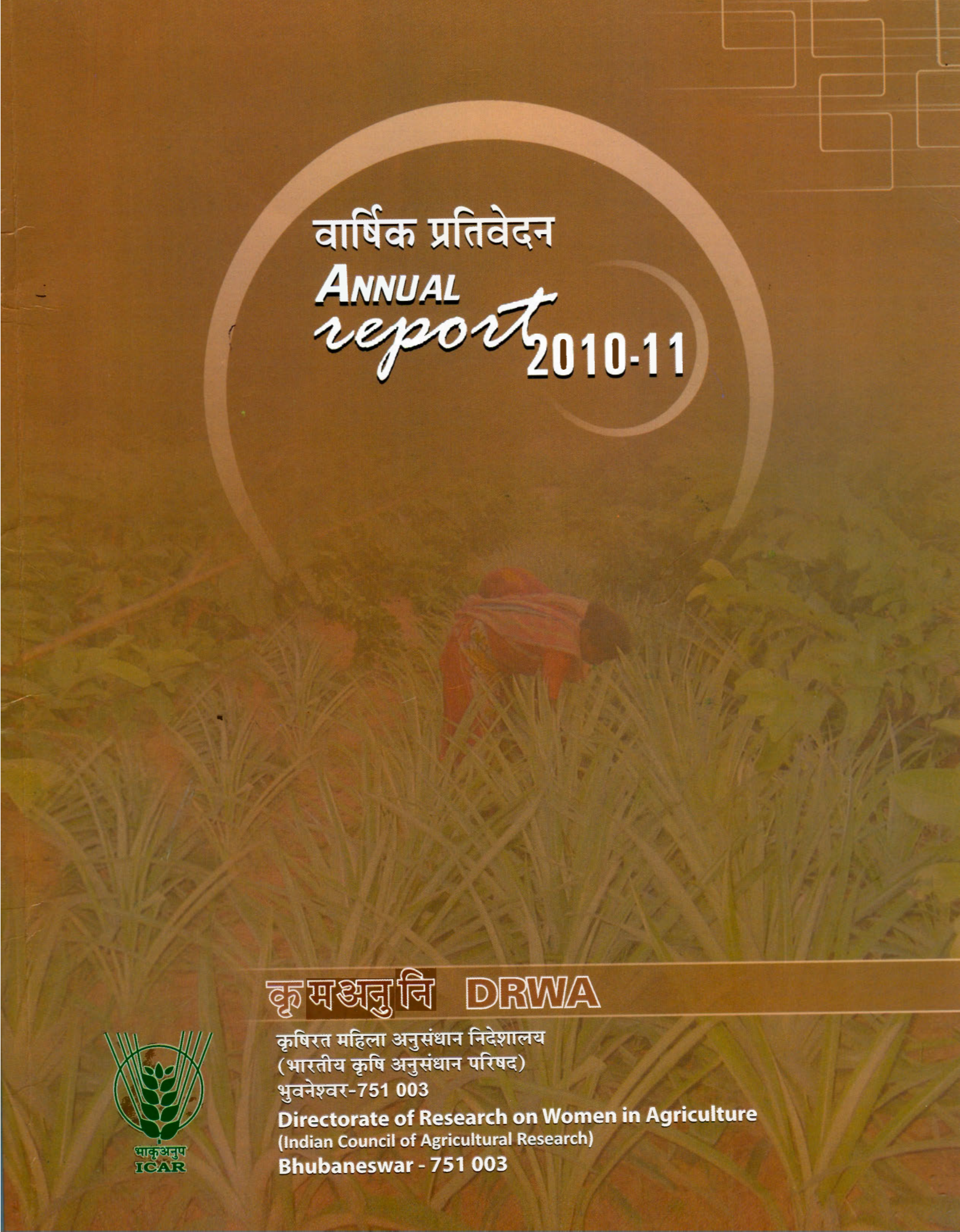
वार्षिक प्रतिवेदन

ANNUAL report 2010-11



कृमअनुनि DRWA

कृषिरत महिला अनुसंधान निदेशालय
(भारतीय कृषि अनुसंधान परिषद)
भुवनेश्वर-751 003

Directorate of Research on Women in Agriculture
(Indian Council of Agricultural Research)
Bhubaneswar - 751 003

भाकृअनुप
ICAR

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Published by
Dr Krishna Srinath
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Bhubaneswar-751 003, Odisha

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Preface

Identification of gender issues and finding technological solutions is an important approach to sustainable livelihoods and inclusive growth of agriculture. DRWA through the in-house projects, Network Projects and the AICRP on Home Science continued its effort in empowering farm women by understanding the critical areas of women's participation in various sub sectors and activities through collection of gender disaggregated data from about 15,000 households covering different agro climatic zones in the country. An understanding of the sector wise gender participation in agriculture, trends in enrolment of girls in higher agriculture education and review of documented research contributions in the subject were the important outcomes of these efforts. This enabled planning and implementation of participatory action research to develop models for gender mainstreaming in crop production, horticulture, livestock management, fisheries and extension education through collaborative research with 45 institutions including ICAR research institutes, agricultural universities and development departments. Farm and home being inseparable units dealing with human development research programmes under AICRP were continued to address food and nutritional security, drudgery reduction in farm and home, infant stimulation packages for farm families, empowerment of adolescent girls, value addition to farm byproducts and protective clothing. An innovative approach initiated for technology dissemination was AICRP-KVK Interface Workshops implemented by all the Coordinating Centres.

I am proud to present the salient achievements of the DRWA 2010-11 in this Annual Report. I am grateful to Dr S.Ayyappan, Director General, ICAR for his keen interest in the development of the Directorate. It is my privilege to thank Dr K.D. Kokate, Deputy Director General (Agricultural Extension) for his guidance and support in achieving the goals set for the Directorate. I appreciate the members of the Editorial Board for their hard work in the publication of the Annual Report.

Krishna Srinath
Director
Directorate of Research on Women in Agriculture

Bhubaneswar
30 June 2011

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कार्यकारी सारांश

कृषिरत महिला अनुसंधान निदेशालय द्वारा अपनी अनिवार्य (mandated) गतिविधियों को पूरा करने के लिए विभिन्न कार्यक्रम संस्थागत, अंतर संस्थागत एंव नेटवर्क परियोजनाओं के अतिरिक्त अ.भा.स.अनु.प., गृहविज्ञान के माध्यम से शुरू किए हैं। विभिन्न क्षेत्रों जैसे पत्रिका, शोध रिपोर्ट के द्वारा रिपोर्ट संदर्भ एकत्रित किए गये एंव उपयोगकर्ता के अनुकूल इंटरफेस विकसित किया गया जिसे विषय अनुसार लैंगिक अध्ययनों का वितरण करने पर यह पता चलता है कि अधिकांश संदर्भ सशक्तिकरण एंव मुख्यधारा, उसके बाद सामाजिक-आर्थिक भागीदारी, प्रसार संस्थान एंव प्रौध्योगिकी स्थानांतरण एंव नीति से सम्बधित थे। आदिवासी महिलाओं की विपणन में भागीदारी का अध्ययन किया गया और यह पाया गया कि वन उत्पाद की विक्री से महिलाओं को एक वर्ष में 158 कार्य दिवस रू150 प्रतिदिन के हिसाब से रू23700 प्रतिवर्ष की आमदनी होती है। लगभग 95 प्रतिशत आदिवासी महिलाओं ने कहा कि उन्हें केवल 5-10 प्रतिशत का लाभ होता है।

मध्यप्रदेश के भोपाल जिले में महिलाओं के व्यावसायिक स्वास्थ खतरों का अध्ययन करने से पता चला कि 60 प्रतिशत परिवारों के घर के अंदर खाना पकाने का स्थान (रसोइघर) था एंव केवल 3 प्रतिशत घरों में खाना पकाने के लिए रसोई के रूप में अलग कमरा था। लगभग 75 प्रतिशत घरों में रसोई घर में 10 लक्स से कम रोशनी थी, 34.4 प्रतिशत घरों में भोजन तैयार करने के लिए, 25 प्रतिशत में रहने वाले कमरों में एंव 6.2 प्रतिशत घरों में प्रवेश द्वार पर सिफारिश स्तर (300 लक्स) से बहुत कम रोशनी थी। कृषक महिलाओं का सूचना एंव संचार प्रौद्योगिकी (आई.सी.टी) द्वारा सशक्तिकरण परियोजना के उड़ीसा से प्राप्त ऑकड़ों से यह पता चला कि कृषक महिलाओं ने फसल उत्पादन, बागवानी, कीट एंव रोग विशेषकर फल एंव सब्जिओं, उर्वरक आवेदन एंव पशुधन से संबंधित प्रश्न किए।

कृषि के क्षेत्र जैसे बागवानी, मत्स्य पालन और पशुउत्पादन, अन्य खाद्यों एंव चारा फसलों से संबंधित विभिन्न लैंगिक मुद्दों की पहचान की गयी एंव पाँच बागवानी आधारित फसल मॉडलों का पोषण सुरक्षा एंव परिवार निर्वाह के लिए मूल्यांकन किया गया। विभिन्न जैविक खेती के तरीकों पर परीक्षण किए गये एंव यह पाया गया कि टमाटर की जैविक खेती में अधिकतम फल प्राप्ति (28.42 टन/है.), शुद्ध वापसी (288226/है) एंव लाभ लागत अनुपात (2.34), गोबर की खाद @ 20 टन प्रति हेक्टेयर एंव जैव कीटनाशकों जैसे हींग+हल्दी पाउडर एंव मृदा सोलेराईजेशन के उपयोग से प्राप्त किया गया। महत्वपूर्ण पर्यावरण अनुकूल कीट प्रबंधन के आई.टी.के. को एकत्रित एंव प्रलेखित किया गया।

कृषिरत महिला अनुसंधान निदेशालय द्वारा विकसित हाथ संचालित मक्का छुड़ाने के यंत्र का एरगोनोमिक्स अध्ययन किया गया। इससे यह पाया गया कि खड़े हुए पौधे से मक्का तोड़ने में 7.3± 4.2एन. बल की कमी एंव मक्का छीलने के यंत्र का उपयोग करने से 492भुट्टे/हैक्टर से 669भुट्टे/हैक्टर की दक्षता में वृद्धि हुई।

नेटवर्क मोड में विभिन्न स्थानों पर भिन्न भिन्न फसल प्रणलियों में लैंगिक मुद्दों का अध्ययन किया गया। चावल आधारित उत्पादन प्रणाली में लैंगिक मुद्दों में पता चला परिवार के उपयोग के लिए दालों, सब्जियों और तिलहन की उपलब्धता बनाम आवश्यकता में अंतर पाया, जहाँ कि महिलाओं का आधिपत्य है। गुणवत्ता का भोजन तैयार करने के लिए महिलाओं की फसल किस्मों के लिए विशेष पसंद पाई गई। उन्नत यंत्र एंव उपकरणों की जानकारी की कमी भी अनुभव की गयी। महिलाओं की बागवानी फसल में मुख्य भागीदारी रोपण, बेसिन बनाने, इण्टरकल्चर ऑपरेशन, उर्वरक आवेदन, फसल तोड़ने एंव फसलों की विक्री में पायी गयी। ग्रामीण महिलाओं के सशक्तिकरण का प्रयास

फसलोपरांत प्रसंस्करण में उद्यमिता विकास द्वारा किया गया।

फसल एंव पशुओं के उद्यमों के लिए विशेषज्ञ प्रणाली का तीन महत्वपूर्ण घटकों पर अध्ययन किया गया 1. कृषको द्वारा दिन प्रतिदिन के कृषि कार्यों में स्वयं निर्णय और सबसे अच्छा संभव विकल्प जानने के लिए निर्णय समर्थन प्रणाली, 2. चुनी हुई फसलों के लिए कीट, बीमारी एंव पोषण विकार को निदान करने के लिए निदान प्रणली फसल डॉक्टर एंव 3. प्रसार अधिकारियों, वैज्ञानिकों, नीति निर्धारकों एंव प्रशासकों के लिए सूचना प्रणाली। बहुत सारे सार्वजनिक निजी भागीदारी मॉडलों को विभिन्न नेटवर्क भागीदारों, कृषिरत महिला अनुसंधान निदेशालय, महिला अविनाशलिगंम विश्वविद्यालय, केरल कृषि विश्वविद्यालय, आसाम कृषि विश्वविद्यालय एंव महाराणा प्रताप कृषि एंव प्रौद्योगिकी विश्वविद्यालय में लैगिंक विषयों के लिए छाँटा गया। तटीय मछुआ महिलाओं के सूखी मछली उत्पादन के तरीकों एंव उत्पादन की गुणवत्तता का उड़ीसा, ऑन्ध्रप्रदेश, तामिलनाडु, केरल एंव महाराष्ट्र में मूल्यांकन किया गया। एकत्रित नमूनों में नमी का उच्च स्तर, बालू, ईष्ट एंव मोल्ड एंव कम जैव रासायनिक गुणवत्ता पायी गयी।

ग्रामीण महिलाओं की आजीविका बढ़ाने के लिए पिछवाड़े मुर्गी एंव सूअर पालन के द्वारा एक्कशन रिसर्च किया गया जिसके द्वारा पशुधन उत्पादन एंव पशुधन प्रौद्योगिकियों का मूल्यांकन किया गया उनकी आजीविका बढ़ाने के लिए संबंधित उपाय किए गए। सूअर पालन की वैज्ञानिक पद्धतियों, स्थानीय स्तर पर उपलब्ध सामग्री का उपयोग कर खाद्य प्रबंधन, स्वस्थ प्रजनन प्रबंधन और टीकाकरण पारस्परिक भागीदारी मोड में किया गया एंव पशु स्वास्थ्य जागरूकता शिविर का आयोजन किया गया। भूमिका प्रदर्शन पर प्राप्त डेटा से पता चला कि घर के अंदर डेयरी गतिविधियों से लेकर पशुधन प्रबंधन तक महिलाओं द्वारा अच्छी तरह किए गये।

गृहविज्ञान पर अखिल भारतीय समन्वित परियोजना के तहत कृषिरत महिलाओं को जीवन की गुणवत्ता में सशक्तिकरण के लिए विभिन्न उपाय किए गये। कृषि महिलाओं का परिश्रम कम करने के लिए विकसित प्रौद्योगिकी प्रशिक्षण मॉड्यूल का उसकी प्रभावशीलता के लिए परीक्षण किया गया। विभिन्न स्थानों पर किसानों के खेतों में प्रौद्योगिकियों का प्रदर्शन एंव मूल्यांकन पंरम्परागत तरीकों के संदर्भ में किया गया। महिलाओं को घर के आसपास पोषण वाटिका लगाने के लिए प्रेरित किया गया। 20 विभिन्न प्रकार के लेहयाम का पोषण विश्लेषण किया गया, जिसके 20 ग्रा. की सर्विग में लोह तत्व की मात्रा 8.41 मि.ग्रा. से 2.45 मि. ग्रा. तक मिली। किशोर लड़कियों एंव युवा माताओं के व्यावसायिक कौशल को विकसित करने के लिए उनकी आवश्यकताओं की पहचान की गयी एंव उन्ही के अनुरूप प्रशिक्षण दिया गया। प्रशिक्षण के पहले एंव प्रशिक्षण के बाद नौ विभिन्न जीवन कौशल जैसे -निर्णय क्षमता, संचार कौशल, आत्म सम्मान, पारस्परिक संबंधों, समस्या सुलझाने, महत्वपूर्ण एंव रचनात्मक सोच, सहानुभूति एंव तनाव प्रबंधन पर ऑकड़े एकत्रित किये गये। कानूनी मुद्दों एंव प्रजनन स्वास्थ्य पर उनके ज्ञान की कमी का भी ध्यान रखा गया।

लिंग को मुख्यधारा मे लाने के लिए प्रशिक्षण, समीक्षायें, हितधारकों, अनुसंधान सलाहकार समिति व संस्थान अनुसंधान परिषद की बैठक एंव राष्ट्रीय संगोंष्ठी का आयोजन किया गया। हिन्दी चेतना दिवस/ सप्ताह/ मास एंव कृषि महिला दिवस का आयोजन कृषिरत महिला अनुसंधान निदेशालय एंव अन्य नेटवर्क केन्द्रों पर किया गया।

EXECUTIVE SUMMERY

Directorate of Research on Women in Agriculture has undertaken various programmes through Institutional, Inter Institutional and Net work projects besides AICRP on Home Science to execute the mandated activities. Research references were collected from different sources such as journals and research reports and a user friendly interface was developed to access the articles theme wise and year wise. Distribution of gender studies in different thematic areas revealed that majority of references were on gender empowerment and mainstreaming followed by socio-economic studies, extension methodology, technology transfer and policy aspects. Involvement of tribal women in marketing was studied which indicated that the forest contributed on an average 158 woman days in a year with an income of ₹ 150/- per day and an annual income of ₹ 23,700/- through sale of forest produces. About 95 per cent of tribal women opined that they got a meager profit of 5-10 per cent.

Study on occupational health hazards of farm women conducted in Bhopal district of Madhya Pradesh showed that about 60 per cent households had cooking place (kitchen) inside the house and only 3 per cent had separate kitchen. About 75 per cent households had less than 10 lx illumination in the kitchen against the recommended level of 300 lux. Data on empowerment of farmwomen through information and communication technologies (ICT) showed that women in Odisha made queries related to crop production including nutrient management, pest and diseases and livestock management.

Gender issues were also identified in agriculture including horticulture, fisheries and animal production and other food and feed crops and five horticulture-based cropping models were evaluated to address the nutritional security and family sustenance. Trials conducted on various organic farming practices showed that maximum fruit yield (28.42 tonnes/hectare), net return and benefit cost ratio of tomato (BT-10) was obtained with FYM @ 20 tonnes/hectare and use of bio pesticide namely asafoetida + turmeric powder and soil solarization. Important indigenous technology knowledge on environment friendly pest management practices were also collected from different parts of the country and documented.

Ergonomical studies in developing women friendly implements were conductor on hand operated maize dehusker-sheller developed by DRWA. It was found that force required in plucking the cobs with sheath from standing plants reduced to 7.3 $\pm$ 4.2N and efficiency of plucking increased from 492 cobs/h to 669 cobs/h by the use of maize dehusker-sheller.

Gender issues were studied under varying farming systems in multi location network research mode. Gender issues in rice based production system revealed that there were gaps in satisfying the need of pulses, vegetables and oilseeds required for family consumption which is the domain of women. There was a definite choice of women for crop varieties especifically for quality food preparation. Lack of exposure to improved tools and implements was also perceived. Women's participation in horticultural crops was mainly in planting, basin making, intercultural operation, fertilizer application, harvesting and sale of produce. Efforts were made for entrepreneurship development for empowerment of rural women in processing and value addition.

Expert system for crop and animal enterprises has been studied on three important components namely (i) Decision Support System to get best possible options and decision by farmer themselves for the day today agriculture operations, (ii) Diagnosing System (Crop Doctor) to deal with diagnosing the pest, disease and nutritional disorders affecting the selected crops and (iii) Information System for the extension officials, scientists, policy makers and administers. A number of public- private-partnership model were screened to address gender concern by Network partners namely Directorate of Research on Women in Agriculture, Kerala Agricultural University, CCS Haryana Agricultural University, Avinashilingam University for Women, Assam Agricultural University and Maharana Pratap University of Agriculture and Technology.

The dry fish production practices of coastal fisher women and the bench mark of the quality of produce were assessed at selected Centres in Odisha, Andhra Pradesh, Tamil Nadu, Kerala and Maharashtra. The samples contained high level of moisture, sand particles, yeast and mould besides low bio chemical quality.

Action research was conducted on backyard poultry rearing and piggery for enhancing livelihood of rural women through livestock production and appropriate livestock technologies were assessed and related interventions were made for improving their livelihood. Scientific practices of pig rearing, feed management using locally available material, deworming, breeding management and vaccination were carried out in a participatory mode and animal health awareness camp were organized. Data on role performance revealed that majority of the indoor dairy farming activities to livestock management were well performed by women.

Various activities under All India Coordinated Research Project on Home Science were undertaken to empower women in agriculture for enhancing the quality of life of farm families. Trainers' training module on drudgery reducing technology interventions for women in agriculture, was tested for its effectiveness. Multi location field trials were conducted at the farmers' field wherein the performance of technologies was evaluated and demonstrated vis-à-vis their conventional practices. Women were motivated for establishing nutrition gardens in their homesteads. The nutrient compositions of 20 lehyams were developed with the iron content of 8.41mg to 2.45mg per 20g of serving.

Needs were identified for promotion of vocational skills among adolescent girls and young mothers and trainings were imparted accordingly. Data on pre, post test have been collected on the areas covering skills namely, decision making, communication skills, self esteem, interpersonal relations, problem solving, critical thinking, creative thinking, empathy and stress management. Their knowledge on legal issues and reproductive health were also taken into consideration in view of their poor knowledge in these areas.

Research Advisory Committee, Institutional Research Council, trainings, review and stakeholders' meetings and national seminar were organized. Hindi Chetna Divas/week/Mas and Women in Agriculture Day were also observed.

INTRODUCTION

Brief History

The Working Group on Agricultural Research and Education constituted by the Planning Commission for the formulation of the Eighth Five Year Plan (1992-97) recommended for establishment of a National Research Centre for Women in Agriculture (NRCWA). Accordingly, the Indian Council of Agricultural Research established the NRCWA in the month of April 1996 at Bhubaneswar, Odisha and has been upgraded to Directorate of Research on Women in Agriculture (DRWA) from 2008. The Sub-centre of DRWA is located at the campus of CIAE, Bhopal, Madhya Pradesh.

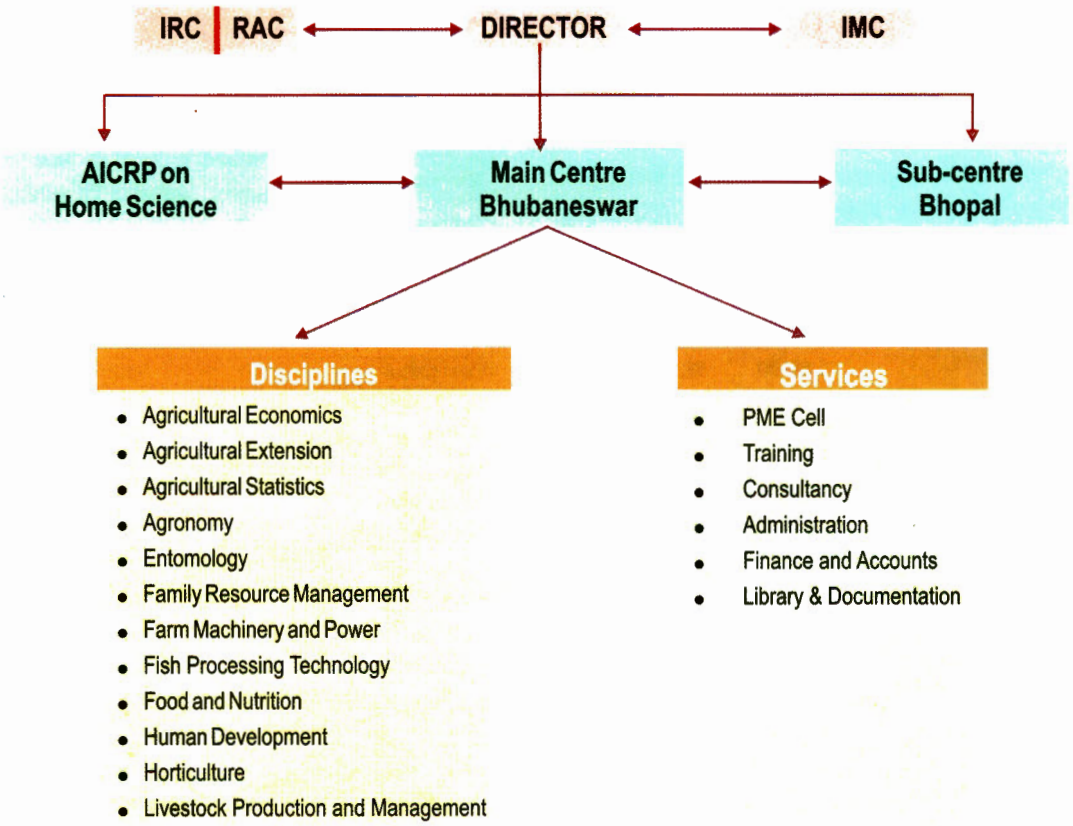
Mandate

Carrying out basic, strategic and applied research to identify gender issues and test appropriateness of available farm-technologies/ programmes/ policies with women perspective. To undertake training and consultancy for promoting gender mainstreaming in research and extension for empowerment of farmwomen and capacity building of scientists, planners and policy makers to respond to the needs of the farm women.

Objectives

- To conduct basic, strategic and applied research on gender issues in agriculture and allied fields.
- To create and maintain database on gender specific information about men's and women's role in food production and agriculture development for effecting technologies, programmes and policies.
- To test the appropriateness of farm technologies and programmes and policies in terms of gender sensitivity in collaboration with relevant national and international organizations and suggest suitable modifications.
- To develop drudgery reducing options for decreasing the workload and increasing the efficiency of women.
- To develop gender sensitive modules and methodologies for transfer of technology.
- To develop gender sensitive training modules and materials, impart trainings and organise seminars and workshops for capacity building of scientists, researchers, planners and policy makers for gender mainstreaming and practical application of gender related technologies.
- To develop and publish gender sensitive materials and create network linkage through journals and information sharing.
- To develop system of managing and sharing gender related knowledge to support institutions and government in their efforts to mainstream gender in policy and programmes; and
- To develop effective evaluation and monitoring arrangements for gender mainstreaming.

Organogram of DRWA



Budget & Expenditure of DRWA for the year 2010-11

(₹ In lakhs)

Major heads	PLAN			NON-PLAN		
	BE	RE	Exp	BE	RE	Exp
A. Recurring						
Establishment charges	5.00	6.17	6.17	137.00	186.00	181.91
OTA	0.0	0.0	0.0	0.0	0.0	0.0
TA	7.50	7.00	7.00	1.00	3.50	3.42
Contingencies including Network	185.70	193.22	193.22	12.00	15.79	12.24
HRD	6.00	4.50	4.50			
Minor works					3.68	3.68
Sub total (A)	204.20	210.89	210.89	150.00	208.97	201.25
B. Non-Recurring						
Equipment including Network & furniture	63.80	40.94	40.94	0.00	0.00	0.00
Works	92.00	83.21	83.21	0.00	0.00	0.00
Library	7.00	8.96	8.96	0.00	0.00	0.00
Sub total (B)	162.80	133.11	133.11	0.00	0.00	0.00
Grand Total (A)+(B)	367.00	344.00	344.00	150.00	208.97	201.25

AICRP on Home Science

(₹ In lakhs)

Head	B.E.	R.E.	Exp.
Pay and Allowances	436.59	436.59	436.59
T.A	24.07	22.09	21.52
Contingency	155.84	155.84	155.84
Non-recurring contingency	67.50	67.48	67.48
Total	684.00	682.00	681.43

Staff Strength as on 31 March 2011

Category	Sanctioned	Filled	Vacant
Scientific	18	16	02
Technical	07	07	00
Administrative	11	05	06
Supporting	01	01	00
Total	**37**	**29**	**08**

Scientific Staff

Discipline	Sanctioned Strength			In position		
	Scientist	Senior Scientist	Principal Scientist	Scientist	Senior Scientist	Principal Scientist
DIRECTOR		**RMP (1)**			**RMP (1)**	
Scientists						
Agricultural Economics	1	0	0	1	0	0
Agricultural Extension	0	1	1	0	1	1
Agricultural Statistics	0	1	0	0	0	0
Agronomy	0	0	1	0	0	1
Entomology	0	1	0	0	1	0
Family Resource Management	1	1	0	1	1	0
Farm Machinery and Power	0	1	0	0	1	0
Fish Processing Technology	0	1	0	0	1	0
Food and Nutrition	1	0	0	1	0	0
Human Development	0	0	1	0	0	1
Horticulture	2	1	1	2	1	1
Livestock Production and Management	0	0	1	0	0	0
Total	**5**	**7**	**5**	**5**	**6**	**4**

Technical Staff

Designation	Sanctioned	In position
Technical Assistant (T-3)	6	6
Technical (T-1)	1	1
TOTAL	**7**	**7**

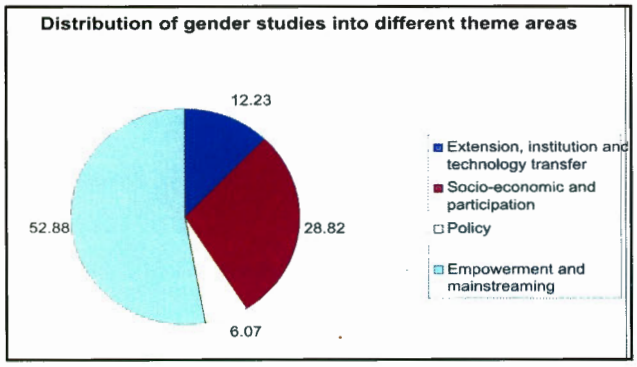
Administrative Staff

Designation	Sanctioned	In position
Administrative Officer	1	0
Asstt. Administrative Officer	1	1
Asstt. Finance and Accounts Officer	1	0
Private Secretary	1	0
Personal Assistant	1	1
Assistant	2	1
Senior Clerk	1	0
Stenographer, Gr-III	1	1
Junior Clerk	2	1
S.S.S.1	1	1
Total	**12**	**6**

RESEARCH ACHIEVEMENTS

Development of gender information system in agriculture

Development of a reference system on gender studies is an important output envisaged under the project. A database on gender studies has been created which is being strengthened every year with addition of new research articles collected from different sources like journals, documents and research reports. The reference system would cater three types of information; (1) Only references that would help researcher with title, source and year of publication, (2) References with abstract on the study and (3) References with full paper. About 3000 references were collected from various sources such as journals, documents and research reports under different theme areas and 1700 entered into the database. Analysis of the theme wise distribution of available references indicate that areas such as policy issues and extension and institution have received relatively less attention of gender researchers as suggested from the fact that they constituted about 6 per cent and 12.3 per cent of studies. A user friendly interface has also been developed to access the articles theme wise and year wise.

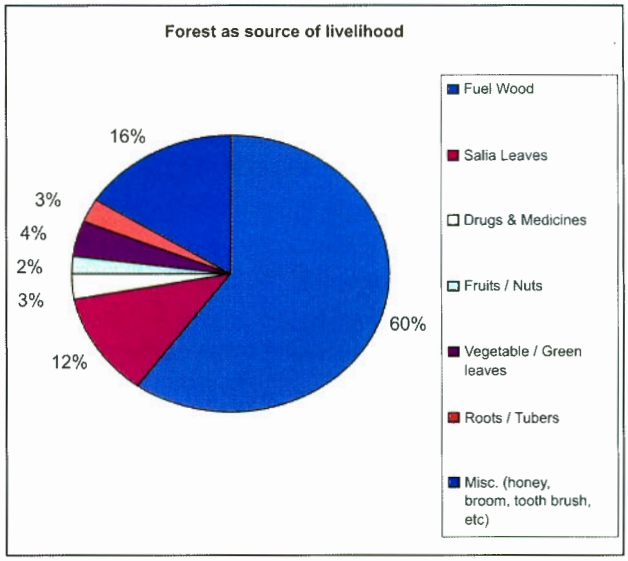


Source (journals) wise screening of articles was also done to compile gender based articles for database. Journals of Journal of Extension Education (1996-2008), Indian Journal of Extension of Education (2002-2006) were examined to identify gender focused articles. It was found that 12 per cent of articles were gender focused in IJEE while JEE contains about 25 per cent of the articles with gender focus. Gender disaggregated data on agriculture collected through network projects are under processing.

Involvement of tribal women in marketing of selected agricultural and important non-timber forest produces (NTFP) in Odisha

The study indicated that the forest contributed on an average 158 woman days in a year with an income of Rs.150/- per day and an annual income of Rs.23,700/- through sale of forest produces. Maximum earning was from fuel wood (60%) and *sal* leaves (12%). The minimum income was from fruits and nuts (2%), medicinal herbs (3%), roots and tubers (3%), vegetables and green leaves (4%) and miscellaneous (16%). The tribal women felt that their marketing capability could be improved through establishing markets in nearby places (52%), promoting sale through

cooperative societies to avoid traders (37%), enhanced transport facility (31%), storage facility for unsold goods (25%) and minimum remunerative price (7%) as well as creation of shelter in the markets for night halt (2%).Tribal women sold their produce directly to traders (42%) and consumers in local haat / sadar market (43%) whereas a few (15%)



disposed their products by door-to-door vending. From the Interaction with local traders it could be seen that they made their purchases directly from producers (90%) through negotiation (100%) and based on existing market price (100%), They made spot payment and transported by cycles, rickshaws and truck. About 95 per cent of them opined that they got a meager profit of 5-10 per cent. The traders also suggested for better transport and cold storage facilities, direct selling to the consumers and enhancing knowledge of tribal women in marketing system.

Occupational health hazards of farm women

The study conducted in Bhopal district of Madhya Pradesh on parameters such as illumination level during cooking, gas detection during cooking with fuel wood, dung cake, crop residue etc., sound level during operation of machines. Dry bulb temperature, relative humidity during cooking and related anthropometric data in the farm households showed that about 60 per cent households had cooking place (kitchen) inside the house and only 3 per cent had separate room as kitchen for cooking. About 45 per cent households had provided window/chimney or outlet for ventilation and day light. All households were having earthen chulha. Of these, 94.4 per cent households had single chulha. About 15 per cent had smokeless chulha, 14 per cent had LPG and less than one per cent had biogas.

Low level of illumination (0 - 55 lx) for cooking, 3-455 lx for food preparation, 1-315 lx in living room, 8-12.04 lx for entrance was observed in the selected households. About 75 per cent households had less than 10 lx illumination in the kitchen, 34.4 per cent for food preparation, 25 per cent for the living room and 6.2 per cent for the entrance which is much less than the recommended level of 300 lux. The study also revealed that rural women spent minimum time of hour continuously sitting very near to the chullah under poor light and ventillation for preparation of *roti* for 7-8 family members. This is one of causes for their stress and ill health. Dung cake and fuel wood including crop wastes were the main source of fuel available for cooking. Rural family of 7 persons, for cooking, needed about 7.5 kg fuel consisting of 1.5 kg dung, 5kg fuel wood and about l kg crop wastes.

Empowerment of farmwomen through information and communication technologies (ICT)

Socio-economic profile of women selected for the study indicated that majority (64%) belonged to medium socio-economic status. Sixty two per cent families had radio, 70 per cent had television, 76 landline telephone and only 2 women had computers with 0.4 per cent Internet connections. Data further revealed that 50 per cent farm women were aware about the PCO booth in their village and only 20 per cent farm women were aware about the village information centre /kiosks. Only one woman was aware about the toll free Kisan Call Centre to get agriculture information. Among radio programmes, Krushi sansar was the most liked programme (40%) followed by Nari Mahal (20%) and Krushi Sikhya (18%). Among television programmes, Krishi Darshan was the most liked programme (36%) followed by Srimati Kam Nuhanti (26%) and Pallishree (18%). Some of the advantages of listening/ watching Radio/ Television programmes as expressed by women were gain in knowledge, development of skill, motivation for adoption of new information and establishment of enterprise.

Data on the use of toll free number by the farm women for two month (February & March 2011) collected from Kisan Call Centre located at Bhubaneswar showed that about 34 women have made queries related to crop production, horticulture and pest and diseases specially relating to fruits and vegetables, fertilizer application and also livestock related queries.

Reducing the gender gap in the nutritional status of family members in rice based cropping patterns

Four cropping patterns namely, rice-rice, rice-millet, rice-wheat and rice-pulse were selected from Odisha, Uttarakhand, Uttar Pradesh and Madhya Pradesh to study the gender gaps in nutrition in these systems. From three villages following rice-rice cropping pattern in the Puri district of Odisha data were collected on hemoglobin level of 60 women and men each through clinical examination.

Horticulture based cropping models

Five horticulture-based cropping models were evaluated to address the nutritional security and family sustenance. Study conducted on mango-

based model with five varieties of mango viz. Dashehari, Langra, Gulabkhas, Mallika and Amrapalli, revealed that cowpea was the best intercrop (8 rows) in terms of return (₹ 29,500/ha) and B: C ratio (2.03).

Under mixed fruit based models consisting of minor fruits viz. custard apple, bael, aonla, sapota and lemon, the highest economic yield of intercrop was recorded with cow pea (green pods and fodder). The highest yield of intercrop was recorded with elephant foot yam (9.7 tonnes/hectare) followed by okra (8.48tonnes/hectare) under coconut-based cropping model; while in cashew nut-based, maximum return was obtained with pineapple (₹ 125464/hectare).

Organic farming practices

Trials conducted on various organic farming practices showed that maximum fruit yield (28.42 tonnes/hectare), net return (₹ 88226/hectare) and benefit cost ratio (2.34) of tomato (BT-10) was obtained with FYM @ 20 tonnes/hectare. Use of bio fertilizers and planting of *Gliricidia* were found effective in improving yields of different crops under organic farming Pest and disease management was done with the seedling treatment of asafoetida @ 0.01% + turmeric powder @ 0.1 % for 6- 8 hours and soil solarization. Soil application of *Trichoderma viride* culture @ 10 kg/ha minimized the disease like

Eco-friendly pest management (red pumpkin beetle, leaf minor, fruit borer) was done with pheromone traps and water traps @ 10/ha, spray of NSKE solution @ 5% at 15 days interval, earthen pot trap with maize cob (after removal of grains) @ 16 numbers/ ha in pumpkin, okra, amaranths and tomato. Moreover, application of pudina (Mint) leaf powder @10 g/ 20 m2 around the field of amaranth at the sowing time was effective in repelling ant.

Storage pest management in cereals, pulses and spices

Farm women of Parbhani, Maharastra dried all the farm produces for storage at the interval of every 10 months preferably in the month of Chaitra (March - April). Jowar, wheat, moong, urd and pigeon pea were stored up to two years to meet the emergency requirements in the event of rainfall or crop failure. Common storage structures used by farm women were tin container, plastic fertilizer bags locally known as khat, jute bag locally known as pota, kangi made from a fibre producing plant sindhi and uttarand made from earthen pitcher kept in dark storage room called ladni. Uttarand is also made from steel / brass pitcher depending upon the socio economic status of family. As per the perception of farm women the insect damage was less when storage was done in ladni plastered with cow dung and white soil collected from old broken houses in the village. Aluminium made kothi was also one of the preferred storage structures for pulses. Use of news paper in the kothi below and top of the stored items, sand in tin container, biba (*Semecarpus anacardium*) seed, boric powder and neem leaves in layers for the storage of rice/pulses and


Storage structure uttarand

crystal salt were some of the storage practices in vogue. Farm women also stored ear head of jowar in gunny bags for seed purpose and broadcasted gamexin over the jute bag filled with wheat and jowar. Dry empty shell of bottle gourd (*Lagenaria siceraria*) was used by the farm women for the storage of pulse seed. Fumigation of the house with neem leaf / tangede (a yellow flower plant commonly found on road sides) was found reduce the insect infestation. Use of dry chilly and custard apple


Storage structure peru

leaf in rice, red soil and ash in pulses, mixture of edible oil and turmeric powder in red gram and neem leaf in cereals and pulses were different storage practices followed by the farm women in Warangal, Andhra Pradesh. In Belgaum, Karnataka galagi (bamboo made round structure pasted with cow dung), sandook (teak wood box) and hage, an underground 40 - 50 feet deep pit structure and jute and plastic bags were used for storage of cereals and pulses. Garlic and onion were stored by hanging were adopted in the villages. Traditional storage structures were found gradually decreasing due to non availability of local artisans and raw materials. Farmwomen were seen mixing methyl parathion powder in maize and moong by bare hand causing health hazard.

Ergonomical interventions in developing hand operated maize dehusker-sheller for farm women

The hand operated maize dehusker-sheller was assessed ergonomically with five men and women workers for dehusking-shelling of un-dehusked maize cobs (Maharaja variety). The cob was fed one by one at about 2-4 seconds intervals. Unshelled cobs, if any at outlet, were re-fed to the machine. The output capacity was 89.6 kg grain/h while machine was operated by men workers at hand cranking speed of 57 rpm and it was 63.4 kg grain/h with women workers at hand cranking speed of 52 rpm. Heart rate of men worker was 127 beats/min and it 143 beats/min for women workers. Rest pause to both the workers (by swapping i.e., shifting from cranking to feeding) was given after an hour for about 15 min. This equipment was also operated with 370 W single phase electric motor.

Performance of final prototype of hand operated maize dehusker-sheller (standing posture)

Particulars	Average Values	
	Man	Woman
Hand cranking speed, rpm	57	52
Output, kg grain/h	89.6	63.4
Dehusking efficiency, %	99.25	99.23
Shelling efficiency, %	99.28	99.07
Grain breakage, %	0.7	0.64
Heart rate during work, beats/min	127	143
Work pulse, beats/min	46	51
Cost/ kg maize grain,(₹)	1.12	1.43 (with man)

Physiological workload of farm women during plucking the maize cobs

Ten farm women participated in both the experiments (plucking the cobs from standing and harvested plants). Force required in plucking the cobs from standing plants was 7.3 ± 4.2N. Farm women plucked 669 cobs/h from standing plants where as 492 cobs/h from harvested plants. Leaves of maize plant scratched the body during plucking of maize cobs from standing crops. Wearing of protective cloths would be a remedial measure for this problem. Missing cobs were also significantly higher (8.1%) in standing plants than the harvested plants (0.5%) at 5% significance level.

Physiological workload of farm women during dehusking the maize cobs

Eight farm women participated in this experiment whose average (± S.D) age, height and weight of subjects were 33.9 ± 5.0 yrs, 1.5 ± 0. 046 m and 44 ± 3.2 kg, respectively. Dry bulb temperature, relative humidity and wind speed were 30.5 ±0.60C, 62.5 ± 2.9% and 0.4 ± 0.2 m/s, respectively. Farm women dehusked 393 cobs/h. Heart rate during dehusking was 103 beats/min. Force required in removing single layer of outer sheath was 2.94 N and it was 19.7 N when 3-4 leaves were to be removed. Though workload was of light category but frequency of continuous hand action per cob (8 including nailing and palming) to be dehusked was high.

NETWORK PROJECTS

Network project on gender issues in rice based production system and refinement of selected technologies in women perspective

The project is in operation at five Centres viz. (i) Directorate of Research on Women in Agriculture, Bhubaneswar as Lead Centre, (ii) Central Rice Research Institute, Cuttack, Odisha, (iii) Directorate of Rice Research,

Rajendranagar, Hyderabad, A.P., (iv) Kerala Agricultural University, Vellanikkara, Thrissur, Kerala and G. B. Pant University of Agriculture and Technology, Pantnagar, Utterakhand and an assessment of socio-economic conditions, women's role, gender issues, policies and programmes in rice based production system was carried in five major rice production zones. Gender disaggregated data were collected from a total of 500 households from each zone by interviewing men and women separately.

Socio-economic profile

In Madhya Pradesh farming was the main (96.4%) family occupation followed by services (2.6%), business (0.8%) and farm labour (0.2%) and women were involved both in farming (3.3%) and services (7.7%). Women were less educated (71.9%) than men (86.8%) and only 5.9 per cent women had undergone higher education as against 13.7 per cent men.

Only 3.2 per cent women had ownership of holdings, that too marginal, consisting of ponds, fallow, pastures or rain fed lands. Red gram, green gram, finger millet, sesame, black gram, field pea and lentil were grown in rainfed lands where as vegetable, wheat, rice, niger, bengal gram and Khesari were grown both under rain fed and irrigated conditions.

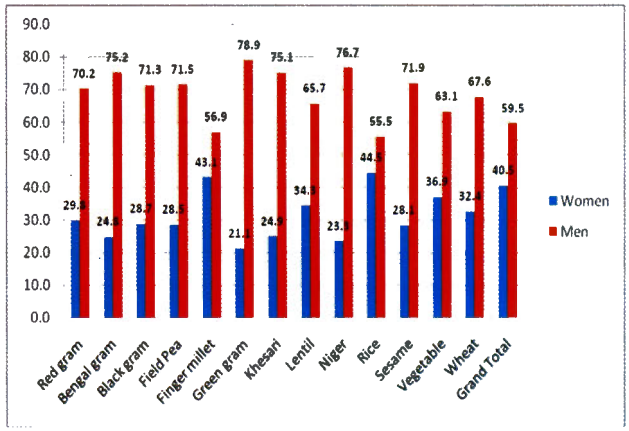
Access to and control over resources

Only 2.18 per cent women had control over the family resources as against 48.15 per cent for men. However the access to family resources was 6.80 per cent and 34.69 per cent for women and men, respectively. Joint control over and access to the family resources by men and women was 36.37 per cent and 58.52 per cent, respectively. Family resources pertaining to backyard were the major resources under the control of women. In domestic animals men had more control, but in the case of backyard poultry women and men had equal access.

Participation in crop production

Rice-wheat, rice-rice, rice-maize, rice-vegetables, rice-groundnut, rice-wheat-sugarcane and rice-wheat-finger millet-fallow occupied major area in rice based cropping systems in Madhya Pradesh, Odisha, Andhra Pradesh, Kerala and Uttarakhand. The participation of women and men in rice based cropping system recorded was 40.5 per cent and 59.5 per cent, respectively. In Madhya Pradesh. Rice recorded the highest (78.2%) participation of women followed by wheat (12.8%), field pea (3.2%) and black gram (2.4%) based on the of total hours of work in these crops.

Among various field activities, filling of raw material in compost pit, manual weeding, harvesting, transplanting/sowing, winnowing/cleaning, drying harvest, seedling uprooting, sorting, threshing by bullock and drying the produce were the ten activities with highest women participation. Among these, manual weeding, harvesting and sowing and transplanting were the three most important activities with long working hours (>6) and monotonous. In Odisha rice recorded the highest participation both from men and women followed by ground nut and maize.



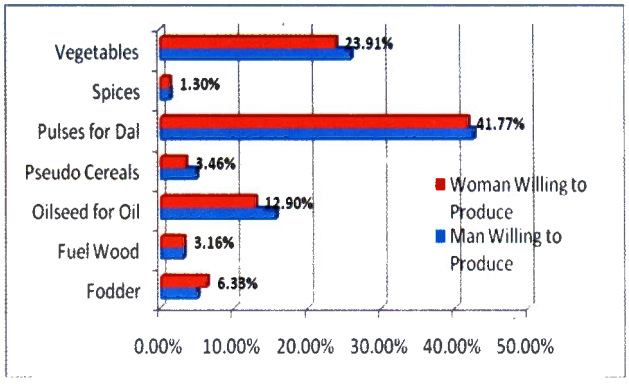
Gender participation (%) in different crops in Madhya Pradesh

Testing of crop production tools and equipment

In Madhya Pradesh among the farm tools and equipment tested women perceived drum seeder, finger weeder and metal bins easy to use whereas traditional plough and spade were rated not easy. Operation of traditional plough and application of chemicals by women were not socially accepted activities for women.. In Odisha spade, sickles and bamboo winnower were quite commonly used implements by farm women and cono weeder, drum seeder and power transplanter were least popular and women did not know about these implements. In Kerala, about 60 per cent men and 20 per cent of women in Kerala were skilled in operating improved tools.

Food availability

About 65 per cent of the households in the rice based production system in Madhya Pradesh reported that vegetables, spices, pulses, coarse



Assessment of household need in M.P.(Change title/can be deleted)

grains (pseudo cereals), oil seeds, fuel wood and fodder produced by them as insufficient to meet the household needs. Women expressed interest . in producing them on their own. In Odisha majority (84%) of women were willing to produce vegetables and pulses. Hence, rice-vegetable cropping pattern may be taken-up as long term strategy to improve social, economic and nutritional status of women. In Kerala they were willing to purchase rather than to produce these commodities.

Varietal preference

Among 19 varieties of rice grown by the farmers of the selected locationsv in Madhya Pradesh men and women equally preferred local varieties (Madhuri and Menka) for the characters including colour, taste, expansion on cooking, texture, marketability and yield followed by the variety Lochai, MTU 1010 and IR 64. In Odisha , rice variety Sarala, Pratikhya and Swarna were preferred. Among wheat varieties Sujata was preferred by both men and women, followed by WH-147.

Network Project on Development of expert system for crop and animal enterprises

Network project is in operation in 4 centres *viz.,* Directorate of Research on Women in Agriculture, Bhubaneswar, e-extension centre of Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai and Zonal Project Directorate, Zone-VIII, Bangaluru. The objectives are to identify location specific knowledge needs of the farming community for content generation and digitization, develop expert system in respective language on the crops and animal enterprises and test the validity and reliability of the expert systems at different locations both on men and women farmers before facilitating on multilingual customized mode. Development of Expert System is being developed in Multi Lingual (English, Tamil, Kannada and Malayalam) languages for the benefit of Tamil Nadu, Karnataka and Kerala farmers.

DRWA, Bhubaneswar

Development of database in MS Access for the Low Cost Gender Friendly Integrated Pest and Disease Management of Paddy was undertaken. Data entry was completed as designed in MS Access for different categories of pest such as insects, rodents and their common names as well as scientific names in order to facilitate the farmers, extension functionaries and scientists for easy understanding of developed data base. Type of management techniques included indigenous technical knowledge, integrated pest management, spread of these pest and diseases according to agro climatic regions of India. Images were collected for various pest and diseases of paddy and incorporated in the database. In development section, Home page as well as other user interfaces were designed and coding or programming part was initiated in Asp. net using C# as language to complete the development of expert system.

TNAU, Coimbatore

The following research activities were taken up :

- Data generation and content digitization for paddy, ragi, sugarcane, coconut and precision farming technology for banana
- Expert System development for the above crops
- Content development of expert system in multilingual namely Tamil, Kannada and Malayalam with the assistance of resource centres
- Expert System shell development for Animal Husbandry Components

Expert System

The home page of the expert system will have three important components namely:

1. Decision Support System,
2. Diagnosing System (Crop Doctor) and
3. Information System.

1. Decision Support System (DSS)

Decision support systems have been contemplated and designed to get best possible options and decision by farmer themselves for the day today agriculture operations. Drop down formula or multiple combo boxes have been created using simple dot net programme. Each boxes in the DSS are correlated with each one for retrieving the best possible decision support for crop cultivation. The Decision Support System is consisting of details about Season, Variety, Soil, Water, Land preparation, Nursery Management, Cultivation, Irrigation, Nutrient Management, Farm Implements, Post Harvest Technology, Marketing, Institutions and Schemes and FAQ's.

Key features of the DSS

1. User friendly navigation
2. Image and Video based information
3. Instant decision support for key information crop production technologies.
4. Automatic calculation of nutrient requirement for different stage of crops
5. Scientific information about the crop, botanical characteristics, varietals characteristics with images

2. Crop Doctor

Crop doctor is a vital component in the expert system which acts as artificial intelligence. It is picture and image based 'if and then rule' based programme which has been written using dot net programme. It deals with diagnosing the pest, disease and nutritional disorders affecting the selected crops. The first obvious sign is given as thumbnail images in the Key Visual Symptoms (Primary Symptom) with multiple stages (Secondary Symptoms). Primary and secondary symptoms were documented in stage by stage and loaded in the expert system shell by using if and then rule based programme. The concerned experts validated all the symptoms which are loaded in the expert system shell.

Key features of Crop Doctor

- Crop doctor is purely based on if and then image based programme, so it can be used by all the stakeholders. Even illiterate users can sit in front of the system and use the crop doctor for diagnosing the field related problems and get the suitable solution for managing the field problems.
- Single item diagnosis or two items diagnosis or multiple combination of diagnosis of pests / diseases / nematode / nutrition disorders are possible in the crop doctor

- It is available in English, Tamil, Malayalam and Kannda languages and can be scaled up to all the regional languages of India.
- Voice based image or video integration is possible
- Information with images on nature of damage and identification of symptoms are available in the crop doctor.
- Management practices namely cultural, chemical, biological, mechanical, physical methods are also available in the control measure components.
- It can be updated then and there, if it needs to be refined any technologies in the crop doctor.
- Most of the developed expert systems across the world were text based which could be used by only extension officials, scientists and rarely by innovative farmers.

3. Information System

Information system is web based static information wherein all the technological information and complementary information about the crop were loaded in this component. The validated contents and images were organized based on the package of practices. Special feature of the information system is user-friendly navigation with image based presentation. The static information system is highly useful for the extension officials, scientists, policy makers and administers as ready reference material and bibliography of concerned crop. This content can be updated dynamically then and there based on the advancement of the technologies.

TANVASU, Chennai

Identification of location specific knowledge needs of farmers

Animal Disease Surveillance Bulletins for last six years were collected from RJD- A.H & ADIUs of all districts of Tamil Nadu to analyze the Disease Outbreak Status in order to identify location specific knowledge needs of farmers in Tamil Nadu. Based on the details collected from state Animal Husbandry Department, the contents were developed for the diseases of cattle, sheep, goat and poultry as listed below:

Animal enterprise	Identified diseases
A) Cattle and buffalo	
Bacterial diseases	Anthrax, Black Quarter, Haemorrhagic Septicaemia, Actinobacillosis, Actinomycosis, Brucellosis, Leptospirosis, Mastitis and Tuberculosis
Protozoan diseases	Anaplasmosis, Babesiosis, Theileriosis and Trypanosomosis
Viral diseases	Foot and Mouth disease, Rabies and Ephimeral fever
Metabolic diseases	Milk fever, Ketosis, Downer cow syndrome, Fatty cow syndrome, Hypomagnesemia tetany and Post parturient haemoglobinuria
Obstetrics and Gynacology diseases	Anoestrus, Retained foetal membranes, Endometritis, Vaginal prolapse, Repeat breeders and Dystokia
General conditions	Bloat, Enteritis, Choke, Simple indigestion and Ruminal Impaction
B) Sheep and goat diseases	
Bacterial diseases	Enterotoxaemia, Anthrax, Tetanus and Foot rot
Viral diseases	Blue tongue, Pestedes petits ruminants, Sheep pox and Goat pox
Metabolic diseases	Acidosis and pregnancy toxaemia
General conditions	Bloat, Choke and Enteritis
C) Poultry diseases	
Bacterial diseases	Chronic Respiratory disease, Infectious Coryza and Colibacillosis
Viral diseases	Ranikhet disease, Mareks disease and Infectious Bursal disease
Parasitic diseases	Ascariasis, Coccidiosis and Aspergillosis
Metabolic diseases	Gout

Contents development on the production and management of livestock and poultry

Contents were developed for Breeds and Breeding, Housing, Feeding, General management and Production, Sanitation and health, Marketing and by product preparations for the Dairy cattle and Buffaloes, Sheep, Goat and Poultry.

Network project on Public private partnership for gender mainstreaming in agriculture

The project is in operation at Directorate of Research on Women in Agriculture, Kerala Agricultural University, CCS Haryana Agriculture University, Avinashilingam University for Women, Assam Agriculture University and Maharana Pratap University of Agriculture and Technology. For the review of present status of public-private partnership in agriculture with gender component each centre collected following available models with likely involvement of PPP.

The analysis of the models indicated that 26 per cent of the models covered women as beneficiaries whereas 17 per cent of models focused on both male and female and the rest 57 per cent included only male members. At Odisha field visits were made to assess the impact of the identified projects based on parameters including risk bearing, sharing responsibility and benefits and management of PPP chain. Centre wise progress is furnished as below:

DRWA, Bhubaneswar

Based on the output obtained from different PPP models all over the country, a logistic project model was prepared with the objective of gender mainstreaming of women of SC&ST communities in the Bantala village in Khurda district through collective farming of maize in 30 acres. The PPP partners include DRWA, APICOL, ATMA, State Department of Agriculture in the public sector and, the farmwomen for implementation of farming activities and Seashore Agricultural Promotion Company for marketing support in the private sector. An action plan for taking up QPM maize production was prepared with the participation of the stakeholders. The risk factors such as climatic disturbances, pest and disease attack as well as financial, technological and marketing factors were identified and minimization strategies suggested which included improving irrigation facility, soil testing, insect and disease resistant variety, timely technology intervention, introducing drudgery reducing implements, assured marketing channel and insurance coverage.

KAU, Trichur

Based on the weighted scores the following five models of PPP for women empowerment were selected for further investigation study:

- Cadbury-KAU Cooperative Cocoa Research Project (CCRP)
- Subicsha Coconut Produce Company Ltd for facilitating backward and forward linkages in entrepreneurship development and self employment
- Samagra Project for capacity building and skill development in Nendran Banana production and processing
- Thirumadhuram Pineapple Project for market support and buy back of agriculture products
- Sevashram for promotion of organic products

Agencies involved in PPP

Major Public partners that fostered private partnership in the state were Kudumbhasree (State Poverty Alleviation Mission), Kerala Agricultural University, Coconut Development Board and Panchayati Raj Institutions. Minor Public partners included CPCRI, IISR, KILA, DBT, CFTRI and NABARD. Major Private Partners were **Prowins Agri System,** Subicsha, Sevashram, Swasraya Organic Products Limited, Nadukkara Agro processing Company, Cadbury India Pvt.Ltd.Minor Private partners included AV Thomas and Company, Plant n Plenty, Ottappalam Welfare Trust, Nutrifood, Jaimatha Estates and Nature Fresh.

Role of public - private partners in selected PPP models

The role of public and private partners in fulfilling the different partnership functions agreed upon as per the MOU was studied using a 10 point rating scale. Data were collected from different stakeholders based on their perception. The results indicated that the extent of involvement of public partner was mostly related to institutional and financial functions and processes while private partners were involved in technological backstopping, marketing and activities related to training and capacity development except for PPP in agricultural research. In Cadbury-KAU Cooperative Cocoa Research Project (CCRP), KAU the public partner has the sole responsibility of providing innovative production technology related to Cocoa and training and capacity development in the area.

Community based decentralized PPP model for Kerala

Although Kerala is a state where the legislative frame work does not favor private interventions in agriculture sector, all the identified models from the state indicated an active facilitatory role of Panchayat Raj Institutions (PRI), community development societies and other community based organizations. Therefore, a Process Documentation Research (PDR) is being applied to the identified models and is in the process of developing a community based decentralized PPP model that highlights the role of PRIs and CSO in streamlining the functions of gender mainstreaming in agricultural development through rural women entrepreneurship for Kerala.

Dimensions of women empowerment through PPP interventions

Women empowerment development as part of PPP intervention has been operationalized as a function of six dimensions viz. Economic development, Social participation, Political consciousness, Information access, Improvement in Decision making skills and Improvement in cognitive ability and skills. The results from Samagra model and Uravu RSVY model indicated significant difference on almost all dimensions between the PPP beneficiaries and control group.

PPP initiatives documented from Karnataka

Greenhouse technology in horticulture for women empowerment, Technology Informatics Design Enterprise (TIDE), Bangalore, SWASHAKTI, a project for empowerment of women - Karnataka State Women Development Corporation, Women Milk growers Union under Karnataka Cooperative Milk Producers' Federation Limited (Nandini), Women's economic empowerment through co-operative farming, vocational training & business development of George Foundation are the major agencies working for upliftment of farming community through PPP approach.

Avinashilingam University for Women

Seventy five projects were identified covering the states of Tamil Nadu, Andhra Pradesh and Puducherry among which five models including awareness programme on Jatropha, Promotion of Cocoa Cultivation, Fisheries Development Mission Programme and APPTA Market from Tamil Nadu and Precision Farming from Puducherry were identified for detailed study using score card method.

The benefits gained by farmwomen included personal enrichment, economic emancipation and social empowerment attributes. Based on the experience derived from the case studies an action research on Engendering agricultural production and marketing through PPP was formulated and implementation is in progress. The public partners include the Tamil Nadu Agricultural University, Department of Horticulture and the private partners including farmwomen SHG comprising 33 members from Ikkaraipoluvampatti village of Thondamuthur Block, Coimbatore district and the Annapurna Hotels. The SHGs were supplying vegetables including coriander leaf, cauliflower, bottle guard, capsicum and ladies finger to the private partner.

A National Workshop on Engendering agriculture production and marketing through Public Private Partnership was organized at Coimbatore with the participation of 128 members representing various stakeholders groups. Six meetings and five training-cum-exposure visits were conducted to continuously motivate the farmwomen.

CCSHAU, Hisar

Five models were taken up for detailed investigation out of 75 models identified . The selected models included PPP between Panjab National Bank, NABARD, CCSHAU, Hisar, PNB farmers Welfare Trust for PNB

Farmer's Training Center; Kamboj Export, Karnal for production and marketing of maize hybrids production; and HAFED and SKOL for contract farming of Barley in Haryana. None of the models had given attention to gender.

AAU, Jorhat

Thirty two institutions were visited from Assam and West Bengal to collect information about institutional arrangements in gender mainstreaming.. Five PPP models from Assam and three from West Bengal were screened for gender mainstreaming in agriculture. Data were collected from 100 beneficiaries of n each of the selected models. A regional Symposium sponsored by NABARD and funded by North Eastern Council was organized. Implementation of alogistic model for promoting Commercial Bio - fertiliser production.is in progress.

MPUAT, Udaipur

In Rajasthan, there were 58 projects based on PPP mode of operation in agriculture. Majority of the PPP projects were in agriculture sector (30) followed by 16 projects in energy and 5 projects each in horticulture and fisheries. There were only 2 projects related to animal production.

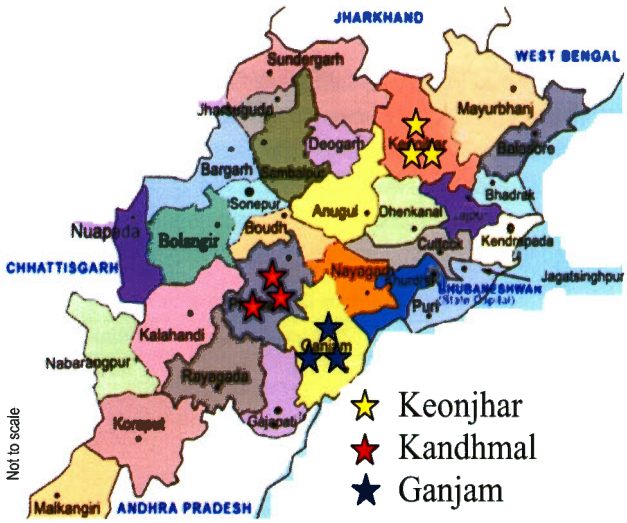
Four projects (BAIF, NAIP, Morarka Foundation and ATMA) had women component with respect to leadership, agriculture education & training, poverty & unemployment, access to production resources, decision making ability, participation in agriculture programmes & creating new opportunities. Three projects i.e. BAIF, NAIP, Morarka Foundation were concerned about gender sensitization, visibility & recognition to women, equitable sharing of benefits, health & nutrition, access to agriculture information, & development of social infrastructure for women. Only in two projects i.e. BAIF & NAIP, gender sensitive disaggregated data gathering & institutional mechanisms to address gender concern were reported.

Network project on Assessment of gender issues and identification and refinement of selected women specific technologies in horticultural crops

Network project is operational in six different institutes; DRWA, Bhubaneswar (Lead centre), CIPHET, Abohar, CITH, Mukteswar, CTCRI, Thiruvananthapuram, CISH, Lucknow and IIHR, Bangaluru to carry out comprehensive study on women's role in horticulture. The achievements of each network partner are presented as under:

DRWA, Bhubaneswar

Data on social status, land use pattern, status of horticultural crops and gender disaggregated participation were collected from three districts of Odisha viz. Ganjam, Kandhamal and Keonjhar covering 600 farm families in each district. The data pertaining to Ganjam and Kandhmal district are presented hereunder.



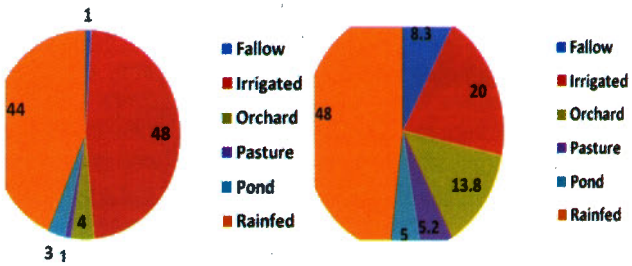
Sites of Network Project in Odisha

Social status of farm families

In Ganjam, 77.85% of respondents belonged to OBC whereas majority of respondents were schedule tribe (70.67%) in Kandhmal, however, families in both the districts were predominantly nuclear (85.6%). In Ganjam the percentage of women involved in farming (32.6) was almost half than that of men (66.5) and majority of women (67.8%) were unemployed. In contrast, the participation of women in farming (47.5%) was significantly higher and moreover their unemployment rate (45.6%) was also low in Kandhamal district. Status of education among respondents showed that majority of them (62%) had primary and secondary education; however, the gender difference in education was insignificant. Furthermore, the college education was as low as 2.4 and 1.7% in Ganjam and Kandhmal, respectively.

Land use pattern

Among the sample selected for the study in Ganjam, 44% of land was rainfed and about half of the area (48%) was under irrigation, however, orchard occupied only 4% area. In Kandhamal, the per centage of irrigated land was only 21.5 and area under orchard (mainly mango, jackfruit) was 14.5% which entails opportunities for horticultural based cropping system in the district.



Ganjam district

Kandhmal district

Land ownership and distribution pattern

Women had only 2.4 and 1.8 per cent land ownership in Ganjam and Kandhmal districts, respectively and their ownership was restricted mostly to marginal and rainfed land holding.

Status of horticultural crops

Horticultural crop from different villages of Ganjam included cole crops (40%), brinjal (30.5%) and cashew (10%) were major horticultural crops, whereas turmeric (49%) and mango (32%) were major horticultural crops in Kandhamal district. Hence presence status of horticultural crops maximizes the scope of horticultural intervention in terms of quality seed, protected horticulture and crop diversification for empowering women.

Area under major horticultural crops

Major crops	% of total area under horticulture	
	Ganjam	Kandhmal
Banana	1.0	4.2
Brinjal	30.5	1.3
Cole crops	40.0	3.0
Mango	1.0	32.0
Turmeric	5.0	49.0
Okra	5.0	1.0
Tomato	3.5	-
Cashew	10.0	-
Jackfruit	4.9	4.5
Others	4.1	5.0

Gender participation in horticultural activities

Male and female were involved in almost all the farm activities of horticultural crops, however, intensity of involvement varied. Women's participation was major in planting (40.0%), basin making (38%), intercultural operation (77%), fertilizer application (42%), harvesting (45%) and sale of produce (38%), however, they had poor say in selection of crop (23%) and participation in capacity building programme (4.5%). These findings suggest that capacity building programme for women on production technology of fruits and vegetables will have significant impact on socioeconomic condition of farm women.

Participation of woman and man in horticultural activities

Farm activity	% participation	
	Woman	Man
Land preparation	41.2	58.8
Basin preparation	38.3	61.7
Selection of crops	23.3	76.7
Planting	40.6	59.4
Cultivation of intercrops	6.7	93.3
Fertilizer application	41.9	58.1
Inter culture operation	77.1	22.9
Irrigation	27.4	72.6
Manure application	43.5	56.5
Pest management	9.9	90.1
Harvesting	45.2	54.8
Marketing of produces	38.4	61.6
Training on capacity building	4.5	95.5

Constraints in cultivation of horticultural crops

Non-availability of inputs (seeds, pesticides and fertilizers), technical knowhow, labour and irrigation were major constraints faced by the respondants. They also had poor access to institutional credit and poor condition of roads which affect the transportation and sale of produce and access to inputs; moreover, large scale migration further limits the horticulture development. Hence research institutions have to play a pivotal role in addressing the issues related to technical knowhow and ensure availability of quality inputs to the farmers.

Access to and control over resources

Women in Ganjam figured very low in access to and control over resources such as farm land, credit and implements & machinery, farm produce and profit. However, in Kandhmal women had better say in all the farm resources.

Access to and control over resources by man and woman

Resources	Ganjam (N=600)				Kandhmal (N=600)			
	Access (%)		Control (%)		Access (%)		Control (%)	
	Man	Woman	Man	Woman	Man	Woman	Man	Woman
Agricultural land	93.0	7.0	97.5	2.5	82.0	18.0	92.0	8.0
Credit	94.5	5.5	96.4	3.6	86.5	13.5	90.5	9.5
Family labour	87.8	12.2	91.8	8.2	74.8	25.2	84.8	15.2
Implements/machinery	86.2	13.8	86.2	13.8	80.5	19.5	88.5	11.5
Hired labour	91.2	8.8	93.5	6.5	82.6	17.4	90.5	9.5
Produce	76.4	25.6	81.4	18.6	64.5	35.5	82.5	17.5
Profit	81.8	18.2	85.8	14.2	70.0	30.0	85.0	15.0

Production and profitability of horticultural crops

Data on yield of crops showed that the productivity of horticultural crops in both the districts are significantly less than that of national average; however the average yield of turmeric (39q/ha), brinjal (68q/ha), cole crops (97q/ha) and tomato (98q/ha) was relatively high in Kandhamal district. The B: C ratio of horticultural crops was found to be relatively high in Kandhamal district indicating better management and yield. The respondents of Kandhmal got maximum benefit from turmeric (5.2) followed by cole crops (3.39) while cashew (3.5) was the most profitable crop in Ganjam. Technological interventions like quality seed, pest management, use of biofertilizers and fertilizer schedule will help in improving productivity and benefit.

Yield and B: C ratio of horticultural crops

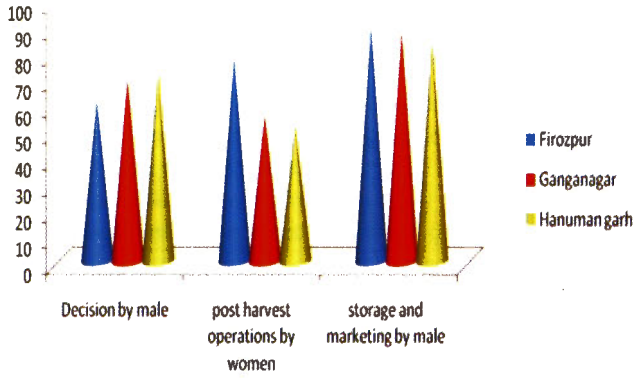
Crops	Ganjam (N=600)			Kandhmal (N=600)		
	Yield (q/ha)	% of national productivity	B:C ratio	Yield (q/ha)	% of national productivity	B:C ratio
Banana	130.0	36.0	2.2	115.0	29.3	3.2
Bean				37.0	54.5	1.92
Brinjal	56.7	32.5	1.8	68.0	40.0	2.57
Cole crop	78.5	39.8	2.4	97.0	51.0	3.39
Mango				52.0	78.5	1.65
Okra	40.0	42.0	1.8	37.2	38.5	2.9
Tomato	85.0	43.3	2.2	98.0	49.0	2.65
Turmeric				39.0	82.0	5.24
Cashew	35.30	43.5	3.5	-	-	-
Chilli	42.5	45.5	1.7	-	-	-
Parval	86.6	-	2.8	-	-	-

CIPHET, Abohar

Data on gender disaggregation in production and post harvest management in different horticultural crops were collected from 100 and 250 farmers of Firozpur district in Punjab and Ganganagar and Hanuman Garh districts in Rajasthan. Respondents of Punjab and Rajasthan mainly belonged to OBC and general castes and about 60 per cent families were nuclear.

Role and responsibilities in horticultural activities

Major fruits grown in study area were kinnow, guava, ber, pomegranate and aonla. The participation of women were more pronounced in sorting, packing, crop residue collection, clod breaking, grafting, selection of intercrop, weeding and harvesting. However, in Punjab post harvest operations was manly carried out by women (77.5%). The decision on most of the activities was taken mainly by men (Ferozepur- 62%, Ganganagar- 70%, and Hanuman Garh – 73%).



Role and responsibility of men and women in fruit production

Access to and control over resources

Data showed that women had relatively low access and control over farm resources such as land, inputs, implements & machinery, labour farm produce and profit in both Punjab and Rajasthan.

CITH, Regional Station, Mukteshwar

Data were gathered from 200 respondents of Nainital and Almora districts of Uttarakhand regarding participation of women in production and post harvest management of horticultural crops. In both the districts respondents were belonged to scheduled caste (22.5%) families belong to whereas scheduled tribe (12.5%), OBC (20%) and general (45%). The families of respondents were mainly nuclear (67%).

Role and responsibilities in fruit production

Temperate fruits viz. apple, peach, pear, plum, apricot, walnut, kiwi, strawberry were mainly grown in both the districts. The participation of men in all the farm activities was found comparatively high, whereas, women were mainly involved in crop residue collection, clod breaking, selection of intercrop, weeding and harvesting. The decision on farm operations was mostly taken by men (75%). Further, in the post harvest

operations like grading, sorting/cleaning, packing, labeling, storage and marketing men's participation was significantly high (85.5%). Unavailability of quality planting material, suitable implements and irrigation facilities were major constraints. Further, the distance from the production areas to the city was found to be the major constraint.

Role and responsibilities in vegetable production

Major vegetables being cultivated in Nainital and Almora districts included pea, potato, cauliflower, cabbage, tomato, capsicum, French bean and leafy vegetables. In contrary to fruit production the involvement of women in vegetable production was more (49.6%) than that of men. In post harvest operations as well the participation of women (54.6%) was more than that of men. Availability of quality planting material/seed, implements, labour, road, were found the major constraints in both the districts. The flower cultivation in both the districts has not been taken up on commercial scale so far.

Economics of fruit and vegetable production

It is evident from data (Table) that in women managed crops production is less than that of man and in turn return is also reduced. Cauliflower and apple were most profitable crops while potato and peach were least profitable (in term of return).

Economics of fruit and vegetable production (per hectare)

Crop	Nainital				Almora			
	Yield (Qtl)		Return (₹)		Yield (Qtl)		Return (₹)	
	Man	Woman	Man	Woman	Man	Woman	Man	Woman
Apple	40	35	80000	70000	35	30	70000	60000
Plum	15	14	30000	28000	17	18	34000	36000
Peach	20	18	30000	27000	22	20	33000	30000
Pear	30	32	30000	32000	35	37	35000	37000
Apricot	16	18	32000	36000	20	22	40000	44000
Capsicum	25	27	50000	54000	30	28	60000	56000
Pea	45	43	45000	43000	55	52	55000	52000
Potato	60	65	30000	32500	70	68	35000	34000
Cauliflower	150	155	75000	77500	140	145	70000	72500
Cabbage	130	135	65000	67500	125	120	62500	60000

Access to and control over resources

Women had very poor access and control over farm resources such as land, inputs, implements & machinery, farm produce and profit, whereas they had relatively more access and control over family labour and by products.

Technology perception

Various production and post harvest tools and implements ranked by men and women of Nainital and Almora districts are given in table below.

Implement/ technology	Rank	Nainital(N=600)		Almora(N=600)	
		Man	Woman	Man	Woman
Digging and pruning implements	1	164	104	173	109
Spraying and irrigation tools	2	157	96	162	102
Packing boxes/crates	3	142	78	148	86
Packing house and material	4	121	54	133	62
Low temperature storage and transport	5	93	23	97	34

CTCRI, Thiruvananthapuram

Two states *viz.* Kerala and Tamil Nadu were selected for the survey. Thiruvananthapuram and Kollam districts were chosen in Kerala and Salem in Tamil Nadu. The predominating crops were cassava, vegetable, banana and coconut. With respect to the crops selection, cassava and banana were uniformly selected from all the three study districts and the third crop was cucurbits in Thiruvananthapuram, coconut based system in Kollam and chrysanthemum in Salem. From each of the selected crop, 100 men and 100 women were the respondents from each district; thereby making the sample size of respondents to 600 per district and the total respondents of the study was 900 men and 900 women (1800 respondents).

The findings from Thiruvananthapuram and Kollam in cassava revealed that the role and responsibility in general was almost dominated by the male members of the households. Female members took only limited roles, that too along with male members in the case of credit loan repayment, harvesting, intercultural operations, sorting, weeding and layout. Same trend was reflected in the case of responsibility with lesser magnitude.

Role and responsibilities of men and women farmers in cassava cultivation in Kollam district

Operation	Responsibility				Role			
	Man (%)		Woman (%)		Man (%)		Woman (%)	
	Full	Partial	Full	Partial	Independent	With women	Independent	With man
Harvesting	99	0	0	0	1	0	0	0
Sorting	2	0	0	0	2	0	0	0
Weeding	1	0	0	0	1	0	0	0
Layout	97	3	1	0	93	0	1	2
Intercultural Operations	99	0	0	0	1	0	0	0
Marketing of fresh produces	77	0	0	0	75	0	0	0
Irrigation	0	0	0	0	0	0	0	0

Women had minor participation in banana. Female farmers did not have any independent roles, but help the male farmers in cultivation. Relatively more women were engaged in harvesting, intercultural operation, sorting, weeding, irrigation, marketing of fresh produce, layout as compared to other activities, in a limited way. Male farmers took full responsibility in all activities whereas female farmers had only partial responsibilities due to limited opportunity to look after full responsibilities.

Role and responsibility of men and women in banana cultivation in Thiruvananthapuram district

Operation	Responsibility				Role			
	Man (%)		Woman (%)		Man (%)		Woman (%)	
	Full	Partial	Full	Partial	Independent	With women	Independent	With man
Harvesting	95	4	0	12	21	19	0	0
Sorting	54	1	1	3	54	3	3	1
Weeding	92	8	3	6	16	20	0	0
Layout	56	5	0	0	60	0	1	0
Intercultural Operations	100	0	0	0	12	0	0	0
Marketing of fresh produces	96	4	0	15	62	32	0	1
Irrigation	78	17	3	35	17	67	0	1

In Thiruvananthapuram district revealed that women members have independent roles in activities such as sorting, layout, intercultural operations, credit loan repayment, irrigation, seed sowing and transplanting. More number of women helps the male farmers in harvesting, sorting, weeding, irrigation, transplanting and lesser magnitude in layout; inter cultural operations, credit loan repayment, manure application and seed sowing.

The major constraint of both male and female farmers in all the crops is the labour shortage which might be due to preference of white collar jobs than agricultural activities. Credit is another major constraint which is same for both male and female farmers. The other constraints such as natural disaster, crop loss due to biotic and abiotic factors affect more on male farmers than female farmers.

Use of garlic decoction, neem oil with soap solution and jaggery trap is some of the traditional knowledge practiced by Kerala farmers to control pest incidence in cucurbits. In case of banana, the traditional knowledge used for pest control are application of lime in the pits prior to planting suckers and dipping the suckers in FYM solution, drying them under shade before planting.

Role and responsibility of men and women farmers in vegetable cultivation

Operation	Responsibility				Role			
	Man (%)		Woman (%)		Man (%)		Woman (%)	
	Full	Partial	Full	Partial	Independent	With woman	Independent	With man
Harvesting	87	13	1	33	7	28	0	37
Sorting	82	6	2	24	64	23	2	25
Weeding	86	12	2	37	10	35	0	36
Layout	96	1	1	2	92	2	1	1
Intercultural Operations	94	2	3	6	22	0	1	6
Credit loan repayment	76	4	1	5	77	3	1	4
Irrigation	72	27	2	71	13	70	1	71
Transplanting	96	3	2	12	76	5	1	12
Manure application	92	4	1	3	8	1	0	3
Seed Sowing	89	2	1	5	82	6	1	6

CISH, Lucknow

Data on gender disaggregation in horticultural activities were collected from 600 respondents of five gram panchayats; Gulabkhera, Au mau, Amerhia salempur, Khalispur and Bhalia of Lucknow districts. The major fruit crops were mango, aonla, bael and guava. Women were mainly involved in removal of crop residues from the field, application of fertilizers, weeding, sorting, cleaning, grading and transportation, processing of mango at household level and packaging and marketing of produce.

Identification of women friendly horticultural technologies

The women friendly horticultural technologies for aonla growers and processors were identified.

The traditional methods of propagation such as inarching in guava, and budding in aonla and bael can easily be replaced successfully with this new technique. The technique results in rapid multiplication of guava, aonla and bael plants throughout the year. The technique is women friendly and has good potential of commercialization.

Training of rural women for refinement of mango processing technologies

A group of 25 farm women/rural youths from the Au mau village panchayat was imparted training on mango processing. Assessment of participants before and after training was done using a pre-designed questionnaire. Efforts are being made for entrepreneurship development for empowerment of rural women.

IIHR, Bangalore

Data were collected from 600 respondents of Kolar, Tumkur, Chikaballpur of Bangalore Rural districts. Major horticultural crops were chrysanthemum, China aster, grape and cabbage.

Introduction of drudgery reduction technologies

Day long training was organized on farm tools and equipments to sensitize the women participants about drudgery reduction. A total of 175 women participated in the programme. The wheel weeder and drum seeder was distributed to the women farmers for use in farm activities.

Network project on capacity building of coastal fisherwomen through post harvest technologies in fisheries

Project has been running at DRWA (Lead centre), Fisheries College and Research Institute, Thoothukudi, CIFT, Kochi, CIFE, Mumbai, College of Fisheries (OUAT) Rangailunda, Berhampur, KVK (ANGRAU), West Godavari and National Fisheries Development Board, Hyderabad.

Bench mark data on quality of market samples of dry fish collected by the Network centres showed that anchovies, mackerel, sardines, small prawns and thryssa were used for drying were mostly the surplus left after marketing in fresh condition. The quality parameters of the samples indicated 20-47 per cent higher moisture content than the required level. The other quality indices including TMA, TVN, TBA, FFA, and PV also showed higher values. The microbiological analysis of the samples showed the presence of mould. The TPC of was between 3.3 log cfu to 6.9 log cfu. The quality of dry fish used for fish meal production was also analyzed and it was found that the samples were of poor biochemical quality with high content of ash (23.54) indicating the presence of sand. The quality of dry fish from different markets studied suggested the need for development of women friendly practices and interventions at the producer level as beach drying was generally practiced. Socio economic survey of fisher women is in progress at the selected centres. Training and workshop of the Project scientists were conducted at CIFT for standardization of protocol for dry fish production and design of demonstration units. A financial assistance of Rs 38 lakhs was sanctioned by NFDB, the Network partner, for setting up of demonstration units by the Network institutes.

DRWA, Bhubaneswar

A survey conducted in Puri, Kendrapara and Jagatsinghpur districts of Odisha showed that Penthakota in Puri district accounted for 4000-5000 tones of average annual dry fish production. In Puri most of the people engaged in dry fish production were Telugu speaking migrants for whom this activity is the major source of income and dry fish is produced through out the year. The sources of fish were Bay of Bengal and Chilika lake and major markets were Sunakhala, Huma and Brahmagiri in Puri. In Paradeep, a major dry fish market migrants from West Bengal were found to be traditionally engaged in the activity. In the coastal district of Balasore majority of dry fish produces were from Odisha and West Bengal. Women also worked in prawn processing units. Bangladesh, Jagi road in Assam and Kolkata were the markets for dry fish procured from Paradeep. The demonstration unit is under construction at Penthakota in Puri district.

A consultation with the stakeholders for dry fish marketing was held at DRWA under the Chairmanship of Commissioner-cum-Secretary. Officers from state fisheries department, Odisha; NFDB, ORMAS, NABARD, MPEDA, women dry fish producers, traders and scientists of DRWA and OUAT attended the meeting and finalised the demonstration site and other procedures for field level implementation of the project.

CIFE, Mumbai

The hygienic conditions of fish drying yards in seven different locations in and around Mumbai was surveyed. Apart from dust and human activities, lack of water supply, lack of handling infrastructure and lack of knowledge on handling affected the quality of dry fish. Arnala village was relatively better in the above aspects and was selected for the establishment of demonstration unit.

KVK, UNDI, West Godavari

Mollaparru (Pepupalen South) village of Mogatham mandal was selected for setting up the demonstration unit. The project and the socioeconomic data of 100 fisherwomen were collected. The existing fish drying practices were documented. The site for demonstration unit was identified and the construction is in progress. Drying racks made of PVC pipes were introduced among selected fisher women.

CIFT, Cochin

The commercial samples obtained from the Network Centres were analysed for safety and quality parameters and the Network partners were trained in quality assurance and development of protocol for dry fish production by coastal fisher women. Socio-economic survey of selected coastal villages was completed and women selected for participation in the intervention were trained in the hygienic production of dry fish.

FC&RI, Tuticorin

The socio economic survey of selected dry fish producing villages was carried out. Trials were conducted with drying racks and compared with other methods using sardines and anchovies. The rate of drying although was slightly slower in rack drying, the quality of rack dried fish was superior in terms of appearance and other chemical indices.

The study of consumer preference and price for hygienically produced dry fish carried out showed that hygienically prepared dried anchovies enjoyed high preference and willingness to pay more for quality produce. Construction of demonstration unit is in progress.

College of Fisheries, OUAT

The study of dry fish production by women was taken up at Gepalpur coast, Ganjam district indicated the need for improvement in fish handling practices. A comparison of rack dried and solar cabinet dried fish indicated the latter to be better in terms of appearance and taste. Drying was also quicker in tent dryer. In open drying for five hours the moisture could be reduced from 81 per cent to 30 per cent for anchovies whereas rack drying of prawns could reduce the moisture only up to 58 per cent. The quality parameters were better in rack dried fish.

Network project on Enhancing livelihood of rural women through livestock production

DRWA, Bhubanesar

Action research was conducted on backyard poultry rearing and piggery. For backyard poultry individual women were selected whereas piggery was undertaken in a group approach through women SHG. Five piglets were maintained at village Basudevpur of Keonjhar district and 10 were maintained at village Jaypur of Puri district. Scientific practices of pig rearing, feed management using locally available material, deworming, breeding management and vaccination were carried out in a participatory mode. Advantages and constraints of the entrepreneurs were assessed in gender perspectives.

Animal health awareness camp was organized in Tara and Narayanpur village of Kakatpur block of Puri district in collaboration with KVK, Puri. Vaccination, deworming and need based treatment was provided for both the big and small livestock. Men and women in large number participated in the camp.

Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh

Data from 720 respondents has been collected, tabulated and analyzed through an interview schedule. The study revealed that majority of respondents was nuclear families and about 70% belonged to OBC category. None of the respondent knew about keeping records of different livestock practices. Most of the male dominated activities were decided by males independently and women oriented activities jointly, however the share of women in such activities was more than males. High adoption gap was found for feeding of balanced ration/compound feed (67.78%), keeping a crossbred heifer (74.72%), use of industrial by

products and top feed as animal fed (77.50%), pregnancy diagnosis within 60-90 days after insemination/service (80.56%), enrichment of low grade roughages with urea molasses (83.61%), isolation of sick animals (93.61%), dehorning (95.17%), hay and silage making (97.22%), use of disinfectants in preventing diseases (98.06%), weaning of calf (99.17%), use of calf starter (100%) and adoption of drudgery reduction equipments (100%). The medium adoption gap occurred in timely and regular vaccination of animals against contagious diseases (39.44%), Feeding area specific mineral mixture (47.78%) drying the cows two months before parturition (48.33%), regular deworming (60.83%) and year round production and feeding of green fodder/ perennial fodder (63.0%).The minimum gap was recorded for providing clean drinking water (1.94%), washing of hand and udder before milking (4.17%), full hand method of milking (22.50%) and feeding colostrum to newly born calf (31.67%). Low price of milk, lack of women specific technology, distant and ill equipped veterinary hospitals, high cost of medical assistance, untimely availability of inputs, non availability of milk collection center and non availability of dairy cooperative societies were the major problems faced by the dairy owner in adopting improved cattle production technologies.

Data on role performance revealed that majority of the indoor dairy farming activities to livestock management were well performed by wives as compared to husband. The results of 't' test showed significant differences between the husband and wives with respect to breeding, health care and marketing related activities. No significant difference was observed between the roles performed by the husband and wife with respect to management, and feeding activities.

Involvement of women in the joint decisions was found more in feeding of colostrum to newly born calf (39.44%), allowing the newly born calf to suckle its mother within an hour after calving (44.44%), keeping a crossbred heifer (23.61%), feeding concentrates (33.61%). More than 30 per cent women were taking independent decisions in the activities related to feeding of colostrum to a newly born calf and its quantity (36.11%), providing clean and fresh drinking water for animals (49.44%), removing the placenta with in 24 hrs of calving If not shed normally (37.22%), grazing/ stall feeding (36.11%), selection of concentrate feed (31.94%), timely and regular vaccination against the common contagious diseases (46.11%), timely treatment of the sick animal by vet staff (31.67%), cleaning of utensils (32.22%) and deciding the milking method (44.44%).

Based on the data, appropriate livestock technologies were assessed and related interventions were made for improving their livelihood by establishing one goat unit and 16 backyard poultry units. Besides 04 pig units were also established in 04 different villages for schedule caste families. One mahila sangoshti on scientific dairy farming on occasion of International women day and one animal health camp were organized in the villages. Two women - scientist's interactions were organized at campus wherein 42 rural women participated. Skill- oriented training was given to a women group on vermicomposting. Two crystoscope: a field tool for detecting the right time of insemination was distributed to 02 rural families. Fifty kg area specific mineral mixture and 80 urea molasses mineral block were distributed among 25 rural families. Prior to each intervention, specific capacity building programs for selected rural women along with their spouses were delineated by organizing training programs, gosthies and discussions. Interventions on dairy farming including post harvest technologies on milk and milk products were made at campus for 12 rural women.

ICAR Research Complex for NEH Region, Umiam

Piggery being the important practice in Meghalaya, detailed information was collected on the socioeconomic condition and production system. The society structure prevailing in the area being matrilineal reserves all ownership rights to women.

Breeds and feed

About 55 per cent respondents adopted improved breeds and 45 per cent native breeds. Common feed comprised rice bran, wheat bran, broken rice, sweet potato, colocasia, banana stem, tapioca and weeds. In summer green fodder, tree leaves, kitchen waste, vegetables and concentrated feed (1-2kg/day) were given while in rainy season mainly green fodder was available and during winter only dry fodder and concentrate feed was given.

Gender participation

Construction of pig shed was solely carried out by men in the villages, either by the family members or by hiring labour in absence of male family member. The traditional housing system was of ***katcha*** type made of locally available materials such as wooden planks, straw and bamboo with poor drainage system, slurry floor and lack of entrance, this prevents or makes it difficult for women to enter the shed as well as to clean the pig shed.

Women depended on their counterpart for transportation of pig from one place to another and health care. Collection of water from long distances in the hilly slopes for the purpose of cleaning the shed was not possible for women, as cit inured drudgery. Women took up the responsibility of looking after piglets. One of the major obstacles is that the women folk did not have access to regular trainings in their villages and their knowledge on innovative technologies and as the result lagged in the adoption of improved.

Veterinary College & Research Institute (TANVASU), Namakkal

Survey was conducted in Namakkal district selecting one block each in rainfed and irrigated area based on livestock density and 3 villages from each block were identified. Majority of the respondents' occupation was agriculture with livestock rearing as allied activity. Family type was mostly nuclear. None of the respondant was interested in rearing indigenous cattle due to low milk yield. Majority of the respondents possessed Jersey crossbred sows and sheep and goats were the major livestock providing regular income to them. Majority of the respondents reared native breeds or non descript variety of sheep and goats. Very few farmers had Tellicherry and Jamunapari breeds of goats. Small scale desi bird rearing was also seen as a common practice. Regarding technology adoption, no respondents attended any training regarding dairy, sheep & goat and poultry and there was not much difference in technology perception between men and women. Adoption of technologies was limited excepting artificial insemination, pregnancy diagnosis and concentrate feed. Most of the farmers sold the milk to private milkman or private dairies. The middleman played a major role in the sale of sheep and goats. The major problems they felt was high cost of feed ingredients, unfair price for milk and non availability of labour to maintain the livestock. The major activities of livestock and poultry rearing were carried out and by both men and women. The homestead activities such as cleaning, feeding, taking care of young ones and sick animals, milking and cutting the green fodder were carried out mainly by women. Selection of breeds and breeding, construction of housing to the animals, availing credits and purchase of concentrate mixture were done by men. The remaining activities were jointly carried out by them. Similar pattern was found in decision making.

Five models were prepared for capacity building based on the problems in the study area. Capacity building on appropriate livestock production technologies was conducted in selected villages namely Chikanaikanpalyam (irrigated block) and vandinatham village(rainfed block). Around 85 farmers from Chickanaikenpalayam village and 65 farmers from vandinatham village participated in the programme. Inputs such as Co-4 fodder slips, Agathi, Glyricidia, Subabul tree saplings and desmanthus, CoFS 29 seeds, mineral mixture and mineral blocks and books on latest technologies in dairying, sheep and goat farming and backyard poultry specially prepared for the purpose were distributed to the participant. Demonstrations were carried out on azolla cultivation, milking machine and chaff cutter. The women from Chickanaikenpalayam and Vandinatham villages were taken as an exposure Veterinary College and Research Institute, Namakkal livestock, poultry and agronomy model farms.

National Agricultural Innovation Project

Gender work participation scenario of Indian states

An index 'Gender Work Participation Disparity Index' (GWPDI) was worked out using both male and female work participation rate to compare the states according to level and difference in male and female work participation rates. The value of GWPDI varies between 0 and 1. The greater the index value more is the disparity in gender work participation, whereas lower value indicates more equitable gender work participation. Based on the values the states were grouped into low (less than 0.15), moderate 0.15-0.299) and high (0.30 and above) gender work participation disparity states. Based on index values calculated using census 2001 data, Mizoram with value 0.093 had the most equitable gender work participation scenario followed by Manipur (0.094), Nagaland (0.10) and Himachal Pradesh (0.11). Some of the states having high gender work participation disparity include Kerala (0.535), West Bengal (0.50), Uttar Pradesh(0.488), Punjab(0.487) and Bihar(0.434).

Girl students' enrolment in agricultural courses

Disaggregated data on students' enrolment suggest that with more and more girls joining agricultural courses, the scenario of students' enrolment in SAUs has changed drastically over last few years. In some universities, the gender gap has narrowed down moving towards gender equality, while in others the girls have already overtaken the boys.

In Punjab Agricultural University, Ludhiana, the share of girls in total enrolment into UG courses which was 20% in 1998 increased to 48% in 2010 with the exception of few years (2003, 2004 and 2005). In PG courses, how ever, the girl student's enrolment rate has been as high as 50% since 1999 and in 2010 it increased to about 55%. In ANGRAU, the share of girls remained below 40% for most of the years in the period preceding 2001, while in post-2001 period the girl students share in enrolment was more than 40%. In PG courses, during the period preceding 2006, girls' enrolment rate was in the range of 30-40% which increased after 2006. In CSKHPKV, the share of girls in UG courses which was lower than that of the boys before 2007, exhibited an increasing trend and it was 60% in 2009 and 2010. In TANUVAS, girls' enrolment rate in UG courses exhibited increasing trend during last 10 years to reach a point of gender equality in 2010.

ALL INDIA COORDINATED RESEARCH PROJECT ON HOME SCIENCE

The All India Coordinated Research Project (AICRP) on Home Science is in operation at nine State Agricultural Universities namely, AAU, Jorhat (Assam), ANGRAU, Hyderabad (Andhra Pradesh), CCSHAU, Hisar (Haryana), CSKHPKV, Palampur (Himachal Pradesh), GBPUA&T, Pantnagar (Uttrakhand), MAU, Parbhani (Maharashtra), MPUA&T, Udaipur (Rajasthan), PAU, Ludhiana (Punjab) and UAS, Dharwad (Karnataka).

The main thrust of the project is empowerment of women in agriculture for enhancing the quality of life of farm families. The salient achievements under major thematic areas are summarized below.

Development of gender specific database of farm families

Creation of gender specific data base is one of the objectives of the Project that aims at providing structured information about the farm families including their occupation status, education status, family size, land holding, possession of livestock, inventory of equipments and tools, inventory of household articles and facilities. Besides these, gender-wise information on participation, roles and responsibilities, access to and control over resources in respect of agriculture, horticulture, livestock management, fisheries and extension services is also collected. The data were collected following a well designed sampling scheme and stored in a database that would facilitate faster retrieval of required information. During the period under report data pertaining to 2700 households (5400 respondents) were analysed and the results are summarized below.

Profile of farm families

The family profile included family structure, educational status, caste, land holing and main occupation. The data reflected that majority of the families were nuclear, had farming as main occupation and were landless. The average education level showed that 22.33% were having education up to high school, only 5.79% were graduates and 19.19% were illiterate, nearly 39% were of upper caste.

Farming

Role and responsibility

The farm related activities included land preparation, seed selection, seed treatment, nursery raising, plant protection, irrigation, application of manure and fertilizer, harvesting, management of labour, harvesting, management of produce, procuring and repayment of loan. An estimated 76.80% of the respondents participated in farm related activities and among women nearly 66% participated in farm related activities and among men participation was about 72%.

The data pertaining to typology of participation in all the farm related activities indicated that independent participation of men was higher than the women in all the states except in Uttarakhand. Joint participation of men with other men was higher in land preparation, plant protection, irrigation, engagement of labour and procurement and repayment of loan in Assam, Andhra Pradesh, Maharashtra and Karnataka. Engagement of labour was the only activity where the rural women of Maharashtra were involved which was less than 1%. However activity wise number of respondents having complete responsibility differed from state to state. Men were found to have complete responsibility of all the activities in all the states, highest being in Haryana (88.9%) followed by Uttarakhand, Assam and Punjab reflected a different picture in Uttarakhand, nearly 73% rural women were completely responsible for different activities which is much higher than the average of states studied.

Access and control

Comparative analysis of data of nine states indicated that the highest percentage of women in Punjab were found to have complete access to use of land, seeds, labour, management of cash, ranging from 75% to 100%, followed by Himachal Pradesh, Uttarakhand and Rajasthan. Lowest complete access was recorded in Maharashtra. Nearly 30% women of Uttarakhand and Karnataka were estimated to have complete access to the farm related resources. Majority of the rural women (84.00 – 99.00 %) were having no control over purchase (99.12 %) or sale (98.23 %) of agricultural land and farm assets. Women having complete access and control was very low in Haryana in spite of taking the responsibility while the men were estiamted to have greater access to and control over sale (78.21%), purchase (61.55%) and use of land (64.00%), farm implements (69.00%), inputs (55%) and marketing of produce (73.63%). About 42.51% of women in Rajasthan were estimated to have complete access to use of farm implements, grading (36%) and estimated 35.4% of women had complete control over storage. In general women were found to have better access than control over the resources.

Post harvest management

Post harvest related activities included winnowing, cleaning, drying, post harvest processing of produce, management of surplus produce, storage, marketing, management of cash earned, engagement of labour etc. Independent and joint participation of rural women was visible in all home based post harvest operations such as winnowing, cleaning and drying. Joint participation with men emerged to be high in all states with highest in Uttarakhand followed by Himachal Pradesh. However, the practice of women jointly participating with other women was observed to be highest in Andhra Pradesh followed by Maharashtra.

The analysis of participation of men and women in post harvest activities in the nine states under study, revealed that drying, storage, cleaning and processing of grains was mostly performed by majority of the women in all the states with highest participation in Uttarakhand and lowest in Maharashtra. Processing at commercial level, management of cash, marketing and engagement of labour had lesser participation of women.

Women were found to shoulder the responsibility of home based post harvest management activities possibly due to migration of men for income generation.

Homestead gardening

Role and responsibility

Independent participation of women was higher in the case of Uttarakhand and Himachal Pradesh. Women performed the activities such as transplanting, manuring, irrigation, and harvesting independently in these states. Independent participation of men was low in homestead garden related activities. Rural women of Haryana had complete responsibility of homestead garden related activities and performed them independently and also jointly with other women and men. However, men were found to take complete responsibility handling the income.

Horticulture

Role and responsibility

Horticulture related activities included selection of land, land preparation, nursery bed preparation, seed sowing, cutting, budding, grafting, engagement of labour, soil treatment, maintenance of seedling, transplanting, application of manure, plant protection, harvesting, packaging, marketing and management of cash.

Access and control

Most of the horticulture related activities were performed jointly with men, but men had complete access to resources in all the states thus limiting their decision making ability of rural women. In Uttarakhand women had complete access to retention and storage of produce.

Livestock management

About 71% of the families possessed livestock of various categories. Though a large percentage of women jointly performed the activities with men, independent participation was also fairly high for many states namely Punjab followed by Uttarakhand, Rajasthan, Haryana, Himachal Pradesh.. They performed the activities such as cattle shed management, excreta management, management of produce at household level and feeding of animals. Involvement of women was higher than that of men in cattle shed management, excreta management, management of produce and cash earned from produce, procuring and repayment of loan. In spite of higher involvement women in the extent of participation (mostly with men), they only had partial responsibility. Around 3% to 31% of the women had complete responsibility in shed management (31%) followed by processing of produce (15.79%), and excreta management. In Himachal Pradesh, Haryana, Punjab, Rajasthan, Uttarakhand and Andhra Pradesh, the women's participation was higher in livestock management activities than farm and horticulture related activities. Therefore, for these states, women friendly technologies related to the livestock management need to be transferred to the rural women.

Access and control

Women played a very important role in livestock management activities shouldering the responsibilities but had only partial access to and control over the resources.

A comparative analysis of access to and control over livestock resources of men and women among nine states revealed that women had better access and control in Uttarkhand, Himachal Pradesh, Rajasthan and Punjab. Further it was found that women could exert their decision in livestock management with limited say in cash related aspects.

Fisheries

Role and responsibility

The number of households involved in fishery related activities was very small. Out of nine states, involvement of men and women was found in three states only namely, Assam, Andhra Pradesh and Maharashtra. Highest number of participation was found in Maharashtra followed by Assam and Andhra Pradesh. Fisheries related activities included pond cleaning and management, selection of fish seed, size, feeding, harvesting, management of produce, marketing, processing, packaging, value addition, management of labour and cash earned from produce and procuring and repayment of loan. In Assam and Andhra Pradesh involvement of women was higher than men and in Maharashtra it was equal. In Andhra Pradesh, only a small number performed drying, product preparation independently with complete responsibility. Women involved in fisheries had complete responsibility of drying, salting, processing, marketing and management of cash in coastal villages of Maharashtra and joint participation of women was higher.

Knowledge and frequency of contact with extension person

In general, men had more knowledge of different extension personnel than women and the frequency of contact was higher than that of the women. Women reportedly had regular contact with the university personnel and occasional contact with the VLEW whereas men had occasional contact with the extension officers and regular contact with VLEW. State wise analysis revealed that highest percentage of both women and men of Assam possessed knowledge of VLEW followed by Haryana and Maharashtra. Nearly 59.54% men and 58.12% women had knowledge of VLEW followed by knowledge of university personnel. In Rajasthan university personnel were known to more of the respondents of both the categories than other types of extension personnel and in Karnataka the extension officers were contacted more frequently.

Participation in extension programmes

It was observed that men participated more in farm related extension programmes.. Highest participation of rural women was found in entrepreneurship development programmes (31.98%) followed by farming related programmes (17.45%). Shortage of time, inappropriateness of the subject and insufficient prior notice were indicated as the reasons for non-participation by women.

Reasons for non adoption of technology

Both women and men had stated that cost of input was the main reason for non adoption of agricultural technologies. While women felt that lack of proper training and lack of women specific technologies as the other important reasons, men reported lack of regular extension contact and lack of proper technical knowledge as the other reasons for non adoption of technology.

In conclusion, the data revealed that the highest independent participation of women was seen in post harvest management activities followed by livestock management that are basically home based. High degrees of inter-state and intra-state variations were observed in gender roles in agriculture and allied areas. It was found that though women performed the activities and shouldered the responsibility, their access and control over productive resources such as land, implements, inputs and cash was limited and partial in comparison to men who limited their decision making in availing the goods and services.

Development of gender specific extension methodologies and training modules

Development of training modules for the establishment of micro enterprises is in progress at each centre. *Trainers' Training module on drudgery reducing technology interventions for women in agriculture*, was tested for its effectiveness. The module was translated into different regional languages and was evaluated with the Subject Matter Specialists of KVK's and extension. The module was found effective with an observed mean score of 16.81 over all variables against a max score of 18.

Two training modules in English and regional language were prepared and tested by each centre and are being finalized.

Technology interventions for drudgery reduction in agriculture and rural enterprises

Work was carried out in drudgery reduction in agriculture and rural enterprises.

Technology Interventions for drudgery reduction in agriculture

Multi location field trials were conducted at the farmers' field where in the performance of technologies was demonstrated vis-à-vis their conventional practices. The performance of technology was assessed in terms of reduction in work rate, total labour hours and wages. Drudgery perceptions were quantified. Centre-wise field trials of technologies have been detailed below:

Centre	Crop	Drudgery prone activity	Treatment / conventional practice	Technologies used
AAU, Jorhat	Paddy	Sun drying by women	Conventional bamboo tool (*Khurana*)	Improved spreading tool
ANGRAU, Hyderabad	Cotton	Collection of harvested material	Old *dupatta* or cloth sheet	Harvest bag
UAS, Dharwad			Conventional cotton picking	Coton bag
CCSHAU, Hisar	Wheat, Barley	Threshing	Tying cloth on head	Capron
	Cluster bean,mustard	Weeding	Hand hoe (*Kasola*)	Wheel hand hoe
CSKHPKV, Palampur	Allcrops	Clod breaking by women	Local clod breaker (*bhatam*)	Improved clod breaker
GBPUA&T, Pantnagar	Paddy	Threshing	Manual Threshing (By beating on wooden platform)	Hand operated paddy thresher Pedal operated paddy thresher
MAU,Parbhani	Groundnut	Decortication	Manual	Groundnut decorticator
	Dairy	Dung collection	Manual	*Gopal khore*
MPUA&T, Udaipur	Dairy	Cleaning of animal shed	Manual	Hand rake fodder collector
PAU, Ludhiana	Vegetable crop	Plucking vegetables	Manual	Improved ring cutter

Performance evaluation of improved technologies

Improved spreading tool

- A gain in work rate to an extent 25 per cent
- Reduction in drudgery up to 42 per cent in spreading due to postural improvement
- Higher spreading efficiency achieved through improved angle of the blade.

Harvest bag

- Gain in work rate by 17 per cent
- Saving in labour time by 16 per cent
- Saving in labour wages by 20 per cent
- Reduction in drudgery

Capron

- Reduction in drudgery due to metabolic comfort and convenience up to 20 per cent respectively
- Irrespective of gender all farmers preferred Capron as a useful protective guard.

Coton bag

- Only 0.51 per cent increase in the work rate in women
- Zero per cent saving in time spent by women and did not effect the labor costs
- Marginal reduction in drudgery

Gloves

- Gain over work rate to 5 per cent for men and 3 per cent for women
- Increase in pace of work resulted in 4.8 and 2.9 per cent savings in time respectively for men and women.
- The economic benefit to a tune of 4.8 to 2.9 per cent due to saving in labor wages.
- Men found their work performance better with gloves
- Harvesting with gloves was preferred by women and men farmers

Clod breaker

- Seven per cent increase in the work rate in women
- Use of clod breaker was found to reduce drudgery to the extent of 22%

Hand/peddal operated paddy thresher

- About 42 per cent decrease in the work rate of women
- Higher drudgery reduction with pedal operated thresher

Gopal khore

- About three fold increase in work rate
- About 50 per cent reduction in time and wages.

Groundnut decorticator

- Increase in work rate of women by 460 fold.
- Reduction in time by 80 per cent and saving in wages
- About 50 per cent improvement in pace of work.

Hand rake

- Work rate of women increased by 37 per cent.
- Reduction in time by 33 per cent.
- Reduced drudgery by 44 percent
- About 47 per cent of women preferred hand rake for gathering waste fodder.

Ring cutter

- About 70 per cent increase in work rate.
- About 30 per cent reduction in time 27 per cent in drudgery in harvesting vegetables
- Hundred per cent preference by women and men farmers

Among the technologies introduced in agriculture, for improved sickle and improved khurpi, adoption rate was higher among men and where as among women (above 50%) adoption rate was higher for maize sheller and vegetable plucker besides improved sickle and khurpi. Cotton picking apron, ground nut decorticator, hand rake, improved cap, ring and Trishul weeder were also found to b adopted by 50 per cent of women studied.

Technology Interventions for drudgery reduction in rural enterprises

The focus of this sub-project is on the study of livelihood occupations that generate income through small business enterprises in rural families. The purpose is to understand the performance of women, their drudgery experiences in order to muscular and physiological stress, work process, tools with which they operate in order to improve labour intensive methods with alternate technologies.

The action steps include selection of drudgery prone enterprise activities, comparison of conventional and improved technologies, modification or development of new technologies, validation of improved technology for user acceptability and dissemination of technology. The following enterprises were identified for detailed analysis in terms of drudgery prone activities. Centre-wise identified activities for drudgery reduction are given below.

Enterprise	Drudgery prone activity
Food processing enterprise	Pounding of rice
Community meal preparation by SHGS	Cooking on conventional *Chulha*
Bead making	Bead string making
Bamboo craft	Bamboo strip smoothening
Quilt making	Checking, mending and packaging
Dairy	Milking stand and stool
Vegetable growing	Vegetable plucking

Women who are the active participants and belonging to 25 to 40 years age were selected for the study. Physical characteristics of the subjects were examined through Step stool test. Controlled experimental design was followed to conduct the following experiments.

1. Performance of women in pounding rice using *Dhenki* with adjustable rope
2. Thermal efficiency of commercially available briquette Stove was evaluated through Water Boiling Test in controlled laboratory conditions. The field feasibility was assessed through complete cooking test and Kitchen Performance Test in the village.
3. Performance evaluation of manual and rotary oscillating disks holding beads in bead making
4. Performance evaluation of improved tool for smoothening bamboo strips
5. Performance evaluation of work station improvements (frame & high stool) in quilt making.
6. Performance evaluation of milking stand and stool while milking
7. Performance evaluation of improved ring cutter in vegetable plucking

Parameters of evaluation for drudgery reduction in enterprise activities

Parameters	Variables	Measurement (Tools/methods)
Physical characteristics	Age, physical fitness	Step stool test exercise
Physiological stress	Heart rate	Heart rate monitor
Muscular stress	Musculo skeletal disorders, stimuli & response indicators	Body map, Indigenous stimuli & subjective reflex analyzers
Postural stress	Angle of deviation	Flexi curve, goniometer
Environment stress	Light, ventilation, dust, heat, noise	Environment quality monitors
Work output	Pace of work, quantity of work done	Stop watch, weighing scale

Results

Dhenki with adjustable rope (AAU, Jorhat)

- Reduction in time
- Savings in wages
- Lesser drudgery
- Reduced time demand on activity
- Improved postures and ease of work

Laboratory & field feasibility of the blower type briquette stove (ANGRAU, Hyderabad)

- Thermal Efficiency of the stove was 21 per cent when Water Boiling Test was performed.
- Burning rate of fuel was 2.6 kg/ h.
- Power out put of the stove was 0.58 kW/h.
- The specific fuel consumption was estimated as 4.482 kg/h/kW.
- On Kitchen Performance test rice, vegetable and dhal were prepared and found that the burning rate was 2.8 kg/h.
- Results of field tests conducted revealed that the stove is useful for

preparing community lunch with a capacity of 30 kg rice and 5 kg dhal. But for mid day meal, as usually the number is varying from 5 to 20. It was expressed that a smaller capacity of briquette stove is needed.

- Hand blower was found to be effective in managing the combustion of the fuel.

Work process compared between conventional vs Improved tools in bead making (7-8 mm beads) & (3 mm beads) (CCSHAU, Hisar)

- Rotary model of oscillating disc distinctively increased the pace of work while using 7-8 mm as well as 3 mm beads for bead making.
- Reduction in time was achieved up to 72 percent while using 7-8 mm beads and 63 per cent while using 3 mm beads in bead string making process.

Performance evaluation of improved tool for smoothening bamboo strips (CSKHPKV, Palampur)

- Increased the pace of work and work output by 4 per cent.
- Cardiac strain was increased by 13 per cent. However, workers felt that the tool reduced cuts that used to happen in conventional practice.

Performance Evaluation of work station improvements (frame & high stool) in quilt making (GBPUA&T, Pantnagar)

- Reduction in working heart rate and energy expenditure.
- Significant reduction in the perceived exertion by the workers.
- Relief in muscular pains was also reported.

Performance evaluation of milking stand and stool while milking (MAU, Parbhani)

- Evaluation of milking activity with use of revolving stool and milking stand indicated a significant reduction in physiological parameters in the improved method.

Nutritional security and health promotion of farm families

Promotion of nutrition garden

Motivation campaigns were organized to inspire the women for laying nutrition garden in their homestead areas. The selected families were trained through demonstrations regarding the importance and benefits of nutrition garden. Seeds and seedlings were procured and distributed among the selected families. Other inputs like vermin-compost, neem oil, neem cake were supplied to the beneficiaries based on individual needs. Details of nutrition gardens established by the families of different centres are presented in the following table. In the Kharif season **(March-September, 2010)** a total of 292 nutrition gardens were laid out, out of which 225 gardens survived and the remaining 67 failed due to various reasons.

A major portion was utilized for individual consumption and a portion was sold/ shared except for MPUAT, Udaipur and MAU, Parbhani, where a major portion was sold for livelihood.

Roots and tubers grown

- Onion
- Radish
- Akki avare

Amongst roots and tubers, PAU Ludhiana and UAS Bangalore were only centres to raise whose average production were 3.90 kg and 5.16 kg respectively. Onion, radish and akki avare were the crops raised among roots and tubers.

Information, education and communication (IEC) programmes organized for improving health and nutrition practices

Various IEC programmes were organized in the adopted villages of the nine centres of the project. Following six messages were taken up as a package of practices:

- Importance of balanced diet in daily life.
- Additional food requirements during pregnancy and lactation.
- Importance of breast feeding.
- Supplementary feeding for the young children.
- Preparation of nutritious weaning food at home.
- Importance of kitchen garden in homestead area.

Training programmes, lectures, talks, demonstrations and nutrition exhibitions, preparation of value added products from underutilized grain, processing of fruits and vegetables were conducted on various topics. Audio visual aids like charts, posters, leaflets etc were used.

Development of iron rich formulations named as *Lehyams*

The iron rich product developed during 2008-09 named as *lehyam* in which, majority of the centres used cauliflower leaves as one of the ingredients. The main reason behind selecting cauliflower leaves were: a) it is a good source of iron, b) it is under utilized as per the project objective and c) the acceptability and product quality is good with cauliflower leaves. However, later on it was thought that there is possibility of presence of pesticide residues since, cole crops are very susceptible to pest infestation and hence pesticides are likely to be used by the farmers. Possibilities of eliminating pesticide residue will involve some processing devices which will increase the cost of the product and in the same time nutrient content might get reduced. Hence, it was decided to go with other green leafy vegetables instead of cauliflower leaves.

Altogether 20 lehyams/ formulations were developed using green leafy vegetables as a major ingredients. However, Udaipur centre had developed lehyam using lotus stem as a major ingredients with or without incorporation of green leafy vegetables. Reason for selecting lotus stem was the high iron content.

Acceptability and quality of the product was found to be better without incorporation of green leafy vegetables, hence the centre decided to choose lotus stem lehyam without green leafy vegetables as the final product. The 20 lehyams finally developed were accepted based on the iron content in per serving of 20g and overall organoleptic characteristics.

Mean acceptability score of organoleptic characteristic of lehyams developed :

The overall acceptability score of the final 20 *lehyams* products ranged from 8.6 (Amla ball, Ludhiana) to 5.9 (Lehyam with bengal gram leaves powder, Pantnagar) based on 9 point hedonic scale.

Nutrient composition of the lehyams developed

The nutrient composition of the final 20 *lehyams* developed per 100g as is basis, dry matter basis and per serving basis of 20 g are presented in 19 and 20 respectively. However, the iron content per 20g of serving ranged from 8.41mg (Udaipur) to 2.45mg (Hyderabad).

Other micronutrients like calcium, vitamin C and β-carotene were also reported along with iron. Calcium content per 20 g serving of formulation ranged from 294.0 mg in PAU to 0.04 mg in MPUAT. Vitamin C content per 20 g serving ranged from 42.4 mg in UAS to 0.7 mg in PAU. β-carotene content per 20 g serving ranged from 1255 µg in UAS to 20.78 µg in ANGRAU.

Mean acceptability scores of organoleptic characteristics of the final 20 lehyam developed (from nine SAU's)

Name of the Lehyams	Colour	Taste	Flavour	Texture/ Consistency	Overall acceptability
AAU, Jorhat					
Dry *madhusuleng* leaves powder *lehyam*	7.2	7.3	6.1	7.3	7.3
ANGRAU, Hyderabad					
Khajikaya	8	8	8	8	8
Toffee	8	8	8	7	8
Murukulu	8	8	8	8	8
Laddoo	8	8	8	7	8
HAU, Hissar					
Amla greenleafy balls	7.4	7.9	7.5	7.8	7.6
CSKHPKV, Palampur					
Colocasia lehyam	8.0	8.0	8.0	8.0	8.0
Fennel and lettuce lehyam	7.5	7.7	7.5	7.6	7.6
Seabuckthorn lehyam	7.2	7.0	7.2	7.2	7.1
GBPUA&T, Pantnagar					
Lehyam with bengal gram leaves powder	5.2	5.6	5.4	5.9	5.9
MPUA&T, Udaipur					
Lotus stem dates lehyam	7.4	7.6	7.5	7.5	7.8
MAU, Parbhani					
Iron rich toffee (Variation I)	7.4	7.5	7.3	7.5	7.5
Iron rich toffee (Variation III)	7.3	7.4	7.3	7.7	7.1
PAU, Ludhiana					
Tamarind ball	8.6	8.5	8.2	8.4	8.4
Amla Ball	8.9	8.6	8.5	8.6	8.6
UAS, Bangalore					
Lehyam with amaranth leaves powder – I	7.2	8.1	8.0	7.8	8.1
Lehyam with amaranth leaves powder – II	7.0	7.6	7.3	7.5	7.4
Surakta fruit toffee	7.3	0.7	7.2	7.8	7.9
Pushtika laddu	7.3	7.5	7.5	7.4	8.0
Poushtika Chikki	7.4	7.7	7.6	7.4	8.0

Evaluation of lehyam/formulations

Formulations were subjected to acceptability trials using scientific panel and analysed for nutrient compositions with an emphasis on iron content. Most of the centres had achieved the targeted iron content between 3-5 mg/ 20 g of servings of *lehyam* /formulations. Formulations also had good nutritional profile in terms of calcium, vitamin C and β carotene.

To create awareness regarding the importance of indigenous knowledge and medicinal plants, lectures were organized and the concept of herbal gardens within the regular kitchen gardens and community herbal plantations was also initiated.

Total antioxidant activity

A general consensus has been reached during the last few years that a pre-dominantly plant based diet reduced the risk for development of several chronic diseases such as cancer, coronary heart disease, obesity, diabetes, hypertension and cataract.

The amount of well known antioxidants, such as α tocopherol, vitamin C and β carotene in the dietary plants has been measured in detail. However, recent data may suggest that a relatively small part of the anti-oxidants in most dietary plants is contributed by well known antioxidants. Thus, the total amount of electron-donating anti-oxidant (i.e. reductants) in the diet derived from combinations of individual anti-oxidants that occur naturally in foods, may be a better concept than individual dietary anti-oxidants. So, the need arises for quantitative data on the total antioxidant contents of variety of foods. In Western countries, generation of such data is taken up in recent years. But in Indian situations, reported information on screening of large samples for total antioxidant is not available.

The proposed study will generate data from large number of varieties of samples from all food groups on the total antioxidant capacity or concentrations. However, for the time being, only the green leafy vegetables have been considered for estimation of the total antioxidant content (TAC).

Total antioxidant content of green leafy vegetables

27 varieties of green leafy vegetables were selected and the total antioxidant content in the green leafy vegetables were within the range of 19.67 in spinach to 83.58 in lettuce leaves.

Promoting vocational skills amongst adolescent girls

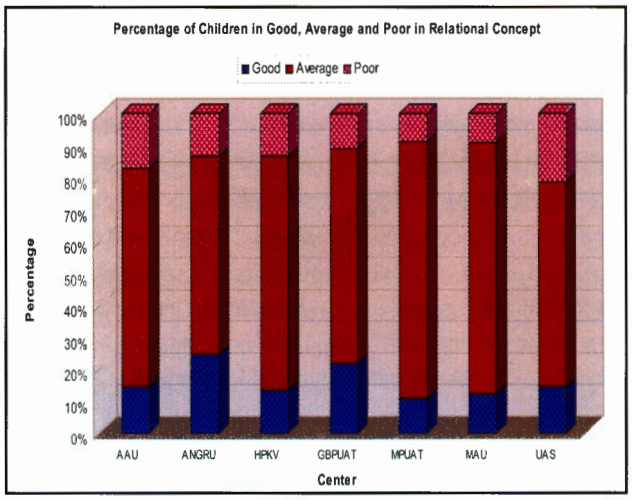
For promotion of vocational skills among adolescent girls and young mothers, needs were identified and trainings were imparted accordingly. Skill oriented trainings were imparted in areas like Crèche management, preparation of educational play materials, soft toy making, food preservation, preparation of utility items, embroidery and infant garment making. To sensitize the rural adolescent girls on vocational preparation, motivation campaigns were also organized and training modules have also been developed. The following trainings of 1 to 7 days were organized for adolescent girls for their capacity development:

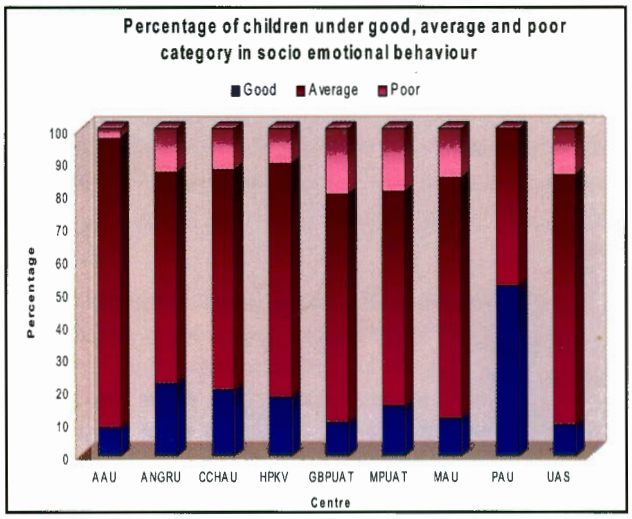
- Value addition to seasonal farm produce
- Value addition to clothing and garments
- Preparing household decorative articles
- Preparation of soft toys and utility articles from waste

- Preservation of fruits and vegetables
- Soap and detergent making
- Vermi-composting
- Improved animal feed
- Utilization of non-degradable farm waste
- Establishment of herbal and kitchen garden

Training modules for care and management of children

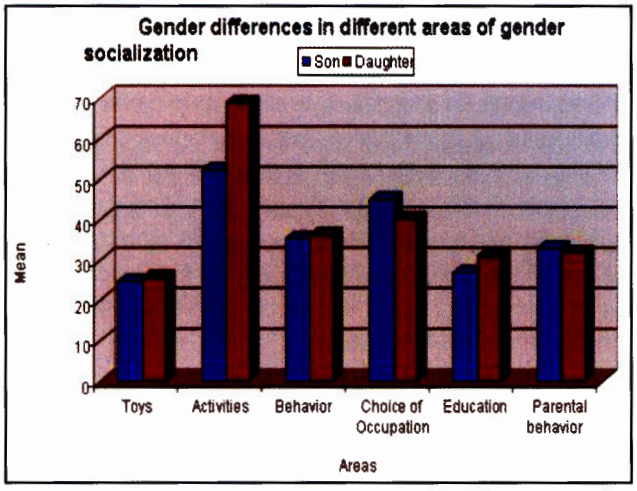
To develop training module for farmwomen for care and management of children existing Anganwadi centres of adopted villages were selected. 30-35 children belonging to the age group of 3-5 years were taken for the study. Base line information of selected Anganwadis were collected. Selected children were tested for various parameters namely; socioeconomic status, socio-emotional behaviour, and relational concept. Effort has been made for improvement of aspects namely socio emotional development, and concept formation. Anganwadi workers and mothers of these children were imparted trainings on child care, development of educational play materials, health and nutrition and other important areas. Various activities were planned as a part of behavioural and developmental intervention to facilitate concept formation, group participation, sharing, and for emotional development.





Social and educational empowerment of adolescent girls and young women of farm families

Data on pre, post test I and post test II have been collected on the areas covering nine life skills namely, decision making, communication skills, self esteem, interpersonal relations, problem solving, critical thinking, creative thinking, empathy and stress management. Their knowledge on legal issues, reproductive health were also taken into consideration since they were having poor knowledge in these areas. Another aspect added to this project was gender socialization. Upbringing practices, provision of toys for children, media exposure and gender attitude of young mothers were measured by using psychological scales. A checklist on gender socialization was used to find out the way gender socialization takes place in nine states of India. The checklist covered areas like toys, behaviour, activities education, occupation where a mother generally shows gender discrepancies. When all the aspects of gender socialization were analysed, at all the centres significant gender differences in mothers' attitude was found in the choice of occupation and education.



Under the sub-project social and educational empowerment of adolescent girls analysis of data indicated positive impact of intervention in the area of decision making, interpersonal relationship, communication skills and mental health. Regarding gender socialization it was seen that there was still gender discrimination in maternal behavior towards children right from early age. Gender discrimination in mothers' attitude was noticed in the use of toys, activities and choice of occupation. Mothers showed positive feeling when boys played with toy gun and negative feelings when girls play with the same. Hence, for promotion of positive gender socialization in rural areas, process of women empowerment need to be taken up right from early childhood. Significant gender differences in mothers' attitude were noticed in choice of occupation and education for boys and girls. Regarding gender differences in providing educational facilities mothers expressed differences favouring sons in sending them to college, making economically independent, borrowing money for education and career education. Significant difference favouring daughters was noticed in preparing for child rearing.

Synchronizing with training programmes in various areas most of the Centres developed print materials like leaflets, posters, calendars, CDs etc. Packages developed earlier were also translated to regional languages.

Value addition to underutilized natural resources for enterprise development

Each centre selected different underutilized locally available fibers to produce value added products. According to the nature, quality and characteristics of the fiber, different woven and non woven products were made namely – garments, table mats, doormat, toran, basket, files, purse, bags, asanas, kambal, cap, mobile pouch, tufted balls etc.

Efforts were made to train the women for taking up activity related to under utilized locally available fibers to produce value added product so that they can set up region specific relevant enterprises for their income generation.

Name of the Fiber	Process / Techniques used	Products made
Jute	Fiber extraction/ Dam Rating	Bag, Wall hangings, Table mat & folders
Sisal	Fiber extraction/ Plaiting	Non woven – hand made papers, paper bag, Table mat, phone mat, doormat, toran, basket, files, wall panel.
Cots wool & Khadi silk Haryana wool	Weaving/ Stitching Shearing/Tufting, quilting & stitching	Designers Kurtis Chapati box cover, curd vessel cover, chapati wrapper, water bottle cover, lunch box cover, baby feeder cover, asana, baby quilt and baby carry bag
Buil (*Grewia Optiva*)	Fiber extraction/ Weaving, braiding & sheet making	Weaving - Fabric Non - woven - Hand bag, purse, table mats and caps.
HempIndian stinging nettle (*Girardininia heterophylla*)	Fiber extraction/ Weaving	Weaving - Purse, cushion cover, belt, head band.
Banana	Fiber extraction/ Braiding	Non woven - Table mats, wall panels
Ambadi, Sun hemp & Bhindi	Fiber extraction/ Spinning , knitting, crochet & braiding	Non woven - Asanas, footmat, magazine holder, cut pile rugs, telephone mats, rakhees, bags and multipurpose holder.
Sun Hemp	Weaving	Weaving - Mat, coasters
Deccani wool	Wool shearing, carding, spinning/ Weaving & felting	Weaving - Asanas, kambal,, Bag, Non -woven - cap, mobile pouch, tufted balls.

Utilization of non-degradable farm waste

Degradable farm waste which was mostly from natural fibers such as banana, jute, sisal, hemp etc and non – degradable farm wastes such as nylon sarees, waste polyethylene bags are used for preparing consumable products namely, files, purse, bags, asanas, durries, tablemats, foot mat, runners, photoframe etc.

Empowerment of rural Women for livelihood security

Socio-economic empowerment of the disadvantaged women groups in adopted villages was the major thrust during the period under report. Efforts were made to strengthen SHGs by adopting different strategies viz., conducting group trainings in a systematic manner, providing continuous facilitation support to the selected groups by exchange of information and ideas with successful group members, micro loaning

strategies by enhanced, mutual trust between banks and SHG groups, promoting saving habit and proper use of loan by the SHG members etc. Since the SHG model is highly dependent on the group cohesion and abilities of group members and group leaders in managing the group affairs, SHGs were trained for enterprise management, leadership development, conflict resolution, communication skill and fund management. Due to the intensive efforts of the team members, many defunct groups were revived and new groups were formed and many SHGs were given refresher trainings. The members were equipped with entrepreneurial skills such as tie and dye, vermin-composting, dairying, flour milling, preparation of handicraft items, embroidered products through demonstrations, video films, mahila mandals (success stories of women entrepreneurs). Micro enterprise units have been established by many SHGs in which their skills were developed viz, handmade paper products, fancy bags, durries, household textiles and embroidered products.

Empowerment of rural women to combat occupational health hazards

Pesticide residue analysis

Each centre selected local crops for pesticide residue analysis. Irrespective of P/C blends, Malathion for tea (0.003), Dimethoate for orange (0.001), Monocrotophos for soya (0.001 and 0.0004), Pegasus for maize (0.002) and Triazophos for cotton (0.005 and 0.009) showed below the level of tolerance. This indicated that these pesticides may safely be used by pesticide applicators. However safe clothes can reduce the risk of health hazards.

Protective clothing for pesticide applicators

Six protective clothes such as beak mask, cap with mask, hood mask, hand gloves, jacket and pant of 100% cotton fabric lining were designed for pesticide applicators men and women based on their felt needs. The protective clothing and designed accessories were assessed and found highly suitable for the pesticide applicators and these could be worn during pesticide application without causing any health problems. The respondents accepted the developed protective clothing and accessories without any hesitation.

IMPORTANT MEETINGS

Research Advisory Committee

The 11th Research Advisory Committee meeting was held on 13 April, 2010 at Directorate of Research on Women in Agriculture, Bhubaneswar. The RAC appreciated the progress of the projects and made valuable suggestions. The following members were present in the meeting.

Dr V.K. Tewari	-	Chairman
Dr Manas Mohan Adhikary	-	Member
Dr Krishna Srinath	-	Member
Dr (Mrs.) Vijaya Sethi	-	Member
Dr (Mrs.) Usha R. Mehra	-	Member
Dr S.K. Srivastava	-	Member Secretary

Institute Research Council

The 9th and 10th Institute Research Council meetings of Directorate of Research on Women in Agriculture were held on 3-4 May 2010 and 23rd October, 2010. Detailed deliberations were held on the progress made under different projects. New projects were also finalized. The following persons attended the meeting.

Dr Krishna Srinath, Director	-	Chairperson
Dr V. P. Chahal, Senior Scientist	-	Council nominee
Dr M. Srinath, Principal Scientist	-	Member
Dr M.P.S. Arya, Principal Scientist	-	Member
Dr Suman Agarwal, Principal Scientist	-	Member
Dr A.K. Misra, Principal Scientist	-	Member
Dr S.P. Singh, Senior Scientist	-	Member
Dr P.K. Sahoo, Senior Scientist	-	Member
Dr Naresh Babu, Senior Scientist	-	Member
Dr Sabita Mishra, Senior Scientist	-	Member
Dr H.K. Dash, Senior Scientist	-	Member
Dr Jyoti Nayak, Senior Scientist	-	Member
Smt L.P. Sahoo, Scientist (SS)	-	Member
Smt Abha Singh, Scientist (SS)	-	Member
Dr S.K. Srivastava, Senior Scientist	-	Member-Secretary

Institute Management Committee Meeting

The 13th Institute Management Committee Meeting was held on 15 May 2010 at Directorate of Research on Women in Agriculture, Bhubaneswar. The following members were present in the meeting.

Dr. (Mrs) Krishna Srinath Director,DRWA, Bhubaneswar	Chairperson
Dr. M.M. Panda Dean (Research),OUAT, Bhubaneswar	Member
Dr. S. Gopal Sharma Head, Biochemistry, Physiology & Environment Science, CRRI, Cuttack	Member
Dr. (Mrs.) Archana Mukherjee Principal Scientist, Regional Centre, CTCRI, Bhubaneswar	Member
Sh. V. Ganesh Kumar AAO, DRWA, Bhubaneswar	Member Secretary

DRWA-IRRI collaborative workshop

A two day training-cum-workshop on strengthening gender prospective in SRLS subprojects of NAIP was organized on 1-2 September, 2010 at Directorate of Research on Women in Agriculture (DRWA), Bhubaneswar by DRWA, in collaboration with IRRI, Philippines under Visioning, Policy Analysis and Gender (V-PAGe), subproject of NAIP to discuss different interventions and to identify gender action points under SRLS (Sustainable Rural Livelihood Security) subprojects and finalize the templates developed for assessing gender role in livelihoods and gender sensitivity of project interventions for implementation. Twenty six participants including the CPIs, scientists and research staff from five selected SRLS consortia i.e. OUAT, Bhubaneswar; CRIDA, Hyderabad; BAIF, Pune; BAU, Ranchi and VPKAS, Almora attended the programme.Dr. Krishna Srinath, Director, DRWA welcomed the participants and apprised them of the significance of gender role in achieving sustainable livelihood security and the need for looking at gender perspective in livelihood intervention planned under SRLS subprojects. Dr. Thelma Paris, gender expert from IRRI, Philippines, gave a brief introduction about the background and objective of the workshop.

National Seminar on Gender and Biodiversity

On the occasion of the International year of Biodiversity a two-day long National Seminar on 'Gender and Biodiversity' was organized in collaboration with UNDP, National Biodiversity Authority, Chennai and Research Association for Gender in Agriculture, Bhubaneswar on 28 – 29 December 2010 with following aims:

- Discuss and understand the role of women in biodiversity in different agro-ecosystem and policies and rights relating to biodiversity conservation and management in India.
- Share experiences and best practices in biodiversity conservation and management in gender perspective.
- Sensitization of the stakeholders' about the importance of biodiversity conservation and management

The seminar was inaugurated by Dr Aurobindo Behera, IAS, Principal Secretary, Forest and Environment Deptt., Govt. of Orissa and Chairman, Orissa State Biodiversity Board, Bhubaneswar. In his address he highlighted the important role played by women through ages in conservation of biodiversity and stressed upon developing linkages and collaborations between agencies to address the issues of biodiversity. Four publications related with gender mainstreaming were released. About 70 delegates including researchers, policy makers, development practitioners, academicians and NGOs from Madhya Pradesh, New Delhi, Tamil Nadu, Karnataka, Meghalaya and Odisha participated in the seminar.

Twenty-five invited papers were presented in the seminar and the following recommendations were made during deliberations.

- Documentation and conservation of biodiversity in tribal and rural areas need to be prioritized.
- Strengthen the linkages and collaboration between research and development agencies to conserve biodiversity.
- Mobilization and sensitization of farming community particularly women for conservation and management of biodiversity.
- A database on passport information on genetic resources provided by women need to be developed to recognize the contribution of women in conserving biodiversity.
- Collaborative research between NBPGR and other research institutions is needed to conservation and management of biodiversity.
- Case studies on community initiatives in biodiversity conservation and their impact on community and environment need to be undertaken.
- Scattered knowledge needs to be capitalized, evaluated and centrally disseminated to avoid confusion and conflict among stakeholders.

Stakeholders' meet on women friendly farm tools and equipment

Two-day interaction meet on Women-friendly Farm Tools and Equipment was organized on 4-5 October 2010 in collaboration with the Deptt. of Agriculture, Govt. of Orissa, OUAT, Bhubaneswar and CRRI, Cuttack. The meet focused on status of women-friendly farm tools and equipments, adoption of farm tools, safety and ergonomics, production and marketing, government policies for promotion and research and development to meet future challenges. The meet was attended by

Scientists of DRWA, CIAE, Bhopal, CRRI, Cuttack, CIPHET, Ludhiana, IISR, Calicut, NRC on Seed Spices, Ajmer, OUAT and AICRP on Home Science, ANGRAU, KVKs and Research and Development Agencies of Deptt. of Agriculture, Govt. of Odisha and manufactures. Meet was also attended by more than 50 farm women carrying out different types of farming including turmeric farmers of Kandhamal. A display of about 50 farm tools and equipment including household level drudgery reducing equipment and protective clothing suitable for farm women was arranged on this occasion. The Meet was inaugurated by Sh. U. P. Singh, Principal Secretary-cum-Commissioner, Deptt. of Agriculture, Govt. of Odisha. The meet was also graced Dr. M.M. Anwar, Director, NRC on Seed Spices, Ajmer, Dr Md. Khalid Khan , Dean, College of Agricultural Engineering and Technology, OUAT, Dr, L.P. Gite, Project Coordinator, CIAE, Bhopal, Dr B.C.Parida and Dr P.N. Mishra from CRRI, Cuttack, Er P.K.Paikray, Executive Engineer Meet made following recommendations:

- A catalogue on women-friendly farm tools and equipment needs to be developed.
- Good market potential exists for women friendly tools and equipment and hence there is a need to promote the manufacturing of such items with after sales services.
- While identifying equipment for farm women under government schemes for subsidy, a gender expert may be included in the technical committee.
- Proper training need to be imparted to farm women in the operation of identified tools and equipment and a set of such equipment may be made available at the block level.
- Increasing trend in the enrolment of girl students in engineering courses is a good opportunity for designing, development and refinement of farm tools and equipment in women perspective.
- Ergonomics may be introduced as a core course in the U.G. curriculum of agricultural engineering discipline.

Women in Agriculture Day

The Directorate of Research on Women in Agriculture observed Women in Agriculture Day on 4 December 2010 at the DRWA Headquarters as well as at KVK, Vikash Bharti, Gumla, Jharkhand. The theme of the day was Empower women to defeat hunger. At Gumla an interaction was arranged with the 700 farmwomen. The programme was organized by DRWA jointly with the Zonal Project Directorate, Zone-II, Kolkata. The programme was inaugurated by Dr Krishna Srinath and attended by Dr A.K. Singh, ZPD, Zone-II. Sh Ashok Bhagat, Chairman, KVK, Gumla chaired the meeting. An exhibition of value added products prepared by SHGs from locally available resources was also arranged on this occasion. At DRWA an interactive session and exposure visit were arranged for 25 farmwomen.

Rajbhasha implementation

Rajbhasha Hindi meetings were organized regularly during each quarter of the year. Hindi Chetna Mass was observed at DRWA from 14 September - 13 October, 2010. Hindi Divas was also celebrated on 14 September. Four competitions were organized for both Hindi and non-Hindi speaking staff of the institute during the Hindi Chetna Mass and winners of various competitions were given away prizes. The programme was ended with the appeal to all the members to make more use of Hindi in their office work for its promotion. Four Hindi workshops were organized for the staffs of DRWA during each quarter of the year.

PUBLICATIONS

Research papers

Attri, B.L. and Singh, Abha. 2010. Effect of different salt concentrations on drying and non-enzymatic browning of mango slices. *Indian J. Hort.* **67**: 485-487.

Sahoo, P.K., Dash, H.K. and Biswal, J. 2009. Promotion of ornamental fish production through women's participation. *Journal of Extension Education.* **14** (1 & 2): 54-60.

Sahoo, P.K., Biswal, J.R. Sahoo, S. and Dash, H.K. 2007. Carp fry rearing in small and backyard ponds of rural Odisha : An avenue for economic upliftment for rural women. *J. Aqua.* **15**:45-53.

Singh, S.P. and Singh, Pratap. 2010. Hand operated maize dehusker-sheller for farm women. *Agricultural Engineering Today.* **34**(1): 25-29.

Singh, S.P. 2009. Physiological workload of women workers in operation of manual rice transplanters. *Gender, Technology and Development.* **13**(2): 271-284.

Singh, S.P. 2010. Ergonomic evaluation of cono-weeder with farm women. *Agricultural Engineering Today.* **34**(3): 31-36.

Singh, S., Singh, R.S. and Singh, S.P. 2010. Farm power availability and agriculture production in India. *Agricultural Engineering Today.* **34**(1): 9-20.

Presentations in Conferences/ Symposia/ Seminars/ Workshop

Arya M.P.S., Tripathi P.C., Mishra A.K. and Srivastava, S.K. 2010. Contribution of women in agriculture. Lead paper. *XII National Agriculture Science Symposium on Management of natural resources for sustainable agriculture production, improvement and conservation* held on April 22-24, 2010 at CSSRI, Karnal. pp106-115.

Naresh, Babu, Srivastava, S.K., Arya, M.P.S. and Krishna Srinath 2010. Strengthening Livelihood Security of Farmwomen through Promotion of Leafy Vegetable- Amaranth. Proceeding. *International Conference of Horticulture - Horticulture for Livelihood Security and Economic Growth* from 9- 12 November. 2009 at Bangalore. pp1962-1965.

Krishna Srinath and Ponnusamy, K. 2011. Gender mainstreaming through public private partnership in agriculture. Keynote address. *National Seminar on Engendering agricultural production and marketing through public private partnership* on 27.01.2011 at Coimbatore organised by Avinashilingam Deemed University for Women. pp 8-17.

Nayak, Jyoti., Singh, S.P. and Moharana, G. 2010. Women and inner environment. *National Seminar on Gender and Biodiversity* at DRWA, Bhubaneswar, December 28-29, p44.

Rout, S.K. and Nayak, J. 2010. Gender related farm mechanization towards sustainable agriculture & food security. Abstract. *National Seminar on Sustainable Agriculture & Food Security: Challenges and Opportunity* at OUAT, Bhubaneswar, p186.

Singh, Abha and Krishna Srinath. 2010. Orange fleshed sweet potato for alleviating vitamin A deficiency in infants. *Indian Horticulture Congress,* 2010 during 18-21 November, 2010, New Delhi.

Singh, S. P., Singh, Pratap and Singh, S. 2011. Effect of posture and speed on torque and energy expenditure during hand cranking at constant frictional load. Engineering Interventions in Agriculture (Farm Machinery & Power), NSAE- 2011, Eds. VK Pandey, A K Dave, A K Agrawal, S Karthikeyan, MP Tripathi and J S Nikhade, IGKV, Raipur, 63-70.

Singh, S.P., Singh, Pratap and Singh, S. 2011. Ergonomics in developing hand operated maize dehusker-sheller for farm women. Abstract. *45th Annual Convention & Symposium of ISAE*, held at Nagpur from Jan. 17-19, pp375.

Singh, S.P., Singh, S. and Singh, Pratap. 2010. Biomechanical parameters while operating maize dehusker-sheller. Lead Paper, *National Symposium on Engineering Agriculture for Evergreen Revolution,* 24-25 September. Indian Society of Agricultural Engineers, A. P. Chapter, Hyderabad: pp285-290.

Srivastava, S.K., Arya, M. P. S., Naresh Babu, Sarangi, D. N. and Krishna Srinath. 2010. Pest management in okra using locally available botanicals - gender friendly approach. Abatracts: *National Symposium on Emerging trends in pest management strategies under changing climatic scenario*, organised by Society for Plant Protection and Environment, OUAT, Bhubaneswar 20-21 December, 2010. p211

Srivastava, S.K., Arya, M.P.S., Naresh Babu, Behera, B.C. and Jena B.C. 2010. Biodiversity conservation-why and how? Abstracts. National *Seminar on Gender and Biodiversity* held on 28-29 December 2010 at DRWA, in collaboration with UNDP, National Biodiversity Authority Chennai and Research Association for Gender in Agriculture, Bhubaneswar. pp.54-58.

Srivastava, S.K., Naresh Babu and Krishna Srinath. 2010. Effect of panchgavya on growth, pest incidence, yield and shelf life of brinjal. Proceedings. *International Conference on Horticulture*. PNASF, Bangalore, Eds. Sulladmath, U.V. and Swamy, K.R.M. pp1746-1748.

Srivastava, S.K., Behera, B.C., Sadangi, B.N. and Krishna Srinath. 2010. Participatory evaluation of *bindi* technique of weed management with gender concern in coastal agro eco-system of Odisha. Abstract. *9th National Symposium of ISCAR*, Goa, October 27-30, 2010. pp118-19.

Technical bulletin/Abstract

Biswal J. and Sahoo, P.K. 2010. Gramina Mahilanka Arthik–urnati pai Rangin Machha Chash(in Oriya). Technical Bulletin, DRWA, Bhubaneswar. Pp 1- 13.

Srivastava, S. K., Arya, M. P. S., Agarwal, S. and Singh, Abha. 2010. Abstracts *on National seminar on Gender and Biodiversity.* 28-29 December, 2010 organised by DRWA, Bhubaneswar in collaboration with UNDP, National Biodiversity Authority, Chennai and Research association for Gender in Agriculturre, Bhubaneswar. Pp 1-67.

Popular articles

Arya M.P.S., Tripathi P.C., Misra A.K. and Srivastava S.K. 2010. Bhartiya Krishi mein mahilaon ka yogdaan. *Krishi Kiran.* 3: 96-100.

Naresh, Babu, Srivastava S.K. and Prusti M. 2011. Tomato seed production-Promising enterprise for women. *Sabujima.* 19:36-38.

Srivastava S.K, Priyanka Rani, Naresh Babu and Behera, B.C. 2011. Nutritional interventions- New approach to minimize chemical hazards. *Sabujima.* 19: 33- 35.

Singh, S P. 2010. Maize dehusker-sheller. *ICAR News*, 16(3): 12.

Singh, S P., Singh, S. and Singh, Pratap. 2011. Hand operated maize dehusker-sheller: An option for small and hill farmers. *Agrovet Buzz,* 4(1): 20-21.

Srivastava, S.K., Rani Priyanka, Naresh Babu and Behera, B.C. 2011. Nutritional interventions: New approach to minimize chemical hazards. *Sabujima.* 19: 33-35.

Behera, B.C., Srivastava, S.K. and Sahu S.R. 2011. Food security through increased pulse production in Odisha: Importance, constraints and techniques. *Sabujima,* 19: 44-47.

TV programme

Sabita Mishra Participated in Live Phone-in programme of DDK, Bhubaneswar on "*Mahilanka Pain Krishi Jantrapati*" (Agriculture implements for farm women) on 26 November, 2010.

Award / Recognition:

S P Singh selected for Bharat Jyoti Award. India International Friendship Society, New Delhi

S.K. Srivastava awarded Best paper award oral presentation in Technical Session - IV , for the paper entitled Pest management in okra using locally available botanicals - gender friendly approach by S.K. Srivastava, M.P.S. Arya, Naresh Babu, D.N. Sarangi and Krishna Srinath during National Symposium on emerging trends in pest management strategies under changing climatic scenario, organised by Society for Plant Protection and Environment, Department of Entomology, College of Agriculture, Odisha University of Agriculture and Technology, Bhubaneswar from 20-21 December,2010.

K. Ponnusamy, received the Best Article Award for research paper entitled, "An assessment of sustainable livelihood parameters in coastal farming systems" published in Indian Journal of Dairy Science in the year 2009 during the XXXIX Dairy Industry Conference on 06.02.2011 at Kolkata.

Leaflet/Folders

DRWA hand operated maize dehusker-sheller. Women Empowerment Series No. 17. 2010. Directorate of Research on Women in Agriculture (DRWA)- Bhopal Sub-centre, CIAE Campus, Bhopal: 1-4.

Hand Operated Maize Dehusker Sheller. Women Empowerment Series No. 17

Gender Sensitive Extension Models. Women Empowerment Series No. 18

Low cost weaning food for combating malnutrition among infants. Women Empowerment Series No. 19.

Zero energy cool chambers. Women Empowerment Series No. 20.

Meeting attended by Dr Krishna Srinath, Director

Visited the sub-centre at Bhopal and reviewed the activities, 6 April 2010.

Brainstorming session on ICAR 2030 Vision on Perspective Plan at NAARM, Hyderabad, 12 April, 2010.

Annual Review Meeting of the AICRP on Home Science at MPAUT, Udaipur, 21-22 April, 2010.

Meeting at NFDB for finalization of demonstration units under Network project on Capacity building of coastal fisher women through post harvest technologies in fisheries at Hyderabad, 17 May 2010.

Interaction meeting on ATIC at New Delhi, 1-2 July, 2010.

Meeting with Secretary, National Biodiversity Authority regarding the celebration of International Year of Biodiversity.

Finalization of work plan under the inter-institute project on Development strategies for gender empowerment through suitable brackishwater aquaculture technology in Odisha state at Chennai, 9-11 July 2010.

ICAR Directors' Conference at New Delhi, 15-16 July 2010.

ICAR Foundation Day at New Delhi, 16 July 2010.

Interaction meet on Agricultural mechanization at CIAE, Bhopal, 23 July 2010.

Divisional review by DG, ICAR at New Delhi, 4 August 2010.

17th Extension Council Meeting at CIFE, Mumbai, 14 August, 2010.

XXth meeting of ICAR Regional Committee at CARI, Port Blair, 14-17 September 2010.

National Consultation on Future Approaches in Agricultural Extension (As instructed by DDG (AE) and 37th Foundation Day of Agricultural Scientists Recruitment Board at ICAR New Delhi, 31 October, 2010 - 03 November 2010.

Women in Agriculture Day awareness programme for farmwomen at Gumla, Jharkhand, 4 December 2010.

Review of the Network project on Development of expert system for crop and animal enterprises at TNAU, Coimbatore, 25 January 2011.

Third National Project Steering Committee Meeting of the UNEP/GEF Project entitled Conservation and sustainable use of cultivated and wild tropical fruit tree diversity: promoting sustainable livelihoods, food security and ecosystem services at New Delhi, 15 February 2011.

Directors-Vice Chancellors Interface & meeting and ICAR Directors' Conference at New Delhi, 23-24 February 2011.

Divisional Review by DG with chair of RAC at New Delhi, 28 February 2011.

Seminar on Water used in agriculture challenges ahead at Directorate of Water Management, Chandrasekharpur, Bhubaneswar, 22 March 2011.

APPOINTMENTS

Dr. B. N. Sadangi, Principal Scientist, Extension, selected as Head at CRRI, Cuttack.

Dr. P. C. Tripathi, Principal Scientist, Horticulture, selected as Head at CHES Chethali.

Sh. P. R. Sahoo, T-3, selected as T-6 at CIFA, Bhubaneswar. .

Ms. Gayatri Moharana joined as a Scientist (FRM) at DRWA on 27th August, 2010.

Dr. A. K. Mishra, Principal Scientist appointed as Head at CAZRI, Jodhpur, Rajasthan. (October, 2010)

Dr. A.K. Shukla joined DRWA, Bhubaneswar as a Principal Scientist (Horticulture) (19th Nov., 2010)

Dr. K. Ponnusami joined DRWA, Bhubaneswar as a Principal Scientist Agri. Ext. (24 November, 2010)

Dr. Kundan Kishore joined DRWA, Bhubaneswar as a Senior Scientist Horticulture. (31st December, 2010)

Sri. S. K. Nayak joined as a Technical Assistant. (10th November, 2010).

Sh. J. R. Das joined DRWA, Bhubaneswar as LDC. (29 July, 2010)

Sh. P. Mallick joined DRWA, Bhubaneswar as Junior Stenographer. (29 July, 2010)

SUPERANNUATION

Dr. M.Srinath Principal Scientist, Statistics, retired from ICAR service on 31st May, 2010.

Research Collaborations

During Implementation of various research programmes, collaboration was established with ICAR Institutes, State Agricultural Universities, Government Departments, NGOs and Private Stake holders.

The list of important collaborators

AAU, Jorhat	CSKHPKV, Palampur	NAARM, Hyderabad
ANGRAU, Hyderabad	CTCRI, Thiruvanathapuram,	NCAP, Hyderabad
APICOL, Bhubaneswar	DOEE, TANVASU, Chennai	NFDB, Hyderabad
AUW, Coimbatore	DOEE, TNAU, Coimbatore	National Horticulture Board,bhubaneshwar
BAU, Ranchi	DRR, Hyderabad,	National Horticulture Mission, Odisha
BIFE, Pune	FC &RI, Thoothukudi,TANVAS, Chennai	Odisha Agro Industry
CCSHAU, Hissar,	GBPUAT, Pant Nagar	OUAT, Bhubaneswar
CIBA, Chennai	IASRI, New Delhi	PAU, Ludhiana
CIFE, Mumbai,	ICAR, Research Complex for NEH Region, Umiam,	PGIV&AS, Akola
CIFT, Kochi,	IIHR, Bangalore,	Sea Shore Agricultural Promotion Company, Bhubaneswar
CIPHET, Abohar,	IVRI, Izatnagar,	Line Departments of Government of Odisha
CISH, Lucknow	KAU, Kerala,	UAS, Dharwad
CITH, Mukteswar	KVK, ANGRAU, West Godawari	UAS Bangalore
CMFRI, Kochi	KVK, Powerkheda, JNKVV, Jabalpur	VC&RI, Namakkal
CRIDA, Hyderabad	MAU, Parbhani	VPKAS, Almora
CRRI, Cuttack,	MPUA&T, Udaipur	ZCU, Zone VIII, Bangalore

RESEARCH PROJECTS

S No	Title	PI & Co PI	Duration
Institute Project (Ongoing)			
1.	Nutritional security as related to livelihood patterns among tribal families of Odisha	Smt Abha Singh	2008-10
2.	Development of gender information system for Agriculture	Dr H.K. Das, Dr Sabita Mishra	2008-12
3.	Resource base traditional knowledge and participation of farmwomen in livestock production	Dr A. K. Mishra, Dr P. K. Sahoo, Smt Abha Singh	2008-11
4.	Refinement and development of horticulture based cropping models for gender mainstreaming	Dr Naresh Babu, Dr Kundan Kishore, Dr A.K. Shukla	2008-13
5.	Ergonomical interventions in developing hand operated maize dehusker sheller for farm women	Dr S. P. Singh	2009-11
6.	Empowerment of farmwomen through information and communication technologies (ICTs).	Dr Suman Agarwal, Dr Sabita Mishra	2009-12
7.	Refinement of vegetable based organic farming practices with gender perspective	Dr Naresh Babu, Dr M.P.S. Arya, Dr S.K. Srivastava	2009-12
8.	Assessment and refinement of aquaculture technologies for gender mainstreaming.	Dr P.K. Sahoo, Dr A. K. Mishra	2008-11
9.	Refinement of storage pest management techniques in selected cereals, pulses, condiments and spices with gender perspective	Dr S.K. Srivastava, Dr Suman Agarwal, Dr Naresh Babu	2008-11
10.	Involvement of tribal women in post harvest handling and marketing of fruits, vegetables and non-timber forest produces	Dr Sabita Mishra, Dr H.K.Dash	2009-12
11.	Reducing the gender gap in nutritional status of family members in rice based farming system	Smt Abha Singh, Dr M.P.S. Arya	2010-13
12.	Occupational health hazards of farm women at their workplace in Bhopal	Dr Jyoti Nayak,Dr S.P. Singh,Kumari Gayatri Moharana	2010-2012
Network Project			
13.	Public-private partnership for gender mainstreaming in agriculture. **Network Centres :** DRWA, Bhubaneswar, KAU, Kerala, CCSHAU, Hissar, AAU, Jorhat, AUW, Coimbatore and MPUAT, Udaipur	Dr Krishna Srinath, Dr Sabita Mishra Dr K. Ponnusamy, Dr M. P. S. Arya	2009-12
14.	Assessment of gender issues, identification and refinement of selected women specific technologies in Horticulture crops. **Network Centres:** DRWA, Bhubaneswar, IIHR, Bangalore, CTCRI, Thiruvanathapuram, CIPHET, Abohar, CISH, Lucknow and CITH, Mukteswar	Dr A.K. Shukla, Dr Naresh Babu Dr Kundan Kishore, Dr K.Ponnusamy	2008-12
15.	Gender issues in rice based production system and refinement of selected technologies in women perspective. **Network Centres:** DRWA, Bhubaneswar, CRRI, Cuttack, DRR, Hyderabad, KAU, Kerala and GBPUAT, Pant Nagar	Dr. M.P.S.Arya, Dr S.K. Srivastava, Dr S.P. Singh	2009-12
16.	Capacity building of coastal fisher women through post- harvest technologies in fisheries. **Network Centres:** DRWA, Bhubaneswar, CIFT, Kochi, CIFE, Mumbai, NFDB, Hyderabad, FC &RI, Thoothukudi, OUAT, Bhubaneswar and KVK, ANGRAU, West Godawari	Dr P.K. Sahoo, Smt Abha Singh	2009-12
17.	Enhancing livelihood of rural women through livestock production. **Network Centres:** DRWA, Bhubaneswar, IVRI, Izatnagar, ICAR, Research Complex for NEH Region, Umiam, VC&RI, Namakkal and PGIV&AS, Akola	Dr A. K. Mishra, Dr P. K. Sahoo	2008-12
18.	Development of expert system for crop and animal enterprises. **Network Centres:** DRWA, Bhubaneswar, ZCU, Zone VIII, Bangalore, DOEE, TNAU, Coimbatore and DOEE, TANVASU, Chennai	Dr S. K. Srivastava / Dr. K. Ponnusamy	2008-12
Externally Funded			
19.	NAIP on Visioning, Policy Analysis & Gender (VPAG -e)	Dr Krishna Srinath, Dr H.K Das, Dr K. Ponnusamy	2007-12
AICRP on Home Science			
20.	All India Coordinated Research Project on Home Science	Dr Krishna Srinath, Dr Suman Agarwal	2007-12

PERSONNEL

(As on 31 March 2011)

Sl. No.	Name	Designation
1.	Dr Krishna Srinath	Director
2.	Dr M.P.S Arya	Principal Scientist (Agronomy)
3.	Dr Suman Agarwal	Principal Scientist (HDRM)
4.	Dr S.K. Srivastava	Principal Scientist (Entomology)
5.	Dr Anil Kumar Shukla	Principal Scientist (Horticulture)
6.	Dr K Ponnusamy	Principal Scientist (AE)
7.	Dr Prabati Kumari Sahoo	Senior Scientist (Fish & Fishery)
8.	Dr Sabita Mishra	Senior Scientist (AE)
9.	Dr Shiv Pratap Singh	Senior Scientist (FPM)
10.	Dr Naresh Babu	Senior Scientist (Horticulture)
11.	Dr Hemanta Kumar Dash	Senior Scientist (Agril. Economics)
12.	Dr Jyoti Nayak	Senior Scientist (FRM)
13.	Dr Kundan Kishore	Senior Scientist (Horticulture)
14.	Smt. Laxmipriya Sahoo	Scientist-SS (Seed Technology)
15.	Smt. Abha Singh	Scientist-SS (Food & Nutrition)
16.	Smt. Gayatri Moharana	Scientist (FRM)
17.	Smt. Geeta Saha	Technical Officer (T-5)
18.	Smt. Nidhi Agarwal	T- 4
19.	Shri B. C. Sahu	T- 3
20.	Shri. D.N.Sadangi	T- 3
21.	Shri. Bhikari Behera	T- 3
22.	Shri. Manoranjan Prusty	T- 3
23.	Shri Sujit Nayak	T- 3
24.	Shri V. Ganesh Kumar	Assistant Administrative Officer
25.	Shri S. K. Das	Assistant Finance and Account Officer
26.	Smt. Parisima Sen	Personal Assistant
27.	Smt. Bishnupriya Moharana	Assistant
28.	Shri Parikshit Mallick	Stenographer Gr. III
29.	Shri Jyoti Ranjan Das	Lower Division Clerk
30.	Shri. Biswanath Biswal	S.S.S

कृषिरत महिला अनुसंधान निदेशालय
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