

Annual Report

2012-13



Directorate of Research on Women in Agriculture
(Indian Council of Agricultural Research)
Bhubaneswar-751003

Annual Report

2012-2013

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Preface

Contribution of women in the agriculture sector is immense. There is every likelihood of increase in overall development of rural families if due consideration is given to develop gender sensitive agricultural technologies, extension and development models, working environment including their health and hygiene. The Directorate of Research on Women in Agriculture has been making efforts in this direction through in house projects, network programmes, sensitization of line departments and developing global linkages. Network Projects and the AICRP on Home Science continued its effort in empowering farm women by understanding the critical areas of women's participation for various sub sectors and activities through collection of gender disaggregated data and collecting evidences through action research. An understanding of the sector wise gender participation in agriculture, trends in enrolment of girls in higher agriculture education and documentation of research contributions in the subject are the important outcomes of these endeavours. These have facilitated 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 ICAR research institutes, agricultural universities and development departments. Farm and home being inseparable units dealing with human development, research programmes under AICRP continued to address food and nutritional, drudgery reduction in farm and home, infant stimulation packages for farm families, empowerment of adolescent girls, value addition of farm byproducts and protective clothing. An innovative approach towards technology dissemination was also initiated in the form of AICRP-KVK Interface Workshops implemented by all the coordinating centres.

I feel proud in presenting the salient achievements of the Institute 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) and Dr. Krishna Srinath, former Director, DRWA for guiding the scientists and supporting each and every person of DRWA which resulted in achieving the goals set for the Directorate.

Mahendra Pal Singh Arya
Acting Director

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EXECUTIVE SUMMARY

The Directorate on Women in Agriculture has been undertaking research in the mandated activities through programmes in Institutional and network mode besides AICRP on Home Science. The major achievements during the year are as under.

The Public Private Partnership (PPP) model for gender mainstreaming was undertaken in Assam, Kerala, Tamil Nadu and Odisha. The impact of gender mainstreaming through the project on vermi-composting was evaluated by undertaking a field study in Jorhat district of Assam. The farmers reported that there was an increase in the yield by 10-15 percent and realized higher returns for their produce. The PPP model helped in creating market demand in the villages and facilitated the sale of surplus produce through fairs and exhibitions. In Kerala, a PPP model for cultivation of oyster and milky mushrooms with commercial viability was established through selected women groups in the districts of Palakkad and Thrissur. The PPP model for vegetable cultivation in Tamil Nadu identified the constraints observed by farm women. Appropriate institutional arrangements need to be put in place to take care of the constraints experienced by farm women while undertaking vegetable marketing in the PPP mode. This model for QPM maize cultivation was taken to the farm women of Bantala village in Khorda district in Odisha and the perceived impact on gain in knowledge and skill on men and women were analyzed in the adopted village.

Gender issues involved in transplanting of rice were studied in association with a local NGO in the model village project. It was observed that the line planting took 20 per cent more time as compared to random planting. Men were involved mostly in

carrying seedling to the field (80.20%) and stretching rope for line planting (49%). Ergonomical parameters such as musculo skeletal discomfort (highest in midback and lowest in ankle), physiological stress (heart rate 88.7 to 103 beats/minute) and grip fatigue were within the acceptable range. Advantages of line planting outweighed the disadvantages. Impact of gender participation in biological pest control in paddy was also studied. Cropping system management through introduction of pulse cultivation on field bunds can take care of the nutritional requirements of farm families.

A study on access of farm women to extension services and credit revealed that women exhibited more interest to take extension messages in group contact while men evinced enthusiasm in all the methods. It was also found that the gender gaps disappeared when access to productive inputs were equalized. The farm women preferred the messages in the areas of mushroom cultivation, nutrition garden, care of domestic animals and credit facility.

Expert systems were developed in English on five major crops : paddy, sugarcane, banana under precision system, coconut and finger millet; and three animal enterprises namely, cattle & buffalo, sheep & goat and poultry. Later these were translated into regional languages - Tamil, Kannada and Malayalam, for the benefit of farmers belonging to the respective states.

Refinement of storage pest management techniques in selected cereals, pulses, condiments and spices with gender perspective was undertaken using camphor, asafoetida, clove, neem oil etc. which is commonly available in rural households.

Research gaps were identified under a network project on assessment of gender issues identification and refinement of selected women specific technologies in horticultural crops, operational in six centres. Interventions taken to address these gaps were (i) seedling raising in portrays inside protected structures, (ii) planting on raised beds for better survival, (iii) introduction of high yielding brinjal, bitter gourd, cucumber and pumpkin, (iv) nursery raising under protected structures with 50% agro-shed net, (v) cultivation of off-season and high value vegetables and (vi) proper staking/training of cucurbits.

Considering the potential of vegetables, technologies have also been standardized for protected cultivation of off- season tomato and cucumber; which gives Rs. 250- 400/ m² annually. The farm women are being trained to upgrade their skills so that they can earn more returns from the unit area of poly house/ net house.

Entrepreneurial capability of farmwomen through hands-on training in processing of guava, lemon and ginger for making squash were carried out at DRWA and their impact studied.

To make quality planting materials available to rural women, *in-vitro* propagation technique for gourd vine was optimized using the nodal portion as explants. The best initial micro-shoot response was obtained when the explants were cultured on the MS medium containing Kinetin 8.0 mg/l. The sub-culturing medium with 4.0 mg/litre NAA produced maximum regenerated shoots with good shoot growth. *In-vitro* rooting was optimized with 0.4 NAA mg/ litre gave highest root initiation and also number of roots.

Appropriate technologies were assessed and suitable interventions were made to improve the skill and livelihood of women livestock keepers with goats, pigs, backyard poultry and area specific mineral mixture at five network centres. Women were motivated to use revolving stool (*pirhi*) for milking animals which reduced their drudgery and increased work efficiency. Hybrid napier fodder was introduced in the backyard garden and along the drainage channels which provided green fodder to their milch animals. There was a general lack of awareness regarding use of chaff cutter and feeding trough for feeding the animals resulting in loss of animal feed.

The All India Coordinated Research Project (AICRP) on Home Science is in operation in nine State Agricultural Universities. The main thrust of the project is empowerment of rural women for improving the quality of life of farm families. It focused on development of gender specific database and training modules for farm women, technology interventions for drudgery reduction in agriculture, nutritional security and promotion of health of farm families, promoting vocational skills among adolescent girls, value addition to under-utilized natural fibre resources, utilization of degradable / non-degradable farm waste and empowerment of rural women. To study the gender participation in agriculture, data pertaining to 8875 households from 46 agro-climatic zones were analyzed through selected indicators. For economic empowerment of women, nine training modules were developed for establishment of micro-enterprises. In the areas of drudgery reduction in agriculture, 19 technologies were field validated and trainings/demonstrations on these were given to the women of self help groups. To combat micro nutrient deficiency

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among rural families, 510 nutrition gardens were established in *rabi* and *kharif* season. Need assessment was done for promotion of vocational skills among adolescent girls and young mothers and 55 skill oriented training programmes were organized for 1351 adolescent girls/mothers and *anganwadi* workers. Underutilized locally available fibres were used to produce value added products for income generation and disseminated to farmwomen in adopted villages for economic

empowerment of farmwomen. Protective garments were designed and developed to protect farmwomen from health hazards faced during pesticide application.

The Directorate observed Hindi *Chetna Mas* by organizing various literary and awareness programmes. Research Advisory Committee, Institutional Research Council and on campus trainings were also organized by the Directorate.





1. INTRODUCTION

1.1 Brief History

On the recommendation of the Working Group on Agricultural Research and Education constituted by the Planning Commission for the formulation of the Eighth Five Year Plan (1992-97), National Research Centre for Women in Agriculture was established at Bhubaneswar with a sub-centre located in the campus of CIAE, Bhopal in 1996. Further, the Institute was upgraded to the Directorate of Research on Women in Agriculture during XI Plan. Since its inception, DRWA has been in the forefront undertaking research on issues affecting women and the opportunities in agriculture. It has focused on participatory action research in different technology based theme areas involving rural women to test suitability of technologies for women and suggest for their refinement. The Directorate is also working to catalyze and facilitate R & D institutions to bring in farm women perspectives in their programmes.

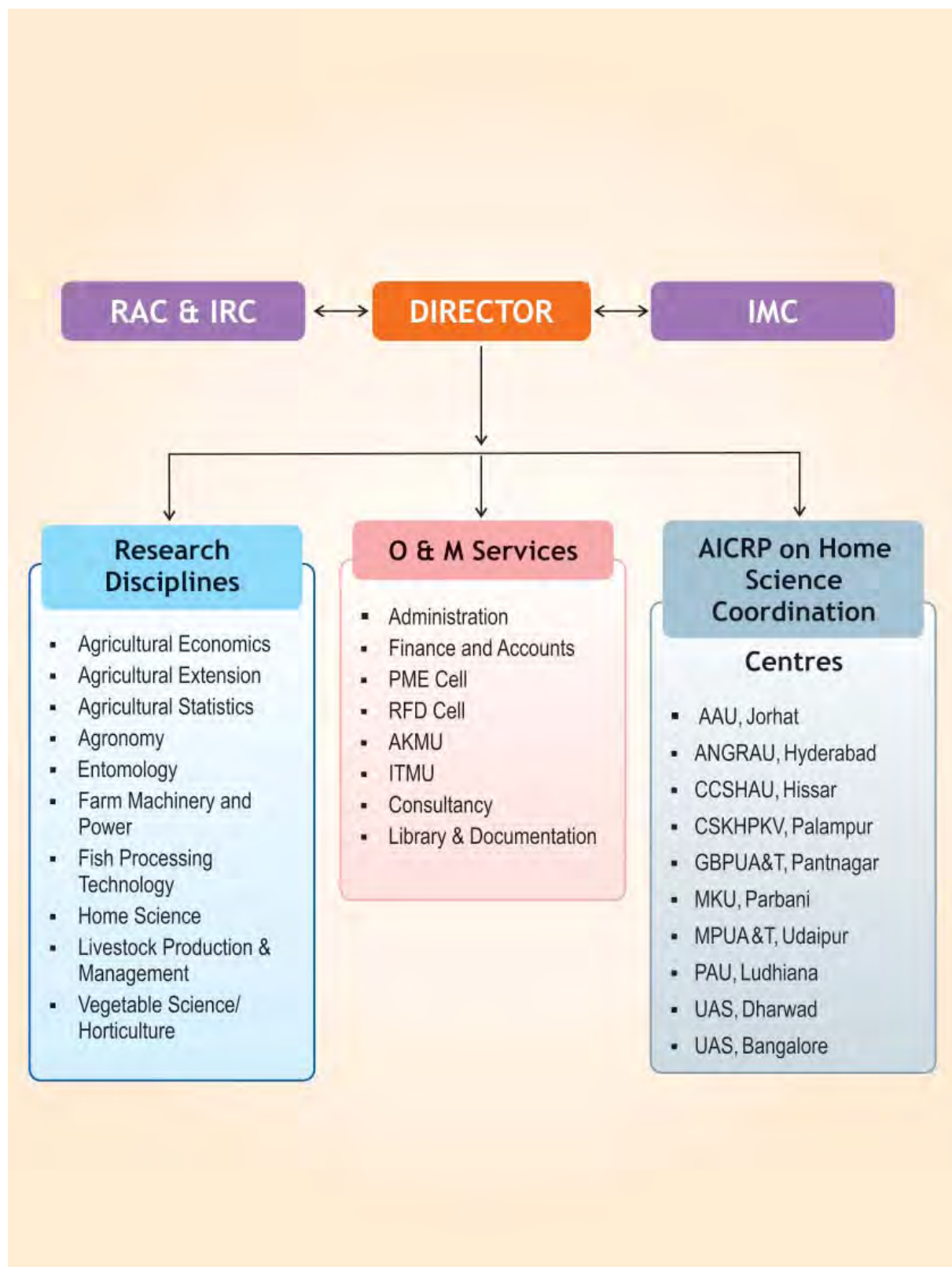
1.2. Mandate

Carrying out basic, strategic and applied research to identify gender issues, testing appropriateness of farm-technologies / programmes / policies with women perspective and capacity building of stakeholders

1.3 Objectives

- Undertake studies to assess farm technologies, programmes, institutions and policies with gender perspective
- Understand the dynamics of gender role in different agro-ecological and production systems and its linkages with agricultural development
- Identify and understand drudgery related issues and other constraints among farmwomen and suggest measures for increasing their work efficiency
- Create and maintain a database on gender in agriculture to meet information needs of stakeholders
- Develop gender sensitive science & technology based models and institutional innovations for sustainable livelihood security and empowerment of women.
- Capacity building of R & D professionals for addressing gender issues in agriculture
- Documentation and dissemination of gender based knowledge among the stakeholders

1.4 ORGANOGRAM OF DRWA



Budget & Expenditure of DRWA for the year 2012-13

(Rs in lakhs)

SI No.	Head of A/C	Plan			Non-Plan		
		BE	RE	Exp.	BE	RE	Exp.
A. Recurring							
1	Establishment Charges	10.00	3.95	3.95	325.00	325.00	300.78
2	OTA	0.00	0.00	0.00	0.00	0.00	0.00
3	TA	10.00	10.00	9.99	5.00	3.75	3.48
4	Contingency including Network Project	70.00	113.95	112.07	30.00	34.25	29.38
5	H.R.D.	5.00	4.00	3.29	0.00	0.00	0.00
6	Minor Works	0.00	0.00	0.00	5.00	5.00	4.32
Sub Total (A)		95.00	131.90	129.93	365.00	368.00	337.96
B. Non-Recurring							
7	Equipment including Network Project	0.00	0.00	0.00	2.00	2.00	1.98
8	Furniture / others	0.00	0.00	0.00	0.00	0.00	0.-00
9	Works	50.00	4.35	4.35	0.00	0.00	0.00
10	Library	5.00	5.00	5.00	0.00	0.00	0.00
11	Minor Works	0.00	0.00	0.00	0.00	0.00	0.00
Sub Total (B)		55.00	9.35	9.35	2.00	2.00	1.98
Grand Total (A) + (B)		150.00	141.25	139.28	367.00	370.00	339.94

AICRP on Home Science

(Rs in lakhs)

Sl. No	Head	BE	RE	Exp.
1	Establishment Charges	900.00	800.00	800.00
2	TA	25.00	25.00	24.99
3	Recurring Contingencies	225.00	325.00	325.00
4	Non-recurring Contingencies	0.00	0.00	0.00
5	Sub Total	1150.00	1150.00	1149.99
6	Grand Total	1300.00	1291.25	1289.27

Cadre Strength as on 31.03.2013

Category	Sanctioned	Filled	Vacant
Director	01	00	01
Scientific	20	17	03
Technical	13	06	07
Administrative	11	07	04
Supporting	01	01	00
Total	46	31	15

2. RESAERCH ACHIEVEMENTS

2.1 Network project on Public Private Partnership for gender mainstreaming in agriculture

K. Ponnusamy, Krishna Srinath and Sabita Mishra

The project was initiated in 2009-2012 at six centers across the country: 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. The various activities undertaken in the project during the year are given below.

2.1.1 Gender mainstreaming for sustainable agricultural production through PPP model in Assam

Farm women in Jorhat District of Assam through Public Private Partnership (PPP) have been practicing and propagating the production and utilization of vermi-compost among the fellow farmwomen in their surrounding areas.

The impact of gender mainstreaming through

vermi-composting was evaluated by undertaking a field study in Jorhat district of Assam. Through this project, first both the men and women were motivated about the technology and then mobilized them based on their involvement through SHGs and NGO partner. Most of the respondents observed the visible benefits of applying vermi-compost in tea gardens and ridge gourd plots which was realized in terms of higher yield, reduction in pest and diseases, substantial reduction of cost of chemical fertilizers and pesticides and disease free plants life. The technology was adopted by the respondents with slight modification based on their perception and available resources. The farmers produced 200 to 500 kg of vermi- compost per cycle (3 to 4 months). They spent about Rs. 1000/- towards bamboo sticks, earthworms and plastic sheet. The farmers reported that there was an increase in the yield by 10-15 percent and realized higher returns for their produce. The leaders of SHGs got a bank account



Fig. 1-2. Vermicompost units in a tea garden in Assam



Fig. 3. Produced Vermi-compost



Fig. 4. Women with Vermi-compost

opened because of DRDA activities. The project also motivated the beneficiaries indirectly for thrift and savings. Local market demand was created in the villages and their neighbourhood. The project has facilitated the sale of surplus produce through fairs and exhibitions. The farm families learnt to pack vermin-compost in appropriate quantities and understood the benefits of organic

produce. There was no hurdle in access and utilization of the local resources like water and other common properties. The farm women also had felt the enhanced access to services provided by panchayat.

2.1.2 Public Private Partnership Model in mushroom enterprise in Kerala

A PPP model for cultivation of oyster and milky mushrooms with commercial viability was established through selected women groups in the districts of Palakkad and Thrissur by Kerala Agricultural University. Selection of members from the established SHG with experience in mushroom cultivation in the two districts was completed. The group consisted of thirty members from Palakkad and five members from Thrissur. A series of sensitization meetings of the selected SHG members and public and private partners were organized at State Seed Farm Kunnanur, Palakkad. Stakeholder meetings of both public & private partners were held to identify the risk and resources that could be shared by each partners and institutionalisation of the linkages through MOU. Hands-on experience was provided for the registered group members by linking with the commercial mushroom demonstration units established under the project. Master trainers from private partners were involved as consultants in the establishment and supervision of the demonstration units. Demonstration units of 20 x 50 sq.ft area were set up in each district for oyster and milky mushrooms at the selected sites. The production in these demonstration units were taken up by the selected women group members under facilitation of Master trainer and research team. The target of 100 kg for the initially months was met from the demonstration units and registered women SHGs. The continuation of the project and redefining of

the MOU terms and conditions to suit any emerging contingencies was ensured and process documentation to evolve PPP model for gender mainstreaming in agriculture was taken up. The model was validated with the women groups in the project through measurement of various women empowerment parameters. Prospects of registering as Producer Company and scope for product diversification were also explored.



Fig. 5. Oyster and milky mushroom cultivation unit



Fig. 6. Stakeholder meetings in Kerala

2.1.3 PPP model in vegetable marketing in Tamil Nadu

The impact of PPP model in vegetable marketing undertaken in collaboration with Avinashilingam Institute of Home Science and Higher Education for Women, Coimbatore, was studied from 04.03.2013 to 07.03.2013 at village Ikkaraipooluvanpatti. The partnership between Hotel Annapoorna, Avinashilingam Institute of Home Science and Higher Education for Women, farm women groups and marketing committee of Coimbatore worked very well during the project period. The constraint observed by the farm women were grading, quality parameters as emphasized by the private partner and assembling of farm produce at one place, receiving and clearing cheques to realize the hard cash and transporting the produce to the Hotels. Appropriate institutional arrangements need to be put in place to take care of the constraints experienced by farm women while undertaking vegetable marketing through public private partnership.

2.1.4 Public-Private Partnership for Gender Mainstreaming in QPM Maize cultivation

Cultivation of quality protein maize was introduced in Bantala village of Khordha district under PPP model to bring gender mainstreaming in agriculture. The perceived impact on gain in knowledge and skill on men and women were analyzed in adopted area. It was observed that there was a great change in the farm women in the following sixteen areas that were studied :

Table 1. Impact of maize cultivation through PPP

Areas of Impact		Perceived Impact	
		Women	Men
i)	Gain in knowledge	***	**
ii)	Gain in skill	****	**
iii)	Employment opportunity	***	*
iv)	Drudgery reduction	****	***
v)	Change in attitude	***	**
vi)	Social recognition	***	*
vii)	Strengthening livelihood	***	**
viii)	Family nutrition	***	***
ix)	Satisfaction	****	***
x)	Profit	***	**
xi)	Productive use of leisure time	***	**
xii)	Production	***	**
xiii)	Bargaining power	***	*
xiv)	Land utilization	***	**
xv)	Social acceptance	****	***
xvi)	Increase in income	***	**

* 0-25%, ** 26-50%, *** 51-75%, **** 76-100%

The impact of maize cultivation was more on women than the men except on the family nutrition parameter where both were benefited equally. The areas where impact was more on farm women were gain in knowledge, skill, attitude, satisfaction, profit, leisure time use, production, bargaining power, land utilization, social acceptance, employment, drudgery reduction, strengthening livelihood and increase in income.

**Fig. 7. Maize cultivation**

Attitude towards maize cultivation: The attitude of farm women was measured in a five point continuum scale covering 'strongly agree', 'agree', 'neutral', 'disagree' and

'strongly disagree' also against each statement the score was assigned as 5, 4, 3, 2 and 1 respectively. The result of rank order analysis is presented in following table.

Table 2. Attitude of farm women towards maize cultivation (n=20)

Sl No	Statements	Obtained score	Rank
1	Maize farming is the least preferred occupation	1.95	XI
2	Maize farming is very difficult to do	1.55	XII
3	It is for good income and nutrition	2.80	VIII
4	Maize farming is highly risky	2.90	VII
5	One cannot run livelihood from maize	3.85	V
6	There is no extra advantages in maize	4.00	IV
7	More income can be obtained from other engagements than maize	4.35	I
8	There is no prestige in growing maize	2.50	IX
9	Maize technologies are needed for agricultural development	4.30	II
10	I do not like to improve my capacity in maize due to uncertainty	2.35	X
11	It is always better to switch from farming to non-farming	3.50	VI
12	No need of maize farming as rice is available @ Rs.2/- by govt.	4.20	III

The study on attitude of farm women towards maize cultivation revealed that the rank for more income can be obtained from other engagements than maize, technologies for maize are needed for agricultural development, no need of maize farming as rice is available @ Rs.2/- by government, there is no extra advantages in maize and one cannot run livelihood from maize were I, II, III, IV and V respectively.



Fig. 8. Discussion with women farmers

2.2. Technology Application and Gender Mainstreaming in Agriculture for developing a model village

K.Ponnusamy, M.P.S.Arya, A.K.Shukla, Anil Kumar, Sabita Mishra, H.K.Dash, Jyoti Nayak, Gayatri Moharana

Under this project different technological interventions in gender perspective were made in Giringaput village for gender mainstreaming. The following themes were prioritized and interventions were implemented during the year.

2.2.1 Gender issues in transplanting of rice

Transplanting is one of the major farm activities in rice cultivation where women involvement is high. In order to understand the perception of male land owners and women agricultural labourers about the gender issues in transplanting of rice linkage was developed with the Department of Agriculture, Government of Odisha to adopt Giringaput village for promoting line planting under one of its schemes "Bringing Green Revolution to Eastern India". Accordingly, 270 acres, involving 210 farmers were facilitated for line planting in a collaborative mode with DRWA offering capacity building and subsequent monitoring;. An NGO Pallishree motivated the farmers for line planting and department of agriculture offered incentives through

NGO. DRWA organised a training on "Gender and improved methods of rice cultivation" on 13.07.2012 at Giringaput wherein all stakeholders participated. Later an interview schedule was designed to document the gender issues from 50 land owning farmers and 50 women agricultural labourers. It was encouraging to note that farmers continued line planting in the *rabi* season also. Following technological intervention introduced by DRWA in the kharif reason.

Average land holding in the village was 2.41 acres for farmers as against 1.24 acres for women agricultural labourers. Both categories of the respondents had more than 20 years of experience in rice transplanting. The average distance of the farm location from residence was 2.40 km for men farmers and average distance travelled by women agricultural labourers from residence to transplanting work was 2.36 km. It was observed that the line planting took 20 per cent more time as compared to random planting. Men were involved mostly in carrying seedling to the field (80.20%) and stretching rope for line planting (49%). Line planting also incurred higher expenditure as



compared to traditional random planting. Ergonomical parameters such as musculo skeletal discomfort (highest in midback and lowest in ankle), physiological stress (heart rate 88.7 to 103 beats/minute) and grip fatigue were within the acceptable range. Advantages of line planting outweighed the disadvantages. The results indicated that incentivizing line planting for further period would enhance the adoption of improved technique, thereby resulting in higher productivity and profitability of rice farming and ensuring sustainable livelihood of rice farm families. The advantages perceived by both categories of respondents are given in Fig 9.

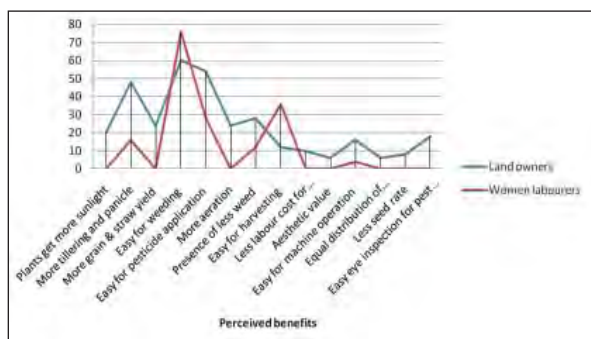


Fig 9. Perceived advantages of farmers and women labourers on line planting of paddy



Fig. 10. Women performing line planting operation of paddy crop in Giringaput village

2.2.2 Enhancing gender participation in biological pest control of rice

Role of women in plant protection at field level is insignificant as their involvement in chemical pest control is perceived as drudgery prone activity. Since, women are mainly involved in intercultural operations such as weeding, it was decided to promote pheromone trap as part of biological pest control method in general and women friendly pest monitoring system in particular. Pheromone traps installed in rice fields can indicate the presence of adults and thereby provide opportunity for taking up appropriate pest control strategies. A training on integrated pest management in rice was organised on 09.11.2012 at Giringaput village. About 20 farm women were given training and demonstration for effective use of pheromone trap in rice fields. Farm women were able to identify the stem borer and count the number of trapped insects.



Fig. 11. Pheromone trap use in paddy for stem borer monitoring and control

2.2.3 Increasing access to nutrition by farm women through cropping system management

In Odisha, rice crop is taken up for duration of 3 to 5 months. Bunds constitute about 1/10th to 1/20th of the area occupied for cultivation. Pulses of 60 to 70 days duration can be taken up on the bunds for additional

income. They can be easily cultivated on the bunds of rice fields. The canopy of black gram or green gram is small and does not affect the paddy crops. Twenty farm families involved in rice cultivation were identified for this intervention. Black gram seeds (T-9 variety) were distributed to the identified farm families, immediately after the completion of transplanting for dibbling in the bunds and the growth of the bund crops were monitored. A family of five on an average consumed 50 kg of pulses. It was observed that about 3 kg of pulses could be obtained on an average from bunds of one acre plot. Hence, there was a gap of 90 per cent which was met through purchase from the market. There was a need for redesigning cropping system models to produce more protein sources in order to enhance the access of women and children to good nutrition.



Fig. 12. Raising black gram as bund crop in bunds of rice fields

2.2.4 Access to extension services and credit

Women exhibited interest to take extension messages in group contact while men evinced enthusiasm in all the methods. This might be due to existing socio-cultural environment prevailing in the society. Evening time was found to be more suitable for women to interact with developmental agents. Women preferred home as better

place of contact whereas men wished to meet extension agents at farm. Interaction once in fifteen days was found to be suitable for both the gender to access the extension services. Gender differences were also found in choosing male/female extension workers. Extensive responsibilities in the household and heavy work load in field limit the women in spending their time on own productive assets which can otherwise ensure prosperity of them. Men and women work in different spheres of farm enterprise leading to different levels of productivity and earnings. These are driven by deep seated gender differences in time use and ownership and control of resources. Gender gaps disappear when access to productive inputs were equalized. Structures of social networks are different for both men and women.

2.2.5 Gender involvement in decision-making and implementation in agriculture

The head of the family, usually a male person, initiates the selection of farm enterprise, assortment of crops/enterprises, resource allocation, investment decision in farm, labour engagement and purchase of farm inputs. Although, both male and female participate in these activities and implement the same, the decision making still rests with the men in majority of the activities. However, women take lead in maintenance of family finance, saving, purchase of family consumption items, cooking items for the day, health of family members and spending for elders in the family, reflecting stereotypical gender roles in the rural society. This analysis would help in identification of activities for gender sensitization and opportunities for gender mainstreaming.

Table 3. Decision-making level of men and women in agriculture

S.No	Activities	Who Initiates	Who Participates	Who decides	Who implements
1	Selection of farm enterprise	M	B	M	B
2	Assortment of crops/enterprises	M	B	B	B
3	Resource allocation	M	B	F	B
4	Investment decision in farm	M	B	M	M
5	Labour engagement	M	B	B	M
6	Purchase of farm inputs	M	B	M	B
7	Timing of farm operations	B	B	M	B
8	Borrowing and repayment of loan	B	B	B	B
9	Maintenance of family finance	F	B	B	B
10	Engagement of farm machinery	M	M	M	B
11	Harvesting	B	B	M	B
12	Farm loan and its payment	M	B	M	B
13	Marketing of farm produce	B	B	B	M
14	Saving	F	B	F	B
15	Purchase of family consumption items	F	B	F	F
16	Cooking items for a day	F	B	F	F
17	Health check up of family members	F	M	B	B
18	Participation in social gathering	B	B	B	B
19	Recreation	M	B	M	B
20	Arrangement of social events like marriage	B	B	B	B
21	Participation in training	M	B	B	B
22	Spending for elders in the family	F	B	B	F

M-Male; F-Female; B-Both male and female

2.2.6 Health status of rural women

The study was conducted to determine the nature and extent of health problems of rural women. The data were collected from randomly selected 90 rural households comprising thirty households each from the three hamlets of Giringaput village using a structured interview schedule. The identified health problems were classified.

The findings of the study indicated the prevalence of a number of health problems among rural women and need was felt for their education on health aspects. A sizeable number of them were found to have skin diseases, arthritis, headache, indigestion, constipation, body pain, conjunctivitis etc.

The Primary Health Centre (PHC) is located at Mendasal block which is 3 km away from the village. Majority of the respondents said the treatment given in government hospital ineffective and there were several other constraints in availing of the treatment facilities at PHC.

An awareness camp was organized with the help of Inner Wheel Club, Bhubaneswar to celebrate the World Breast Feeding week on 10.08.2012. More than fifty women attended the meeting. A quiz competition was organized for them. Health check up of pregnant women and lactating mothers were done by the doctors. A scientist-farmers interface was organized on 24.09.2012 to create awareness for controlling wide-spread

incidence of deficiency diseases among rural women concerted educational efforts were also made to emphasize the need for adequate dietary intake, useful information pertaining to the correct methods of food preparation, healthy life style, utilization of available medical facilities, etc.

2.2.7 Gender Gap in Access to Extension Services

A total of 80 respondents (farm women - 40 and men - 40) were selected from Gringaput village to study the gender gap in access to extension services. The study revealed that the most preferred type of contact for farm women was 'group contact' (2.80) followed by 'afternoon' as most suitable time of contact (2.47), 'home' as place of contact (2.53), Women Village Para Extension Worker as extension agent (2.20), 'demonstration' as

effective group method (2.20), 'within block' as boundary of exposure visit (2.53), 'within one month' as interval of contact (2.60), house of president/secretary as 'place of meeting' (2.40) and 'group approach' for undertaking enterprise (2.53) which emerged as important parameters for planning and implementing extension programmes for the farm women. On the other hand, the most preferred extension needs identified by the men farmers were: 'group contact' (2.50), 'evening' time contact (2.60), 'farm' as place of contact (2.60), male extension agent (2.53), 'tour' as effective group method (2.56), 'within and outside district' as boundary of tour (2.60 & 2.60), interval of contact as 'one month' (2.63), village common place for meeting (2.60) and 'individual approach' for undertaking enterprise (2.53).

Table 4. Composite analysis of extension needs of gender (score)

Sl. No.	Profiles	Farm women (n = 40)	Farmers (n = 40)	Difference (%)
1	Suitable contact	1.61	2.17	25.80
2	Timing	1.69	2.12	20.28
3	Place of contact	1.97	2.34	15.81
4	Effective extension agent	1.59	2.04	22.05
5	Effective group method	1.87	2.39	21.75
6	Boundary of tour	1.45	2.30	36.95
7	Interval of contact	1.76	2.46	28.45
8	Place of meeting	1.53	1.97	22.33
9	Approach for enterprise	2.04	1.89	7.35

The composite analysis of extension needs indicated that out of nine dimensions, there was significant difference (more than 10%) between women and men in eight areas and

only in one case i.e. approach for undertaking enterprise, there was less difference (less than 10%).

Table 5. Intensity of contact of gender with extension functionaries

Sl No	Extension functionaries	MOS	Contact of farm women (n = 40)		MOS	Contact of farmers (n = 40)	
			SO	Gap (%)		SO	Gap (%)
(i)	VAW / LVAW	3	1.90	36.66	3	1.93	35.66
(ii)	Livestock Inspector	3	1.73	42.33	3	2.30	23.33
(iii)	Block officers	3	1.56	48.00	3	2.66	11.33
(iv)	NGO workers	3	1.40	53.33	3	1.43	52.33

MOS- Max. Obtained score, SO- Score Obtained

The table 5 reveals that the gap between farm women and men was nearly the same in case of extension contact with Village Agriculture Worker / Lady Village Agriculture Worker (36.66% & 35.66%) and also NGO workers (53.33% & 52.33%). But

more gaps were of among farm women in contacting block officers (48%) followed by LI (42.33%) against minimum for men i.e. 11% and 23.33% respectively. It was evident clear that when gap is more, the contact w less.

Table 6. Preference of gender on important areas of message (n=40)

Sl No	Areas of message			
	Farm women	Rank	Men farmers	Rank
(i)	Care of domestic animals	III	Crop[production	III
(ii)	Home management	V	Vegetable/ fruit production	II
(iii)	Nutrition garden	II	Plant protection measures	I
(iv)	Credit facility	IV	Agriculture machineries	IV
(v)	Mushroom cultivation	I	Weather information	VI
(vi)	Income generating activities	VI	Market link	V
(vii)	Preservation of fruits & vegetables	VII	Credit and subsidy	VII

It was observed that the preference of farm women in the areas of message were: mushroom cultivation (I), nutrition garden (II), care of domestic animals (III) and credit facility (IV) in order of preference while the least preference areas were preservation of fruits and vegetables, income generating activities and home management. On the other hand, when the preference of men was considered they ranked plant protection measures, vegetable/fruit production, crop production and agriculture machineries as rank I, II, III and IV respectively. Other factors having lower importance were market link, weather information and credit &

subsidy. The study revealed that, the extension functionaries should take in to account the gender needs and preferences for better delivery of messages.

**Fig. 13. Survey with farmers**

Based on the findings of the study, it is suggested that:

- (i) The change agents should be utmost careful in analyzing the socio-cultural environment of gender to formulate action plans for gender mainstreaming in agriculture extension.
- (ii) The extension functionaries should take care to deliver messages according to the needs of the gender.
- (iii) The Government should take steps to bridge the gaps between the farm women and contact with extension functionaries for effective extension services.
- (iv) Extension approaches should be considered as important parameters for planning and implementing extension programmes for the farm women.

2.2.8 Perception of Rural Youth towards Agriculture

A study was conducted in Giringaput village to understand the perception of youth towards agriculture. The findings revealed

that rural youth aspired to enter into agribusiness but lack in entrepreneurship traits like identifying opportunities, creativeness, hard work, communication skill etc. The selected sample youth had no idea about networking, resources, raw materials and market analysis. It was found that the rural youth need explosive and training in agribusiness in the areas of vegetable cultivation raising planting materials, seed production, floriculture, goat and poultry rearing and promotion of market demand, labor availability and credit facilities.



Fig. 14. Focussed group discussion with rural youth

2.3 Network project on Development of expert system for crop and animal enterprises

K. Ponnusamy

The expert systems were first developed in English on five major crops such as paddy, sugarcane, banana under precision system, coconut and finger millet and three animal enterprises such as cattle & buffalo, sheep & goat and poultry. Later, they were translated into Tamil, Kannada and Malayalam languages for the benefit of farmers belonging to the respective states.

13 validation workshops/ training were organized at different places in Tamilnadu,

Kerala and Karnataka in three languages Tamil, Malayalam and Kannada.

2.3.1 Launching of Expert Systems

Expert systems on five crops and three animal enterprises were launched by Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR on 25.01.2013 at a function organised by Zonal Project Directorate (ZPD), Zone -8, at Bangalore. He said that farmers want timely input, information and infrastructure for profitable agriculture. He



opined that smart farming for small farmers is the need of the hour. Expert systems can also reduce the gender divide in accessing the correct information in farming. Dr. K.D. Kokate, Deputy Director General (Agricultural Extension), ICAR while appreciating the work carried out under expert system project team has advised the team to further make it more user friendly. Dr. Narayana Gowda, Vice Chancellor, UAS, Bangalore emphasized that expert systems can greatly supplement the efforts of extension personnel in technology transfer.

2.3.2 Impacts and future scope of the expert system

Expert systems frame developed under the network project need to be focused as national model which can help to develop national frame work. Using this frame work, expert system for other crops can be developed and put into the off line as well as online mode for instant agro advisory services. The separate wing on Expert System Development Unit at SAUs /ICAR can be established for

development and updating of Expert System for all crops in all Indian languages for further strengthening of the extension system. Moreover, this expert system is image based, so even illiterate farmers can use this expert system for diagnosing field problem. Future agriculture will be based on virtual extension services which will play a major role in delivering virtual agro advisory services and facilitate instant field diagnosis of problems. The expert system can be given in all agri clinic centres, block level extension centres, field extension functionaries, NGOs and progressive farmers for instant agro advisory services. Common service centres have also been established in larger number across the country. So expert system can also be given to all the common service centres for providing instant agro advisory services to the stakeholders in agriculture.



Fig. 15. Release of expert systems by Hon'ble Secretary, DARE and DG, ICAR



Fig. 16. Dr. K. D. Kokate, DDG (Agrl. Extension) highlighting the importance of expert systems

2.3.3 Organising Women in Agriculture Day

Women in Agriculture Day was organized on 4 December 2012 at Giringaput village.



Fig. 17. Interaction with women while harvesting of line planting of paddy



Fig.18. Participants of summer school



Fig.19. Participants of WMT (Social)

2.4 Network Project on Gender Issues in Rice-based Production System and Refinement of Selected Technologies in Women Perspective

M.P.S.Arya, S.K.Srivastava and S.P. Singh

State wise data were compiled on socio-economic status like head of the family, house ownership, organizational membership, social distribution, family structure, occupation, literacy, land ownership and access and control over farm resources as also on technology assessment. Brief results are as under.

2.4.1. Socio-economic status

Socio-economic conditions and role of women in rice based production systems were studied in five states viz., Odisha, Madhya Pradesh, Andhra Pradesh, Kerala and Uttarakhand. Data were collected from 1000 respondents (men and women) of 500 families belonging to five major rice growing districts/zones. Socio economic status of men and women studied in the five districts is as follows-

Head of the family: Andhra Pradesh had highest (12.6) percentage of families headed

by women followed by Kerala (6.4%) and Odisha (3.8%). Women headed farm families found in Madhya Pradesh and Uttarakhand were only 3.4 and 2.4 per cent, respectively.

House ownership: Women had only 4.54 percent household ownership access. Joint ownership was 21.5 per cent; whereas men had 73.96 per cent of house ownership. Kerala recorded highest (10.6%) women ownership; whereas Uttarakhand recorded the lowest (2.6%) ownership. Madhya Pradesh recorded only 4 per cent house ownership.

Organizational membership: Woman organizational membership (district/ panchyat/block/ SHG levels) was found highest (73%) in Andhra Pradesh. Whereas that of men was highest (54.8%) in Kerala. Membership of both the man and woman was highest in SHGs followed by block/ panchyat levels.

Social distribution: Majority of respondents were Hindu in all the states. General category



of respondents was highest (87.8%) in Uttarakhand while OBC was highest (75%) in Madhya Pradesh and SC was highest (40.4%) in Odisha.

Family structure: All the households were having nuclear families in Kerala followed by Odisha (76.3%), Andhra Pradesh (76.0%), Madhya Pradesh (71.4%) and Uttarakhand (67.8%).

Occupation: Farming was found to be the highest (76.8%) occupation of women in Andhra Pradesh whereas participation of woman as farm labour was the highest (51.4%) in Odisha. Only 1.5 per cent women were in service.

Literacy: Women literacy was 74.88 per cent. The education level of majority of farm women ranged between primary to high school.

Land ownership: Ownership of land was mostly with men. Women were having ownership but mainly of some of ponds (5.05%), rainfed land, pastures and orchards. The highest ownership was recorded in Kerala.

Access and control over farm resources: Joint access over farm resources found to be the highest (62.35%) across all the States. This was followed only man (30.51%) and only women (7.144%). With regards to control over farm resources, the highest was by men (51.83%) followed by jointly (42.99%). Only 5.18 per cent women had control over farm resources.

2.4.2 Role and responsibilities of women in rice production systems

Participation: Over all participation of women was highest in rice crop (44.46%). The other important crops where women had participated were finger millet, vegetable, lentil and wheat.

Need and priorities

Data were collected on the availability of various household daily needs such as vegetables, pulses, oilseeds, fodder, spices and pseudo cereals. The results revealed that on an average 65.1% of the respondents rated availability of different house hold needs as in-sufficient. Importantly, however, 42 per cent of the women in Madhya Pradesh, 61.2 and 22.4 per cent of Andhra Pradesh and 62.8 and 89.8 per cent women of Uttarakhand wished to purchase pulses and vegetables, respectively. For other commodities both men and women across the States wished to purchase from the market.

Varietal Preference

Nineteen varieties of rice were found popular among the farmers in the five selected district of Madhya Pradesh. The farmers perception recorded on colour, taste, expansion on cooking, texture, marketability and yield characters revealed that local varieties ((Madhuri, Manka) recorded the highest preference (39.04%) both by men and women. This was followed by variety Lochai, MTU 1010 and IR 64. Among the wheat varieties Sujata was preferred by majority of the man (53.5%) and woman (53.45) respondents. This was followed by WH-147 and local wheat varieties. There was however, no much difference in the opinion of man and woman about the preference for varieties.

In Andhra Pradesh the fine grain varieties BPT 5204, IR 64, Tellahmsa, BPT 3291 and NLR 33892 were liked by 82%, 50%, 42%, 27% and 32% man and 90%, 55%, 24% , 71% and 33% woman mainly for their characters like expansion at the time of cooking, colour, texture and taste. The only variety scored poor ranking for its texture was Tellahamsa. In Kerala, however, there was no gender difference in the responses towards any of the characters studied.



Action research was also undertaken aiming to evaluate different intercropping patterns to meet requirements of important food ingredient of daily needs such as pulses and oilseeds besides staple food crop of rice and maize for which the household women are socially responsible. The yield of crops recorded under different intercropping combinations revealed that combination of maize-sunflower-black gram recorded the highest mean Rice-Equivalent (4279 kg/ha). The same combination also responded more to lime application with 4662 kg/ha R.Eq. Results also revealed that maize based combinations recorded more R-Eq. (4324 kg/ha) than rice based (3953 kg/ha) combination.



Fig. 20. Intercropping of Sunflower and Maize

In another intercropping trial the red gram - cow pea recorded the highest Maize-Equivalent (8077.53 kg/ha) and thus found better than other combinations of maize - cow pea and red gram- maize. Out of red gram - cow pea combinations, their planting in 2:4 row ratio was found to be better which recorded highest Maize-Equivalent (8633.86 kg/ha).

In another set of experiment on canopy management, 'V' shape canopy designed by sequencing maize-rice-black gram-rice-maize lines was found to be highly remunerative (Rs 47120/ha). Growing maize and red gram in 2:2 row ratios was found promising in increasing yields of these crops for family needs.



Fig. 21. Intercropping of Maize + Rice + Redgram

2.5. Reducing the gender gap in the nutritional status of family members in rice based cropping system (On-going)

Abha Singh and M.P.S.Arya

This project is continuing in four states Odisha, Uttar Pradesh, Madhya Pradesh and Uttarakhand to assess the gender gap in the nutritional status of family members through anthropometry and clinical examination of four rice based cropping systems viz., state rice-rice (Odisha), rice-millet (Uttarakhand), rice-wheat (Uttar Pradesh) and rice-pulse (Madhya Pradesh). The study revealed that gender gap

in anthropometric measurements (Body Mass Index) and haemoglobin count was highest in rice-rice, less in rice-millet and negligible in rice-wheat cropping pattern and Blood Pressure and Diabetes problem was not prevalent in all the studied rice based cropping systems. To reduce the gender gap in nutritional status, interventions through action research are continuing in rice-rice cropping pattern as

- Promotion of vegetable cultivation for mineral/ iron supplementation in rice-rice cropping system
- Promotion of cultivation of pulses and QPM Maize for enriching protein in the diet
- Nutrition education programme on various aspects of nutrition for improvement in the nutritional knowledge of farm women
- Demonstration on locally available low cost nutritious recipes



Fig. 22. QPM Maize cultivation



Fig. 23. Vegetable cultivation



Fig. 24. Nutrition Education to farm women

2.6 Refinement of storage pest management techniques in selected cereals, pulses, condiments and spices with gender perspective

S.K. Srivastava, Suman Agarwal and Naresh Babu

Based on the data collected from 10 centres viz; Himachal Pradesh, Maharashtra, Karnataka, Haryana, Andhra Pradesh, Punjab, Rajasthan, Odisha, Assam and Utarakhand the process of refinement of pest management techniques for cowpea, chili and coriander was completed. Effect of easily available additives viz; small cardamom, big cardamom, garlic cloves @ 10, 20, 30 numbers /kg, salt, camphor (*Cinnamomum camphora*) @ 10, 20, 30 gm /kg, asafoetida (*Ferula asafoetida*) @ 2, 4, 6 gm /kg, clove (*Syzygium aromaticum*) @ 5, 10, 15 numbers /kg, sand @ 1200 gm/kg and neem oil @ 5ml/kg as standard check were also tested for the storage of cowpea in the earthen pots. Number of eggs of cowpea seed weevil *Callosobruchus maculatus* / 100 seeds, number of bored grain, and germination per cent was recorded, for a period of 8 months. There was increased damage in cowpea from August,

by Cowpea seed weevil (*Callosobruchus maculatus*) due to high humidity in the environment.

Minimum number of eggs of *Callosobruchus maculatus*/100 seeds were recorded in sand followed by Big cardamom @ 10 number/kg, asafoetida @ 6 gm/kg and small cardamom @ 20 number /kg. Minimum per cent bored grain after 8 months was recorded in neem oil @ 5ml/kg followed by sand @ 1200 gm/kg and big cardamom @ 10 number /kg. Maximum germination percent was recorded in sand @ 1200 gm/kg and big cardamom @ 10 number /kg. In neem oil @ 5ml/kg in spite of the highest number of eggs/100 seed, per cent bored grain after 8 months was found lowest, due to juvenomimetic effects of neem oil. In the long run, after 8 month of storage, neem oil has shown an adverse effect on germination and resulted in lowest germination percent, therefore storage of cow pea with neem oil is not suitable for seed purpose.



Effect of easily available good additives and accompaniments found in the kitchen at house hold level viz; salt @ 12.5, 25.0 and 37.5gm/kg, clove, garlic cloves, small cardamom and big cardamom @ 5, 10 and 15 numbers/kg, asafoetida and camphor @ 2.5, 5.0 and 7.5 gm/ kg, were also tested for the storage of chili powder and coriander (*Coriandrum sativum*) powder in plastic jars for one year along with standard check (fortnight oven dry) and control. Results revealed that salt absorbed up to 3.5 per cent moisture during August to October which promoted insect growth in the stored coriander powder. However, asafoetida @ 5gm and 7.5 gm, cloves, garlic cloves and big cardamom @ 15 numbers/kg showed significantly lower infestation of insect pests and were free from moisture. Camphor applied @ 7.5 gm/kg coriander powder protected insect incidence during storage.

In case of the storage of chili powder with salt it was noticed that up to 4.6 per cent moisture was absorbed which was higher than that absorbed in coriander powder. Therefore, chili powder was spoiled earlier than coriander powder. Asafoetida @ 5.0 gm and 7.5 gm/kg was found equally effective and absorbed 3.16 and 3.18 percent moisture, respectively. Clove @ 10 numbers /kg showed 2.3 percent moisture and less infestation of

insect. Garlic cloves @ 10 number/kg recorded minimum 2.06 moisture percentage. With the use of above spices can be stored up to 7 month. Oven drying coriander powder and chili powder at 15 days interval was found to be the best option for safe storage. It was advised to avoid storage of spices in rainy season because spices absorb atmospheric humidity resulting in increased moisture content with higher incidence of insect.



Fig. 26. Refinement in coriander powder



Fig. 25. Refinement in cow pea



Fig. 27. Refinement in chili powder



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

A. K. Shukla, Naresh Babu, Kundan Kishore

2.7.1 Participation of women in horticulture based on the data analyzed in the project

Horticultural crops are different from field crops in respect of their cultivation practices. Majority of fruits, vegetables, and ornamental and plantation crops are not directly seeded. They are raised through seedling production in nursery beds and thereafter planted in the main fields. Raising of seedlings requires constant attention and proper experience about the methods of nursery bed preparation, propagation, sowing depth, plant density and proper nurturing of emerging seedlings. These operations are performed by women. Further, planting of seedlings in the field is done by women. The seed cleaning, preparation of seed and sowing in the field are done by women irrespective of the crops. Their participation in these activities is more than 80 percent. The involvement of women in land preparation activities in nursery and field such as stubble collection, land leveling, manure application and cleaning of field is observed and it is found that their participation is more than 60 percent in stubble collection, manure application.

In India, land holding are small and use of transplanted for transplanting of vegetables is almost negligible and it is mainly done manually either by women vegetable cultivators themselves or by women labourers. The participation of women in transplanting of vegetables is more than 80 percent. Fruit crops are planted at wider distances in pits and the participation of women in fruit planting is less than men but participation of women in frequent watering and proper nurturing of the newly planted seedlings is very high. Women workers perform this work very efficiently with utmost care. Among various intercultural

operations such as irrigation, weeding, thinning, crop watch, weeding is most crucial and cumbersome process and it requires more man power than any other activity of crop cultivation. The weeding operation is predominantly done by women and their participation in these activities varies from 80 to 95 percent in different fruits and vegetables. Lower participation (<50%) of women was found in irrigation, pesticide application and crop watch. This research was carried out in the Giringaput village of Khordha and Raikia Block of Kandhamal district of Odisha.

Horticultural crops unlike other agricultural crops are harvested at frequent intervals based on their horticultural maturity. Women workers are exclusively involved in harvesting of the fruits, vegetables, flowers and spices. Harvesting of vegetables such as pea, chillies, okra, tomato, brinjal, potato, onion, spices is mainly done by women workers. After harvesting of produce, its cleaning, curing, grading and other operations are also performed by women labourers. The participation of women in harvesting and post harvest operation is much more than men. More than 60 percent of cutting, cleaning, grading, packing/bundle making etc. of horticultural crops are performed by women. The women's participation in transportation of crops from field to storage is high. Majority of cleaning and grading of vegetables and spices at farmer's level and at trader level is done by women. The participation of women in cultivation of horticultural crops is influenced by several factors such as caste, region, social factors, social status of the family, and size of the land owned by the family.



2.7.2 Gender issues identified

- Traditionally women are expected to perform a farm operation which involve manual, repetitive tasks such as stubble collection, transplanting, weeding, harvesting, grading, cleaning, etc. Through these activities do not require more physical strength but continuous bending/standing causes various types of physical strains such as back pain, hand pain, cuts, bruises etc. Women suffer more from these strains because of their higher participation.
- Women under take multiple tasks at home, farm and community. They have the responsibility of preparation of food and collection of fuel wood and fodder. A major part of the day is spent on these activities and they get little time for own development.
- Women lack access to skills, trainings and information. Their participation in training is low. Studies revealed that the participation and expertise of women in skill operations such as grafting, budding, training and pruning operations was very low. The major reason of the low participation is the lack of training on these aspects.
- Although most of the technologies are gender neutral they have differential impacts on men and women. A technology which can increase the income of a farmer may reduce the income source of women of landless family.
- Usually women are discriminated in designing and testing technologies. The equipments such as secateurs, pruners, tillers and sprayers are not designed to suit women. The technological requirements of the women are different

from men. The studies on women's response to various weeding methods revealed that women preferred low cost locally available measures such as grass mulch and coconut mulch over weedicides and polyethylene mulch for the control of weeds despite lower weed control efficiency.

- Women often get displaced from traditional employment opportunities when new technology is introduced and man take over the task. The introduction of graders in onion, potato and citrus at various grading units are gradually replacing women.
- Women are usually considered physically weak than men. They are not preferred for so called hard tasks such as ploughing, leveling, pit digging etc. The activities performed by the women are usually considered less important. So they usually get lesser wages than the men.
- Less access to resources such as land, tools, market and credit-The access of women farmer to tools and land was almost equal to men but the access of women labour to these is very low. The control over the resources such as orchard, land, agricultural implements was of men and women farmers. Farmer's wife has limited control over these. The access to market and credit was less to both women farmer and women labourers.
- Men are regarded as farmers and not women.

2.7.3 For the recognition of women's contribution in agriculture and its allied fields and reducing the gender issues, the recommendations are:

1. Recognition of labour work of working women in the rural economy may be accounted in monetary terms.

2. More facilities should be provided to poor rural women for land, agricultural and livestock extension services.
3. Priority must be given to women in accessing credit on soft terms from banks and other financial institutions for setting up their business, for buying properties, and for house building.
4. Measures should be taken to enhance women's literacy rates. A separate education policy for women may serve the purpose.
5. Women must be involved in decision-making bodies that have the potential to introduce structural changes. This action will bring some changes in the gender relations in the society.
6. Women must be aware of their existing rights.

2.7.4 Action Research

Low-cost nutritive guava-lemon-ginger squash:

Guava is the 6th most important fruit-crop of India, which is cultivated in subtropical and tropical climates. In spite of its high nutritive value in terms of vitamin C and antioxidants, market value of the fruit experiences seasonal variations; the rainy-season crop is sold at a very low price and the winter crop at comparatively higher price. Considering substantial post-harvest losses of the rainy season guava, lemon and ginger blended guava squash was prepared to enhance economic value of the crop. Moreover, guava is an important crop of the small farmers; and hence the processed product will generate income for them. Guava-lemon-ginger squash was prepared with 22.5% guava juice, 5.0% lemon juice and 1.5% ginger juice. With the addition of 200 ppm potassium metabisulphite, the product can be kept for 80-90 days in refrigeration (4

°C). The TSS, acidity, pH and total sugar of the product were 43.5 °Brix, 1.32%, 3.4 and 41.5%. Squash is rich in vitamin C content (212-235 mg/100g) and antioxidants. The product has very pronounced sensorial attributes in terms of appearance, flavour, sweetness and overall quality. It is cost-effective (B: C ratio 2.2:1) also, as preparation cost of one litre of squash was Rs. 62 and selling price was Rs. 135. Farmwomen were imparted hands-on training on squash-making to improve their entrepreneurial capability.



Fig. 28. Guava-ginger-lemon squash

2.7.5 Protected Cultivation

Under the hot- and - humid tropical conditions of Odisha, vegetables cultivation is affected in summers and in monsoon seasons. Considering the potential of vegetables in the state, protected cultivation of high- value vegetables has been promoted among the farmwomen to add their source of income. Horticulture can be economically viable for the poor farmers also if protected cultivation is made an integral part of their farming system. Considering potential of vegetables, technologies have also been standardized for protected cultivation of off-season tomato and cucumber, which give Rs. 250- 400 /m² annually. The farmwomen are being trained to upgrade their skills so that



they can earn more returns from per unit area of polyhouse/ net- house. Furthermore, low cost polyhouses give an option to rural women to enhance their entrepreneurial ability.

2.7.6 Capacity building programme on value addition and processing

Training on Capacity Building of Farm Women on Processing and Value Addition of Horticultural crops

A four day Training on Capacity Building of Farm Women on Processing and Value Addition of Horticultural Crops was organized on 9-12 July, 2012 under the Network Project at DRWA with an aim to enhance the capacity of farm women in preparing processed products to generate income and minimize the post harvest loss of fruits and vegetables. Twenty farm women from Khurda district of Odisha participated in the training programme. They were also imparted knowledge on the importance of value addition and processing in horticultural crops and also about the potential of processing at small scale in widening their source of income. They were imparted hands-on training on pickle making, jelly making, squash and sauce making. Participants were advised to maintain proper sanitation while preparing the product and follow standard procedure of

preparation. Farmwomen expressed their willingness to take up home-level preparation of pickle and squash for subsidiary income. The programme was coordinated by Dr. Kundan Kishore, Dr. A K Shukla, Dr. Naresh babu and Dr. Abha Singh

2.7.7 Field Day on Protected Cultivation of vegetables crops

Field Day on Protected Cultivation of vegetable crops was organized for farmwomen on the occasion of International Women's Day on March 8, 2013 to demonstrate protected cultivation technologies for off season cultivation of high value crops like cucumber and tomato to enhance income of farmwomen. The programme was inaugurated by Dr. Krishna Srinath, former Director, DRWA and she emphasized the role of horticulture in entrepreneurship development and livelihood security. Dr. M P S Arya, Director, DRWA emphasized on the focus areas of the Directorate to improve the economic conditions of rural women through technological interventions. The field day was attended by more than 50 farmwomen and the programme was coordinated by Dr. A K Shukla, Dr. Naresh Babu and Dr. Kundan Kishore.



Fig. 29. Training on Capacity Building of Farm Women on Processing and Value Addition of Horticultural crops



Fig. 30. Field Day on Protected Cultivation of vegetable crops

2.8 Refinement and development of Horticulture based cropping models for gender mainstreaming

Naresh Babu Kundan Kishore and A.K. Shukla

2.8.1. Effect of mulching on moisture conservation, yield and quality in mango

An experiment was carried out various type of locally available mulching viz cowpea biomass, mango leaf, cashew leaf, dry grass, glyrecedia leaf, paddy straw, banana trash along with black polythene were applied for soil moisture content, yield and quality in five years old mango (cv Mallika and Amrapali) orchard. One treatment was kept as a control. Results revealed that black polythene mulching responded higher moisture content (33.36 and 34.91%) in the soil (at the depth of 10 cm) near feeding root zone as compared to other treatments in both varieties of mango. Mulching with cashew nut leaf was next higher treatment and recorded 28.51 and 33.73% moisture content. Maximum yield (24.45 and 28.38 kg/ plant) was

recorded under black polythene mulching which was significantly higher than dry grasses mulching (16.45 and 17.20 kg per plant). Lowest fruit yield were recorded under control (10.25 and 13.68 kg / plant) in both varieties. TSS (23.50 and 20.10), and total sugar (16.55 and 15.90) were higher in both varieties in black polythene mulching. Acidity (0.34 and 0.36) was minimum recorded under black polythene mulching. It has been observed that paddy straw was damaged by termite after 14 days of mulching followed by banana trash (after 20 days of mulching).

2.8.2. Intercropping in mango

Four ground story crops viz cowpea, radish, okra, and French bean were evaluated in mango based cropping model to address the yield needs for farm family. Maximum net return Rs 28350/ha with B: C ratio of 2.40 was obtained in mango+ cowpea intercropping. However higher yield (64.25t/ha) were recorded by Radish var. Pusa Chetki. Seed treatment with *Rhizobium culture* @ 20g/kg seed of cowpea and French bean was enhanced 16 and 12 % respectively more yield (green pods) as compared to control. Intercropping with cowpea drastically reduced weed growth with corresponding higher yield in mango var. Amrapali.



Fig. 31. Mulching in Mango



Fig. 32. Inter cropping in mango

2.8.3. Steonic effect in mango

Certain rootstock and scions are incompatible; therefore, the graft union between these two will not normally take place. Maximum incompatibility (effect of scion and rootstock) were observed in

Gulabkhas (90%) followed by Mallika (84%) at the age of five years in mango. Role of women is very important in identification of proper rootstock and scion for production of quality planting materials for healthy and productive orchard.



Fig. 33. Steonic effect in mango

2.9 In vitro multiplication of pointed gourd and pineapple for income enhancement of farm women

Kundan Kishore and A.K. Shukla

Pointed-gourd is one of the potential vegetables of Odisha. However, availability of quality planting material is a major limitation. To make quality planting materials available to rural women and their income enhancement through increase in production, *in vitro* propagation technique was optimized. The best initial micro-shoot response was observed with basal nodal segment on the MS medium containing kinetin 8.0 mg/litre. And the sub-culturing medium with 4.0 mg/litre produced maximum regenerated shoots with good shoot growth. In-vitro rooting was optimized with 0.4 NAA mg/litre; which gave highest root initiation percentage and also number of roots. However, in-vitro roots

were also produced without NAA. Interestingly, shoot initiation and days to shoot initiation showed temporal variations. Maximum percentage of shoot initiation and minimum days for shoot initiation were recorded during March-April. Optimization of *in-vitro* plantlets development can be a tool for propagation of quality planting materials.



Fig. 34. Invitro plantlets of pointed gourd

2.8.1 Resource efficient horticulture model initiated

The development of horticulture model has been considered as the need of the hour to enhance income of farm women through technological interventions, efficient resource management, crop and enterprise diversification which will have the potential of replicability. Moreover, the model is expected to address the issue of nutritional security. The model has been conceptualized considering the resources of small and marginal farmers wherein apart from meeting their daily requirement of vegetables and fruits, substantial amount of income could be generated through different crops and enterprises. Farm women are being involved right from the planning stage to upgrade their skill and to adopt feasible technologies.



Fig. 35. Development of horticulture model

2.8.2 Skill upgradation programme on Horticulture

A training programme on skill upgradation was organized for farm women on Dec. 21, 2012 with an aim to upgrade their existing skills in horticulture and enhance their income generating potential to secure their livelihood. Trainees were imparted knowledge on banana, papaya and guava production technology. Trainees were also exposed to low cost protected cultivation technology of vegetables to minimize the risk of crop failure during summer and rainy season. Twenty farmers including women of Khurda district attended the training programme. Farmers' perceptions were also taken regarding their skill and requirement of technology. The programme was coordinated by Dr. Kundan Kishore, Dr. A K Shukla and Dr. Naresh babu.



Fig. 36. Training programme on skill upgradation

2.10. Network Project on Enhancing livelihood of rural women through livestock production

Anil Kumar, Abha Singh, Tanuja, S.

Data for studying the socio-economic conditions and gender roles in livestock production were collected from five states of India covering 7 districts and 1522 by using proportionate random sampling method.

Data were collected from the respondents using a well structured interview schedule prepared for this purpose comprising socio economic profile of household, herd structure, major crops grown, interest and awareness about extension programs, constraint in adoption of improved technologies, access



and control on resources, role in livestock rearing practices, decision making pattern, perception and adoption of improved technologies, problems faced in adoption of improved technologies, etc. and it was pre-tested before administering to the actual respondents.

2.10.1 Contact to Extension worker

Extension workers are important agents of change in rural areas. The frequency of contact of the extension agents helps in creating awareness about the improved package of practices and scientific rearing of animals for higher productivity. They also make the rural people about the different programmes and policies initiated by the government for the beneficiaries. The study revealed that NGO personnel frequently visited in UP (91.9%), Odisha (54.6%) and Tamil Nadu (16.7%). In Odisha Veterinary Assistant Surgeon (72.1%) and Village Level Extension Worker (66.4%) were the main extension agents, whereas in TN, University/ Institute/ KVK Personnel were the main extension agents (85.6%).

Reasons for not availing the extension services: Non availability of timely services was reported to be the reason for not availing the extension services in Tamil Nadu (70.8%), Odisha (67.9%) and UP (12.2%). Other reason for not availing the extension services were shortage of time, extension personnel not being women etc. The venue of the meeting was another important reason for not availing the extension services.

Communication profile of respondents: Friends, relatives and neighbours were the main source (>90%) of information at all the places. Profile of the sampled households was studied through frequency of utilization of interpersonal, mass media and other communication methods for receiving the

diary related information. Goshti was another source of information in- Odisha (75.19%), U.P. (53.06%) and Tamil Nadu (34.21%). In Odisha, other sources were NGO personnel (66.03%), Village Pradhan (63.35%), Television (58.39%), Institute/ University (41.98%), Farm literature (40.83%), Exposure visit (37.78%), Posters (35.11%).

2.10.2 Awareness of women for various dairy farming practices

Breeding practices: Majority of respondents (93.1%) were aware of the need of proper disposal of placenta in Odisha. Most of the respondents (91.2%) aware of the importance of taking care of animals at the time of parturition. Similarly, proper feeding of advanced pregnant animals were known to most of the farm women in Odisha (77.9%) and Tamil Nadu (78.9%). Other breeding practices were also known to the farm women who practiced them with their animals.

Feeding practices: The need for green fodder for economic animal production were known to most of the farmers, however, the availability of quality seeds and planting material of green fodder was a matter of concern. Balanced feeding of animals was not practiced. The knowledge of enrichment of low grade roughage was not known to the farmers.

Health practices: With regard to health practices, 87.5% of respondents were aware of timely treatment of sick animals in Tamil Nadu and 51.90% in Odisha. Regular vaccination of animals against contagious diseases was practiced in Tamil Nadu (81.1%) followed by U.P (76.7%) and Odisha (51.5%). Respondents were aware of isolation and care of sick animals in Tamil Nadu (73.6%), and in Odisha (59.9%). Respondents in Tamil Nadu were more aware about the need for



taking proper health care of animals as compared to Odisha.

Management practices: In Odisha the knowledge and practice of different management practices of livestock rearing varied. Disposal of excreta and cleaning of shed was practiced by most of the farmers (92%) and 77% of the respondents washed the udder and hand before milking cows. About half (55%) practiced feeding colostrums to newly born calves and full hand milking was practiced by 44%. Use of stylized scalpel for cutting naval cord was rarely used, weaning was done by 28.6% of the respondents and use of calf starter was nonexistent.

2.10.3 Technological interventions and their impact

Appropriate interventions were selected and refined based on their socio-economic profile of household, herd structure, major crops grown, interest and awareness about extension programs, access and control on resources, role in dairy husbandry practices, decision making pattern, perception and adoption of improved technologies, problems faced in adoption of improved technologies, etc and other technological constraints revealed by the respondents. The study also tried to link between the gender and socio economic factors in livestock keeping and livelihood security and used this information as a basis for identifying the interventions and strategies for enhancing the income & employment. Successful implementations of these interventions were not only motivational but also helped in increase in knowledge skills and attitudinal change among the clients in a sustainable way.

At DRWA, women livestock keepers were imitated in cultivation of green fodder (hybrid napier) along boundary of their backyard garden and along the drainage channels

which provided green fodder to their milking animals. Similarly, introduction of backyard poultry among the women helped improve their income and the household nutrition as all the eggs produced was consumed in the household. It was observed that the women preferred 20 days old chicks because of the mortality of day old chicks. In Jaypur village where, backyard poultry were distributed through the SHGs, they were willing to pay back the cost of the chicks. But the major constraint was the regular availability of chicks and the training needs for scientific rearing practices. Organization of health camps helped inculcate the importance of providing timely vaccination and deworming for improved production of the animals.

At IVRI, various technological interventions were introduced for capacity building of women livestock keepers. The interventions included feeding area specific mineral mixture, urea molasses mineral lick block, conservation of fodder in silage pit for lean season, distribution of cryoscope for timely insemination, animal health camps for timely vaccination against contagious diseases, deworming of animals and dealing the problem of infertility in dairy animals, popularization of vrindavani breed (cross bred cattle developed at IVRI) through distribution of semen straws to paravets, distribution of revolving stool for milking (a drudgery reduction tool) to rural women, face mask for reducing the occupational health hazards. Seven goat demonstration units, four pig units and 33 backyard poultry units were established in villages for improving their livelihood. Two animal health and infertility camps were also organized at village level where in more than 350 animals were vaccinated against contagious diseases and treated for the problem of infertility, repeat breeding, etc. About 1000 doses of germ plasm of Vrindavani were distributed among

the paravets to popularize the high yielding breed in their work areas. One hundred kg of mineral mixture and one hundred urea molasses mineral lick blocks were distributed among rural women.

At Namakkal, women livestock keepers were trained on preparation of low cost concentrate feed by using locally available feed ingredients. In sheep and goats, the importance of concentrate feeding during flushing and breeding of adults and for kids from two to four months to attain maximum weight gain and was stressed. Method demonstration on azolla cultivation, milking machine, chaff cutter, full hand milking, deworming, teat dipping, disinfection of navel cord and milk products preparation was conducted to impart skill on these aspects. Method demonstration on silage making were conducted to make green fodder availability throughout the year. To motivate the farmers to grow high yielding fodder crops and tree fodders, inputs such as Co4 fodder slips, Agathi, Glyricidia, Subabul tree saplings and desmanthus, CoFS 29, agathi, guinea grass, seeds were distributed to all the beneficiaries. To encourage the feeding of mineral supplements, mineral mixture for dairy animals and mineral blocks for sheep and goats and calves were distributed to the beneficiaries.

In Akola, action research mainly focused on backyard poultry where 90 units of 8+2 (F+M) Giriraja or Vanraja, 5 months old poultry birds were distributed for egg production, to families either having some poultry birds or having experienced in backyard poultry. The units were preferably distributed to the widows, divorces, orphan and lonely woman from the selected participants at all villages as a source of supplementary income to earn their livelihood. This intervention received tremendous response. The feedback was taken from the beneficiaries to assess the impact of these interventions. It was revealed that average monthly income was increased by Rs. 1043/-

per family. This is quite attractive. However, the units should be of atleast 25 birds with 2-3 roosters to draw considerable income and for self employment enterprise as a refinement otherwise maintaining merely 10 birds by one person would be uneconomical considering the cost of labour. The average 2.48 birds were either consumed or killed by predators costing average 462/- per family. The average number of live chicken sold was 1.28 and Rs. 386/- per bird was realized considering the cost Rs. 300/- per bird. The average numbers of eggs layed per month were 143 per family costing Rs. 663/- out of which average 93 eggs sold @ Rs. 7/- per egg and realized Rs. 651/- per family. The eggs consumed per family were 50 eggs which provided nutritional security to the family. Many families have taken hatches and having about 25-30 birds with them. The roosters weighing about 2.5 Kg within 6 months fetches the price Rs. 500-600/- per bird and females weighing about 2 Kg sold at the price of Rs. 300-400/-.It was successful intervention from the point providing nutritional as well as economic security. The women SHG is coming forward to form women cooperative poultry farm with the help of Government schemes. The impact analysis studies with refinement need to be undertaken to arrive at tangible conclusion.



Fig. 37. Women milking cow



Fig. 38. Livestock management by women



Fig. 39. Goat rearing by women

2.11 Assessment of women's role in traditional livestock dependant societies: Kangayam grasslands

Anil Kumar, K. Ponnusamy and Tanuja, S.

The Kangayam region, being located in the rain-shadow region of south India, is a drought-prone area where pasture grass is the main crop and livestock rearing a major occupation of the farmers. Almost every field in the Kangayam region has a live hedge of *Balsamodendron berryi* which helps secure the animals grazing inside the field. This frees the farmers from having to tend the animals throughout the day, and the farmers use their time productively in other vocations. The innovation lies in recognizing the use of the *B. berryi* plants as live fences. Maintenance of the live fences entails a collective responsibility in keeping away the goats, which has been achieved by a decision by the panchayats (democratically elected body at village level) in the past in restricting the population of goats and imposing a heavy penalty on those who infringed the rule. Over a period of one hundred and fifty years, the grasslands have evolved into an excellent productive system, which has sustained the livelihood of farmers and has helped cope with the frequent droughts that the area faces.

The present study focuses on gender based roles and activities in sustainable

management of the Kangayam grasslands, the livestock production, processing and marketing. The project aims elucidate gender relations in control over income and gender specific needs in livestock activities to make the grassland more productive without affecting its sustainability. The background literature on the historical development of the Kangayam grassland were collected. The Kangayam grassland are located in the districts of Erode, Karur, Tirupur and Coimbatore. A field survey was undertaken in December 2012 and the village A.K. Pudur in the Vellakoil block was surveyed with respect to ownership of land and livestock and their management.



Fig. 40. Women working in the Kangayam grassland



2.12 Network on Capacity building of coastal fisherwomen through post harvest technologies of fisheries

Abha Singh, Anil Kumar and Tanuja, S.

Under this project survey on socioeconomic conditions, women's role and gender issues, in fisheries post harvest technologies was conducted in Odisha, Andhra Pradesh, Kerala, Tamilnadu and Maharashtra. Low cost fish drying rack was developed at each network centers. Manual for fisherwomen on Hygienic handling and production of dry fish was developed in five languages (At each network centers). Training cum demonstration programmes for fisherwomen on hygienic handling and production of dry fish and its marketing were conducted at each network centers. Five Model Fish Drying Units for hygienic production of dry fish were constructed which included two units in Odisha and one unit each in Kerala, Tamilnadu and Maharashtra with the financial support of NFDB.

2.12.1 Socio-economic condition, women's role and gender issues, in fisheries post harvest technologies

Age, caste, education and experience

Majority of the fisherwomen involved in dry fish production and trade were middle-aged (25-50 years) illiterate and belonged to OBC category. They had more than 10 years (10-25 years) of experience in dry fish production and handling with high social participation through SHGs and better decision making power in family and in their trade.

Status of the trade

In earlier days, the fisherwomen were exploited by non-institutional sources of credit. The common sources of non-institutional credit were large traders, moneylenders and wholesalers. For a long period of time the fisherwomen had limited

access to institutional credit sources. The introduction of Self-Help Group movement paved the way for their access to institutional credit sources. This micro credit programme considerably increased the marketing margin in the dry fish trade. Improvement in capacity building, infrastructure facility, and marketing channel and credit facilities are needed for better livelihood of fisher families.

Fish variety

Most of the fisherwomen involved in consumers of dry fish trade concentrate on low and medium valued fishes. These varieties were targeted from the local and adjacent area. Anchovis, Lamba lanji, borei, khainga, Hilsa, Bekti, Morua, Kantia, ribbon fish, kokli were the major fish species for dry fish production in Odisha.

Level of Dependency

Most of the fisherwomen involved in dry fish production were dependent on the men of their family in dry fish trade. They had their own decision making power in only few area of their business.

Institutional Support

Only few fisherwomen had training from Government institutions and NGOs for technical aspects. The training programmes were mainly on value added fishery products. They did not attend any training for improving the dry fish production process, packaging, storage and quality of the product.

Marketing

Fisherwomen sold their products in adjacent villages and town markets. They were not permitted to travel in Public buses to carry



their products to the markets due to foul smell of dry fish. In a few villages fisherwomen collectively arranged for trucks to reach the markets at a distance. Very little quantity of dry fish was sold in markets of distant places. Transportation of the dry fish was found to be the most important problem for them. Marketing channel at most of the places was not well defined and there were also fluctuations in the rate of same variety of dry fish at different places.

Time involvement of fisherwomen in dry fish production process

Majority of the fisherwomen spent 225-250 days (7.5-8 months) in dry fish production process. They go for the fish that were available in the season. In the lean period they work as labourer in prawn peeling factory, net weaving or in the agriculture fields to sustain their livelihood.

Participation profile in dry fish production and marketing

More than 50 per cent women in Puri and Ganjam districts were involved in fish collection/procurement from the sea coast but in other districts this work was mainly done by men. Grading, salting and drying was mainly done by fisher women in all the districts. Packaging and marketing was done by both men and women.

The participation profile of fisherwomen families revealed that women need their counterpart support in the dry fish production process. Very few fisherwomen independently manage whole production process as well as marketing. Majority of fisherwomen receive support from men for raw material procurement and marketing related functions. Except fishing and to some extent marketing other activities in dry fish production process such as sorting, cleaning, salting/curing, drying, packing and storage and marketing were done by women only.

Views of women on their needs in dry fish production

Fisherwomen expressed that social support was the most important need for dry fish production followed by support from their counter part and financial and technical support from Government.

Training needs

Majority of the fisherwomen preferred to attend training on value addition and improved of methods for production of high value dry fish. Most of the fisherwomen were not aware about the improved practices regarding site management, packaging, quality assessment, etc.

Access to resources

As regards to access to resources, 82.50 per cent of women had access to market both for procurement of fish from the market and sea coast. When credit was considered, 32.67 per cent of men had access to institutional as well as non institutional credit. However, 27.50 per cent of male and female both had access to institutional credit and 37.5 per cent of males and females had access to non institutional credit.

Production process of dry fish

Mainly low to medium valued fishes were used for fish drying. Except addition of salt no preservatives or additives were added to improve the quality of the dry fish. Adopting hygienic and standard procedures were not in place for dry fish production. In majority of the area the dry fish production process involved was

Fish collection from the sea — — — Sorting —
— — Salting / Curing — — — — Sun Drying —
— — — Storage — — — — — Marketing.

In dry fish production process common infrastructure facilities, cleanliness, drying



platform and proper water supply for dry fish production lacked in the villages.

Constraints

Non-availability of good quality raw materials, lack of alternative drying methods during rainy season, lack of proper infrastructure facilities for drying, lack of open and clean space, contamination with sand, microbes, attack of insects, birds, and animals, non-availability of proper storage facilities, less credit facilities, middle men interference and transportation during marketing were the major constraints in dry fish trade as perceived by fisher families.

2.12.2 Identification and refinement of selected post harvest technologies

Dry fish production is an age old livelihood of major coastal fisher women in India. In this process surplus fishes and prawns are sun dried for preserving the same for later use. As the process is mostly undertaken in unscientific way in unhygienic condition, post harvest losses, poor quality product, and low price realization are noticed. In view of non availability of adequate space, portable water and above all lack of awareness on quality product, in majority cases fishes are neither gutted nor cleaned properly. In most of the cases they are dried on sand or any available open space available near to their habitat. In case of salted fish, salting of the fish is done by using poor quality salt with high load of halophilic bacteria and other chemical contaminants. The salting method used is not standardized. Among the fishes Sardine, Anchovies, Mackerel, Ribbon fish, Perches and small size prawns are commonly used for drying.

Hygienic production process and packaging of dry fish technology was selected for post harvest handling of fish. A protocol for hygienic production process

of dry fish was developed by CIFT, Cochin and through Trainer's training Workshop all PIs and CoPIs were trained on same protocol on 18-19 January, 2010 at CIFT Cochin. Three fishes 1. Lesser sardine (*Sardinella sirm* and *Sardinella sirm*), 2. Anchovy (*Stolephorus indicus*), and 3. Prwan (*Metapenaeus dobsonii*) were selected at DRWA, Bhubaneswar for hygienic fish drying. Drying process was standardized by calculating moisture content and weight of the final product of these species of fishes.

2.12.2.1 Training and Demonstration

1. A two day training programme on "Hygienic handling and production of dry fish" was conducted on 3-4th February 2012 at Penthakota, Puri, Odisha.



Fig. 41. Training cum demonstration on quality production of dry fish



Fig. 42. Raised drying rack



Fig. 43-44. Training and demonstration on value added products of marine fish



2.12.2.2 Drying rack at DRWA

A fish drying rack was constructed by using PVC pipe, connector and net. The frame consists of length 7' 9", height 5' 7.5" and width 3' 6" which holds four removable drying beds of 3' 6" x 3' 6". Height from ground to first rack is 3' 5.5" and the gap between two racks is 2' 2".

2.12.2.3 Training manual

Training manual on hygienic handling and production of dry fish for fisherwomen was developed in Oriya, Tamil, Marathi and Malayalam language for fisherwomen.

2.12.2.4 Model Fish Drying Units

Five Model Fish Drying Units for hygienic production of dry fish were constructed two in Odisha and one each in Kerala, Tamilnadu, and Maharastra with the financial support of NFDB

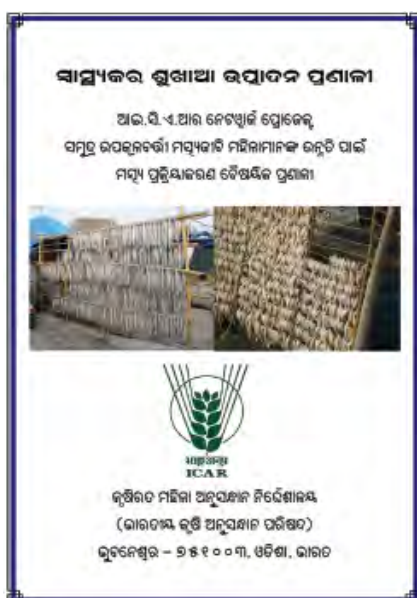


Fig. 45. Training manual on Hygienic handling and production of dry fish



Fig. 46. Model Fish Drying Units

2.12.3 Inauguration of Model Fish Drying Unit at Penthakota, Puri

Model Fish Drying Unit was created by DRWA under the Network project with the financial support of National Fishery Development Board inaugurated on 07.12.2012 at Penthakota, Puri, Odisha. Dr.(Mrs.) Krishna Srinath, Director, DRWA inaugurated and handed over the created



unit to Shanti Marine Fisherwomen Society in the presence of Shri P. Krishna Mohan, Director Fisheries, Odisha Government.,

officials of State fisheries department and scientists of DRWA for hygienic production of dry fish in group approach.



Fig. 47 - 48. Inauguration of Model Fish Drying Unit, Penthakota

2.13 Development of gender friendly hand cum power driven three/ four row rice transplanter

S.P. Singh and Jyoti Nayak

The project has been taken with the objective to develop and evaluate hand cum power driven three/four row rice-transplanter using ergonomic considerations for farm women. During the 1st year, the achievements are given below,

2.13.1 Farm women's feedback in using manual two and four row rice transplanter

Farm women of Siula village of Puri district had used manual two/ four row rice transplanters for two to three times in small area and the equipments were not found to be available for operation by them. Farm women reported more pressure during its operation in puddle field resulted in increasing the total weight of machine. In addition to this, method of field preparation,

duration and raising of seedlings were other parameters responsible for non-operation of the equipment. Two villages were also visited in Cuttack and Dhenkanal districts. Self-propelled rice transplanters were in use but manual operated rice transplanters were not in use.

2.13.2 Component-wise study of manual two and four row rice transplanter

Based on the component-wise study on manually operated CRRI & VST four row and CRRI two row rice transplanters (Table 1), three/four-row rice transplanter can be better options for powering one of the operations. A 0.5 hp two stroke petrol engine can be used as power source for providing power to plucking assembly of rice transplanter. Thus, new rice transplanter will have additional weight for which lugged wheels can be provided to support the machine.

Table 7. Specifications of CRRI and VST manual four row rice transplanter

Particulars	CRRI Make	VST make	Suggested Dimensions for new machine excluding power transmission system
1. Weight, kg	25	32.7	25
2. Operating system			
- Handle for pulling the machine	-	1	1
- Handle for picking the seedling from tray	-	1	-
- Handle for both operation (pulling the machine & picking the seedling from tray)	1	-	-
3. Seedling tray			
- Angle, °	50.5	53	53
- Overall width, mm	1040	1260	1040
- Size of may type seedling, (l x w), mm	225 x 460	285 x 500	225 x 450
- Horizontal plate width at rail end, mm	510	550	550
- Angle of horizontal plate for mounting, °	14	17	17
- Mounting support in tray for movement of tray	20 x 32	25 x 35	25 x 40
- Size of support, mm	10	28	28
- Angle of mounting, °			
4. Rail arrangement for support of tray during movement			
- Length of angle iron for mounting support to seedling tray, mm	1010	1260	1010
- Mounting of m.s. angle, °	15	18	18
- Support mounted at an angle, °	61.5	62	62
5. Float			
- Number	2	3	3
- Width, mm	150	150	150
6. Planting/ picking fingers			
- Angle of finger at maximum opening, °	19	30	30
- Gap in fingers for picking seedling, mm	8	8	8
- Made of	MS flat & groove	Wire	Wire/ MS flat
- Distance from seedling picking point, mm	110	110	<100
- Height from ground, mm	315	310	310
7. Rollers			
- Number	2	2	2
- Diameter, mm	52.5-72	63-70	63-70
- Width of groove in roller, mm	6	5	5
- Depth of groove in roller, mm	5	6	6
- Roller mounting at an angle, °	72.5	71.5	71.5

2.13.3 Experimental setup for measurement of force in picking the rice seedling

An experimental unit was developed for measurement of force in picking the rice seedling from seedling tray (Fig 46-47). The experimental setup was developed to avoid

hand force while measuring the actual force required in picking the seedling. Initial results showed the force requirement in plucking seedlings was about 4.9 N. Without load, force required in moving the seedling tray was in range of 34 to 44 N.

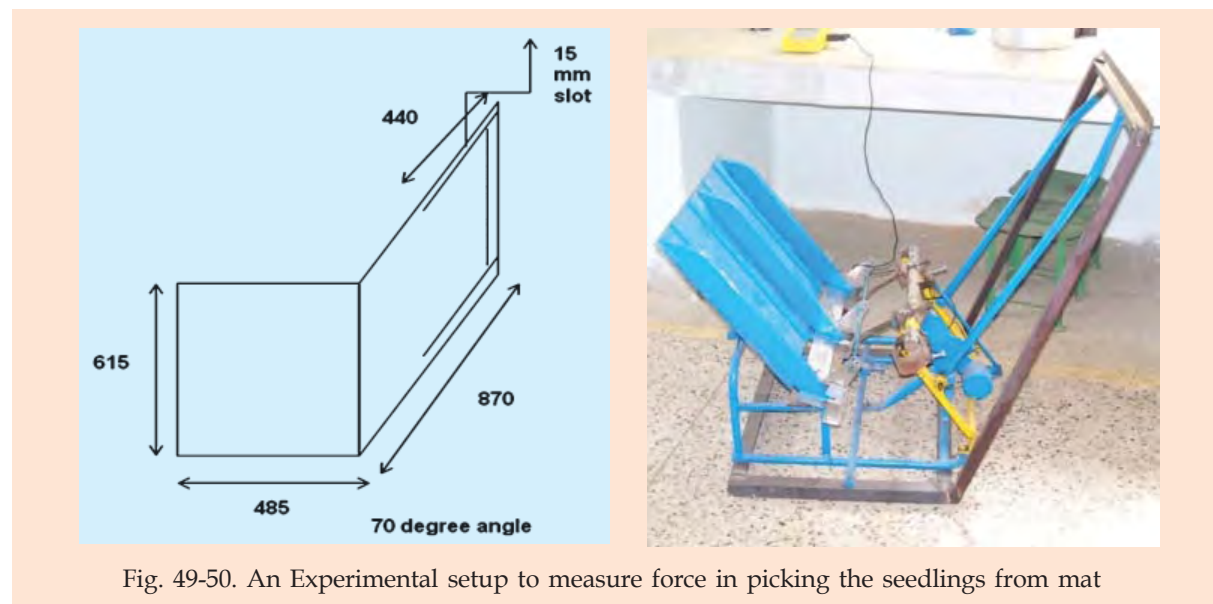


Fig. 49-50. An Experimental setup to measure force in picking the seedlings from mat

2.13.4 Conceptual drawing of power transmission system of the equipment

The planting strokes per min can be kept up to 60. Walking speed of machine may be 0.6

to 1 km/h. Based on the values conceptual sketch was shown below in Fig 48. The side view of proposed mechanism to power is shown in Fig. 49.

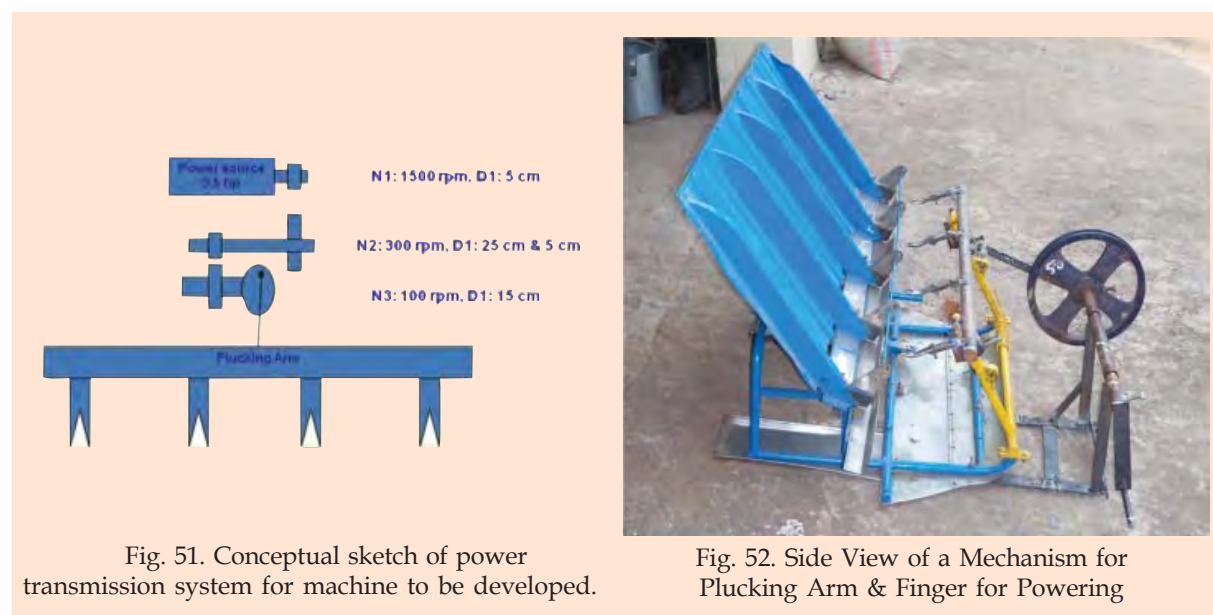


Fig. 51. Conceptual sketch of power transmission system for machine to be developed.



Fig. 52. Side View of a Mechanism for Plucking Arm & Finger for Powering

2.13.5 Development of riding and sitting type pedaling system in DRWA maize dehusker-sheller

DRWA hand operated gender friendly maize dehusker-sheller can also be operated with 1/2 hp single phase electric motor. To increase the versatility an attempt is being made to operate the machine with pedal system. Pedalling mode for operating maize dehusker-sheller was developed for riding and sitting type (Fig 3). The specifications

of both pedalling systems are given in Table 2. Initial results showed the force requirement in moving the pedal at top position from lowest seating height of 490 mm was 38.6N including weight of foot while maximum force by a farm woman was 89.4 N. It was 41.1 N at front (far reach position of pedal) while maximum force by a farm woman was 100.7N. Women subject were more comfortable in pedalling while sitting than riding.



Fig. 53-54. Riding and sitting type pedalling system in DRWA maize dehusker-sheller

Table 8. Brief specifications of Riding and sitting type pedalling system in DRWA Maize Dehusker-sheller

a. Riding type pedalling system: Height of seat from ground Distance from machine Height of pedal mechanism from ground	: 840 mm : 500 mm : 270 mm
b. Specifications of Sitting type pedalling system: Size of rectangular frame Size of adjuster (rectangular frame) Height of pedal mechanism from ground Pedal crank length Height adjustment in Chair without arm Hole of 8 mm at 40 mm spacing for movement of adjuster in main frame	: 1160 mm in length x 650 mm in width : 330 mm in length x 630 mm in width : 260 mm : 190 mm : 400-650 mm



2.14 All India Coordinate Research Project on Home Science

The All India Coordinated Research Project (AICRP) on Home Science is in operation in nine State Agricultural Universities. The main thrust of the project is on empowerment of women in agriculture for their improved nutrition and livelihood security, drudgery reduction for quality living. The salient achievements of the project during the year 2012-13 have been summarized below:

2.14.1 Gender disaggregated data

The data for gender database were collected from nine states covering 46 agro climatic zones. Agro climatic zonal variations create a lot of difference in crop production and life style of the people. With the variation of topography, land and production system, an attempt has been made to find out if any variations exist in participation pattern of farm women and men in different agro climatic zones and in different activity areas of the states viz. Assam, Andhra Pradesh, Uttarakhand, Himachal Pradesh, Punjab, Maharashtra, Rajasthan and Karnataka.

Results show that, in the Upper Central Brahmaputra Valley Zone of Assam, more than half of rural women participated independently in dehusking, cleaning, shelling, grading, drying, storage, parboiling and processing. Though the women members played major role in livestock management activities, male members had complete responsibility in care of livestock (71.38%), care of sick animal (71.27%), feed of animal (70.37%) followed by fodder management.

In Andhra Pradesh, result revealed that in scarce rainfall zone (8) the participation of women is more as compared to other zones. Partial role and responsibility of women was observed high in High altitude tribal zone (9) followed by North Coastal (1) and Godavari zones (2). Among the agro climatic zones

more complete access and control of women on farm resources was high in Northern Telangana Zone. With regard to men, complete access to homestead resources was observed in Godavari zone (82.24%) followed by Krishna zone (74.55%). Complete control of men was observed in Krishna zone followed by Southern Telangana zone.

Overall picture of participation of gender in agriculture in the state of Himachal Pradesh reveals joint participation in farming, homestead gardening, horticulture, post harvest operations and animal husbandry by majority of the men and women. Percentage of independent participation by women respondents is noticeably high in case of homestead gardening, post harvest and livestock management.

In Tarai and Bahadur zone of Uttarakhand women of small land holding and landless category were found to be extensively participating in transplanting, weeding and harvesting but women from large landholding did not participate in field based activities. However, in this zone independent role and complete responsibility were men dominated (55.74% & 64.33%), whereas in Hill zone rural women had independent role (52.61%) and complete responsibility (62.33%) of farming activities. Intra zonal differences in horticultural activities shows that in hill zone both men and women were involved in horticultural activities whereas in Tarai & Bhabhar zone greater number of men members were performing independent role and complete responsibility of farming activities. In Hill zone, women were performing independent role and had complete responsibility of livestock management activities whereas in Tarai and Bhabhar zone, more women were jointly performing the role with men members and



holding partial responsibility of livestock management activities.

In Punjab State, majority of the women were not participating in farming and horticultural operations and men were the major role players. Even in post harvest operations majority of women (66.55%) were not involved. Both men and women in majority performed livestock management activities. Independent participation was highest in livestock management for women and for men it was in post harvest followed by farming and horticulture.

In Maharastra, rural men were having complete responsibility while rural women were having partial responsibility in all the nine agro climatic zones. In horticulture, rural women from the South, North Konkan, Western Ghat and Sub Mountain agro climatic zones were participating jointly with men whereas her joint participation with women was noticed in Eastern Vidharbha and Western Maharashtra Plain zones. In livestock management, rural women from the South Konkan, Sub Mountain, Western Maharastra and Plain agro climatic zones were participating jointly with men whereas her independent participation was noticed in North Konkan, Western Ghat and eastern Vidharbha agro climatic zones.

Data of Rajasthan revealed that most of the farm activities were performed jointly by men and women (35.3-68.1%). Findings indicated that in farming men had complete access as well as control over the resources like farm assets, inputs and procuring and repaying of loan, while women had no access and control over these resources. Most of the livestock activities were performed independently by women 38.97 - 65.12%. The remaining activities were performed jointly by men with women (59.18-84.78%). In livestock resources

women mainly had complete access to and control over some of the resources like feeding of animals, excreta management, management of cash earned from sale of produce and management of produce at household and commercial level, while men had partial access and control in the resources like number of animals to be purchased or sold, fodder management and care of sick animals.

Karnataka is divided into 10 agro climatic zones namely North Eastern Transition Zone (1), North Eastern Dry Zone (2), Northern Dry Zone (3), Central Dry Zone (4), Eastern Dry Zone (5), Southern Dry Zone (6), Southern Transition Zone (7), Northern Transition Zone (8), Hill Zone (9) And Coastal Zone (10). The findings revealed that irrespective of the zones, independent roles and responsibilities of men in farming activities were higher and for women mainly it was joint participation and partial responsibilities. Participation in horticulture activities are seen only in zone 4,5,6,9 and 10 where fruits like Ber, Pomegranate, Guava and mango are grown. Homestead gardening was practiced wherever there is assured water source and this was seen in zone 4, 6 and 7. Fisheries activities were carried out in Zone 2 and Zone 10. But the difference was that in zone 2 it was inland and riverine fisheries exclusively carried out by men, while in zone 10 it is coastal fisheries where men go out to the sea and take care of marketing and women dominate post harvest activities.

2.14.2 Food & Nutrition Security in selected farming system

Recipes which were commonly consumed by the farm families in the selected areas were identified and analyzed for the iron content. The selected recipes were modified to obtain 6-8mg of iron/



serving. Forty five recipes have been modified to obtain the desired iron value. The value of iron ranging from 4.7 in *poha* reported by Ludhiana and 29.09mg in *khatta meetha* namkeen of Palampur. Since vitamin C helps in absorption of iron hence analyzed for each of the recipes also. The recipes were developed using different food

groups. Fifteen were based on cereals, 6 on pulses, 4 with nuts and oil seeds, 6 with green leafy vegetables and 4 with root vegetables. Remaining were developed mixing different groups. Iron sources used in the recopies are lotus stem, rice flakes, bengal gram flour, niger seed, mint powder, rajkeera seed powder etc.

Table 9. Iron and vitamin C content of recipes

Name of the center	Name of the product	Portion size	Iron content (mg/100g)	Vit. C
MPUAT, Udaipur	Coconut laddoo	85	10.31	---
	Kangani biscuits	75	4.96	---
	Til mathri	40	6.32	---
	Til burfi	75	10.2	---
	Lehyam	20	8.31	---
HPKVA, Palampur	Nutritious <i>khichri</i>	150	5.56	12.35
	Nutritious <i>dalia</i>	125	7.98	32.85
	Katta mettha namkeen	75	29.09	15.09
	Mathri	100	14.16	4.75
	Paushtic Pinni	80	20.14	4.35
PAU, Ludhiana	Poha	150	4.7	7.5
	Missa prantha	140	4.8	7.69
	White channa	250	5.7	11.14
	Ladoo	110	10.47	12.3
	Panjiri	100	6.3	5.9
GBPUAT, Pantnagar	Pant namkeen	50	17.27	-
	Pant nutri laddoo	84	12.8	-
	Pant laddoo	54	18.47	13.00
	Nutri goli	80	12.38	-
	Pant pak	150	15.08	-
AAU, Assam	Crispies	50	9.15	0.0
	Lehyam	20	16.29	87.21
CCSHAU, Hisar	Biscuit1	—	6.7	---
	Biscuit2	—	6.0	---
	Nutritious sev	—	7.2	---
	Nutritious laddoo	—	16.8	---
	Matar	—	7.5	---
ANGRAU, Hyderabad	Mint Laddoo	50	16.1	---
	Mint Murukulu	50	12.2	---
	Mint Khajikayalu	50	15.7	---
	Mint Toffee	50	13.4	---
	Lotus stem Laddoo	50	22.2	---
	Lotus stem & Garden Cress seeds	50	17.6	---
	Murukulu	50	16.41	---
	Garden cress & Amaranthus seeds	---	---	---
	Laddoo	---	---	---

MAU, Parbhani	Pearl pops	50	9.55	6.15
	Crunchy ball	50	8.05	11.50
	Nutri Grans	50	8.30	11.75
	Kranky Noodles	50	8.60	10.01
	Nutri Ribbon	60	8.76	17.25
UAS, Bengaluru	Diamond cuts	—	In progress	---
	Green nippattu	—		
	Greens burfi	—		
	Nigar seed burfi	—		
	Leafy greens sweet chocolate	—		
	Leafy green sweet and hot chocolate	—	29.3	

3.14.3 Assessment of technologies for drudgery reduction

To mitigate drudgery and occupational problems of women working in different production systems three technologies were developed and one was modified.

1. A ladle made of iron with wooden handle was designed and fabricated for parboiling of rice by AAU, Assam
2. Okra and brinjal mittens were developed for farmwomen involved in harvesting activity by MKV, Parbhani
3. A portable comb type ground nut stripper was developed by MPUA&T, Udaipur
4. A portable briquette stove with hand blower was fabricated in association of Sri engineering Works, Hyderabad

Technologies Developed



Fig. 55. Ladle Technologies Modified

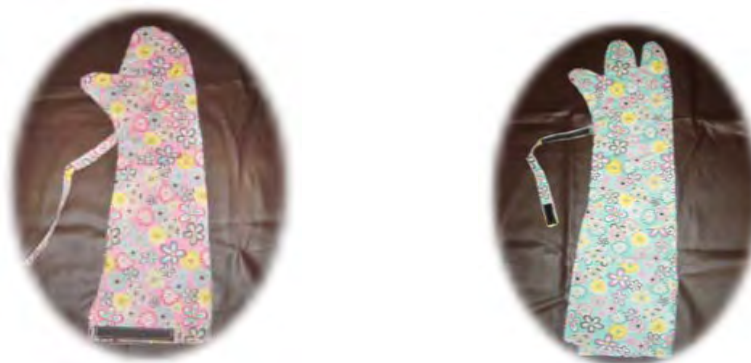


Fig. 56. Okra and Brinjal Mittens



Fig. 57. Ground nut Stripper



Fig. 58. Portable Briquette Stove

Details of evaluated technologies are given below:

1. Head Load Managers (HLM): Four head load managers made of different materials and with variations in design aspects were evaluated. Thirty subjects who are regular head loaders were selected for the study. The subjects selected were asked to use all the four head load managers along with the conventional method of carrying loads. Each trial was carried out for 30 minutes. Data was collected using an interview schedule and an opinion schedule. The study suggests that the head load manager can be used comfortably by the workers for load carrying such as sand, bricks, concrete etc. As they are habituated to the conventional method adoption of this new technology takes some more time.

2. Aonla pricking: Ergonomic evaluation of conventional (fork and hand tools) and improved methods of *aonla* pricking (hand operated *aonla* pricking machine) revealed that Physiological parameters like HR, EER and PCW were found to be slightly higher while pricking with the machine as compared to the conventional tools.

However, the physiological responses with all the three tools in all the three posture were within the acceptable limit for the women workers and pricking with all the tools in all the postures was regarded as the light activity. The postural analysis of workers in different working postures using RULA (Rapid Upper Limb Assessment) indicates towards complete elimination of use of conventional tools as they involved exertion of force and highly repetitive motion of upper extremities. Similarly, Ovako working posture assessments (OWAS) results also clearly indicated that working in sitting and squatting posture with all the three tools should be changed as soon as possible. Spinal deviation was also found to be maximum in squatting posture with conventional tools and in sitting posture with machine. Hence, the biomechanical parameters clearly state towards complete elimination of use of conventional tools and promotion of the machine and at the same time modifications in sitting and squatting postures with the development of a proper workstation. The study suggested development of proper workstation and modifications in working postures.



3. *Petha* making enterprise with WISE (Work Improvement in Small Enterprises) techniques:

Occupational hazards and evaluation of the *Petha* making enterprise with WISE techniques revealed the need for

- Improvements in organizing storage place with access to materials and promoting hygiene in handling
- Development of proper workstation for cutting, pricking and processing mostly for cutting *Petha* into cubes
- Use of safety gloves, masks while handling hot spots
- Postural improvement by providing seating comfort and suitable work tables.
- Improvement in work environment viz-a-viz proper ventilation and lighting at the working areas

4. Cotton picking machine: The mechanical method of cotton picking operation with cotton picking reduced the physiological cost of work of women significantly compared to manual method along with 41 per cent reduction as per rating on drudgery experiences. The picking efficiency increased by 6 per cent.

2.13.4 Functional Clothing to combat occupational health hazards of farmwomen

Health hazards and existing dress patterns of farm workers engaged in different production system of agriculture sector were studied through interview schedule and observation method by all the centres. Data were collected from 850 respondents in the age group of 31-40 years. Seed treatment, land preparation, sowing and threshing were being performed by men farm workers whereas transplantation, harvesting, vegetable plucking, weeding and cleaning

were carried out by both men and women. For land preparation, tractor was being used by majority of the respondents however, bull cart was also being used by many of the respondents. Most of the crops were being sown/ transplanted manually however tractors/ bull carts were also being used in few cases. Flooding system or channels were being used for irrigation as per requirement of crops. However drip irrigation was reported by Udaipur and Dharwad centres. For threshing, combine or thresher were used. Harvesting was either done by combine or manually. Application of fertilizer and weeding was reported to be done manually. Vegetable/flower/cotton were being picked or plucked manually.

For identification of occupational health hazards different centres selected commonly grown crops of their regions. Data revealed that major health hazards encountered while performing various farm activities during crop cultivation by majority of respondents were irritation of eyes, and allergy on face, hand and feet. Seed treatment caused problems in hands, headache and nausea due to use of pesticides. Majority of respondents reported soiling of hand and feet during weeding, irrigation and fertilizer application.

Specific problems encountered while performing activities for selected crops such as:

Sugarcane

- Transplantation: Backache due to bending, foot ailments and hand ailment
- Harvesting and Cleaning : Cuts, Soiling, Itching and Irritation in hands, arms, eyes and other body parts



Wheat and mustard

- Harvesting and threshing: Soiling and itching/irritation on eye, hair, face, neck, arms, hand and feet, running nose/sneezing, breathlessness and cut in hands and feet.

Rice cultivation

- Transplantation : Backache due to bending and foot ailment
- Harvesting: Itching and cuts on hand

Maize cultivation

- Sowing: Backache due to bending
- Harvesting: itching & irritation and cuts in hand.
- Shelling: pain and blisters in hands
- Soyabean, Sorghum, Red gram, Chick pea harvesting: cuts in hand, soiling on hand and feet

Problem encountered during vegetable and flower cultivation varied according to the specific vegetable and flower. These included backache due to bending during transplantation and plucking, cuts in hand, allergy in hand/arms were also reported by many respondents.

During farm activities *Kurta Pyzama* was the most commonly used dress of men farm workers while *Kurta-Lungi*, *Kurta* trousers were also reported by few centres. *Safa*/Towel/ *Gomucha* / *Pagri* were used for protection of head which varied from region to region. Majority of respondents were also using *chappel*. Most commonly used dress among women farm workers was reported to be *Kameez-Salwar* with *dupatta* by Hisar, Ludhiana and Palampur centres whereas *Saree*-Blouse was being worn by women workers of Hyderabad, Dharwad, Pantnagar and Parbani. Udaipur centre reported that

Blouse-*Ghagra* and *Odhani* was worn by women workers and in Assam, Blouse-*mekhla* and *chaddar* was worn. To cover head, they used *dupatta* / towel or scarf. In spite of the protective measures taken by few farm workers, they were facing problem of dust, husk particles on their body parts as *safa*/towel/*dupatta* pulled out while performing farm activities. *Safa*/*Dupatta*/Towel also lead to inconvenience while breathing.

Hisar centre developed educational package on Protective clothing for farm workers to disseminate the information to the target group for popularization of technology. Three Media was planned i.e. pamphlets, video film and interactive CD. Three pamphlets were developed on *keetnashak sambandhit karya karne vale pursho ke liye surkshatmak vastar* (In Hindi), *threshing karne vale pursho ke liye surakshatmak vastra* (In Hindi) and *threshing karne vali mahilaon ke liye surakshatmak vastra* (In Hindi).

Developed pamphlets were got evaluated from 20 experts with reference to length and clarity of title, accuracy, coverage of message, objectivity of the message, writing styles and compatibility of the content. The data revealed that in the content of pamphlets, the material managed in logical sequence and proper grouping and usefulness of the information was found to be highly appropriate. Length and clarity of the title, font size and clarity of printing, message coverage of all the information on protective clothing were also asessed to be highly appropriate. The write up of the pamphlet was clearly stated and self explanatory and repetition of words was avoided carefully. The overall mean score for writing style was found to be highly appropriate. Illustrations and their layout were stated to be effective. Compatibility of pamphlet was found to be highly appropriate. Thus, it clearly indicates that the presentation

of material of various messages was according to farmers' needs. Script has been finalized for video film and interactive CD.

Utilization of plant sources for textile application

To study the disinfectant practice data was collected from 660 respondents in the age group of 21-30 years or 31-40 years comprising of rural and urban women using well structured interview schedule. Maximum no. of respondents were middle class, had nuclear and medium sized families. Family occupation of maximum number of respondent was farming and had monthly income less than 10,000 per month.

For disinfecting of clothes, majority of the respondents used dettol soap while neem soap was also found to be used by few respondents. Other respondents were using ordinary soaps and detergent powders. Amongst disinfectant from natural sources, neem leaves were being used by majority of the respondents and tulsi leaves were also reported by a few respondents. Amongst synthetic disinfectants, dettol solution was used by majority of the respondents and sevlon was reported to be used by few respondents. The antiseptic solutions were used in the final rinse. Clothes were also sun dried to make them disinfectants. Majority of the respondents had knowledge regarding medicinal value of neem and tulsi leaves,

turmeric, ginger and garlic. A few respondents had also knowledge about medicinal nature of eucalyptus, orange peels or pomegranate rinds.

Hyderabad centre worked on diversified use of sisal fiber by improving its process ability and extending from handicrafts and fabrication of composites thereby creating new avenues for sustainable eco-friendly end products. The available varieties of sisal in Andhra Pradesh namely *Agave webert*, *Agave cantala*, *Agave Veracruz* were considered for study, based on the observation of the tested fiber varieties for strength *Agave webert* variety was selected for the study. Sisal being a very stiff fiber, to soften, it enzyme treatments were given with three laboratory grade cellulase enzymes- Sibasof, Microsil and New smooth. To standardize the softening treatments on sisal fibre, three varieties of enzymes namely Microsil, Sibosof, New smooth with three different concentrations of 0.5 %, 1.5 % and 2 % were selected for each enzyme. To optimize the enzyme treatment process it was carried at room temperature for 30 minutes at 5 pH and M: L ratios were maintained as 1:30. Then the fiber was rinsed dried and was got winded manually. Three different types of union fabrics for each enzyme were woven on a handloom using cotton as warp with the yarn count of 60s and 40s of treated sisal fiber as weft. The



Fig. 59. Control samples



Fig. 60. Enzyme I treated samples



Fig. 61. Enzyme II treated samples



Fig. 62. Enzyme III treated



control sample was woven using cotton as warp and untreated sisal fiber as weft.

Dharwad center standardized fibre extraction method from Mesta and Sunhemp Stalks and studied the effect of retting process on fibre yield and quality. Mesta species, *Hibiscus sabdariffa*, variety AS73, CD 560 and sunhemp species, *Crotalaria juncea* grown in Institute of Organic Farming, University of Agricultural Sciences, Dharwad were selected for the study.

For higher yield as well as better quality of fiber the plants were harvested at physiological maturity the harvested stalks were dried completely after the leaves



Fig. 63. Mesta species (*Hibiscus sabdariffa*)



Fig. 64. Sunhemp species (*Crotalaria juncea*)

dropped they were dried subjected to retting process. The dried Mesta and Sunhemp stalks were just steeped in water that took nearly 200 hours to decompose and it was used as control sample. To accelerate the retting process, biological cultures i.e. 2%vermiwash were added into the retting tank in the 2nd sample and 3rd sample was treated with 2% urea, an organic compound. Fiber yield of Mesta and Sunhemp stalks treated with 2% vermiwash had maximum fiber yield. Fiber extracted from urea treated stalks was found to be longest whereas control sample depicted better fineness, strength and elongation percentage amongst all the three samples. Sunhemp stalks treated with 2% urea exhibited increase in fiber cell length, length of fiber strand, strength and elongation than control, while fiber fineness was found to be reduced after urea treatment. The fibers extracted from stalks treated with vermiwash exhibited better strength and elongation percentage as compared to control. On the other hand, reduction in fiber cell length, length of fiber strand and fineness was observed after vermiwash treatment.

Dharwad and Hyderabad centres also conducted survey to find out the utilization of starches in household and commercial laundering. Parbhani centre conducted Phytochemical Analysis of five plant sources viz Ashoka leaves, Lantana camera leaves, Lemon leaves, Drumsticks leaves and Catharanthus Roseus leaves for their characterization. Analysis was done to assess the microbial properties of the plants.

Effort made by all the centres for dissemination of developed technologies:

- Put up Exhibitions in Kisan Mela and Mahila Kisan Mela
- Imparted Trainings



- Organised Demonstrations Delivered Lectures

2.14.5 Capacity development of rural young girls engaged in agriculture

The Training module on Life Skill Education which was developed during the previous plan under AICRP on Home Science was used for the capacity development of youth. The module consists of 54 different lessons based on day to day life situations applicable to rural adolescent girls. Participants are encouraged to actively involve in those activities through which they can develop various life skills. Lessons are very easy, simple and can easily be adapted to age, gender, local situations and language. The approach is completely interactive, using role plays, games, puzzles, group discussions and other techniques to keep the participants involved during the sessions.

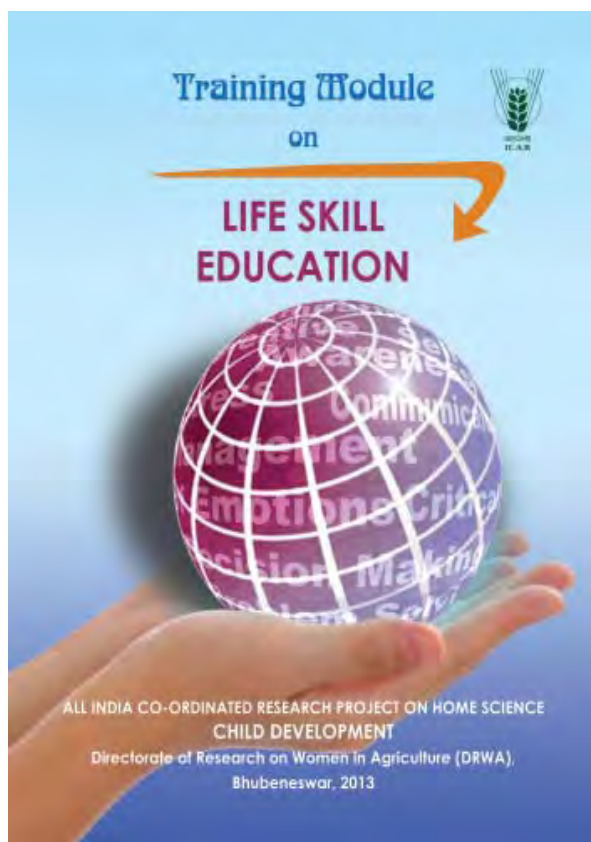


Fig. 65. Training Module

In order to improve life skills of rural adolescent girls and young mothers, interventions were given through modules prepared on life skills. Results of Pre tests and post tests carried out on nine Life skills showed improvement in all the skill after intervention. Improvement in terms of mean scores showed comparatively better result in empathy and communication skill than other skill. When the data were analyzed centre wise for each of the skills, improvement after intervention has been observed in all the life skills in the data of Jorhat and Hyderabad centre. From the data it can be inferred that in the areas where improvement was found insignificant, continuous intensive intervention is required for improving life skills of rural adolescent girls. In the present project the respondents received only six hours intervention for each of the skills which are not at all sufficient for developing a skill. Therefore such interventions should be planned as a continuous training programme for rural adolescent girls.

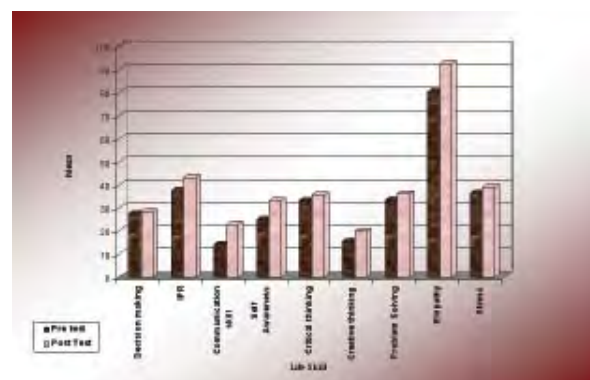


Fig. 66. Comparison of Mean Scores of pre and post tests on various life skills

Trainings were imparted separately for each of the nine life skills in all the nine centres to adolescent girls. Trainings at field level were organized where rural girls actively take part in the activities related to the skill. They perform role playing in some of the skills namely: inter-personnel relationship,



problems solving and communication skill to understand the meaning of these skills.

Thirty-three (33) training programmes were conducted by all the centres on life skill education, parent adolescent relationship, management of adolescent behavior and income generating activities. About 865 beneficiaries including rural youths, mothers, adolescent girl, anganwadi workers and *anganwadi* children benefited from these.

For the purpose of the study on “Developing competencies of rural youths through educational intervention” each of the nine centres selected 150 numbers of rural youths who are engaged in agriculture and allied activities. The selected youths are usually school drop outs as well as those who discontinued their studies after Xth standard. The sample comprises of both boys and girls age ranges

from 15 to 24 yrs. Majority of the samples are from average socio-economic background. Boys are mainly engaged in vegetable cultivation, mushroom cultivation, sugar cane cultivation, fruits cultivation, poultry farms, dairy and piggery. Girls are mainly engaged in post harvest activities like pruning, transplanting, harvesting and sun drying. They are also engaged in allied activities like pickle making, juice making and jute products making, few of them are engaged in rearing of ducks, and poultry in a very small scale.

Socio-economic status of the sample was calculated by calculating mean and standard deviation of the SES score. Table 10 shows the percentage of rural youths under high, average and low categories according to Socio-economic status :

Table 10. SES of the selected sample

Sl. No.	Centre (N=150)	High (%)	Average (%)	Low (%)
1	AAU, Jorhat	14.00	65.33	20.67
2	ANGRAU, Hyderabad	16.00	64.67	19.33
3	CCSHAU, Hissar	15.67	71.88	12.45
4	CSKHPKV, Palampur	10.67	69.33	20.00
5	GBPUAT, Pantnagar	17.33	62.67	20.00
6	MAU, Parbhani	16.00	64.00	20.00
7	MPUAT, Udaipur	16.67	67.33	16.00
8	PAU, Ludiana	14.93	74.03	11.04
9	UAS, Dharwad	12.67	61.33	26.00

- All centres are working on preparation of psychological scales/ checklists for measuring socio emotional behavior of youths, maternal characteristics, characterization of rural youth etc.
- Preliminary work on preparation intervention packages has been started.

2.14.6 Technology empowerment of farmwomen

An ergonomically friendly weaving chair for the fly shuttle weavers (40 inches-height of the loom), designed by AAU in 2011-12, was given to thirty fly shuttle weavers of three different weaving enterprises for collecting users' feedback. The results showed that cent per cent of the users were highly satisfied with the use of improved chair during weaving activity. Further, the weaving enterprises were ready to fabricate/adopt the chair in order to reduce musculoskeletal disorders prevailed among fly shuttle weavers. Moreover, initiative for dissemination of ergonomically designed weaving chair in different KVKs of Assam Agricultural University is carried out.

- Paddy harvesting with serrated sickle has improved the pace of work by saving about 4 hours/ acre, reduced the human power needed for paddy harvesting by 2.37 labour days, increased the work output per hour and has reduced the drudgery score and disorders score significantly
- The use of potato picker introduced has resulted in picking of 52kg potatoes as against 25 kg by the traditional method. Cardiac strain index and drudgery experiences were reduced significantly

Conducted training, demonstration and awareness programmes for men and women farmers on drudgery reducing technologies.

Exhibition also organized on the eve of Kisan Melas.

2.14.7 XX Biennial Workshop of AICRP on Home Science

XX Biennial workshop of All India Coordinated Research Project (AICRP) on Home Sciences organized at University of Agricultural Sciences, Dharwad from 29-30 January 2013. All the AICRP Scientists from nine AICRP centres, DRWA and faculties of UAS, Dharwad participated in this event. On this occasion publications, CDs and training modules on various aspects of home science activities were released in different languages. An exhibition on technological interventions of home sciences was also arranged. QRT members also visited the AICRP on Home Science Centre at UAS, Dharwad during Workshop on 29 January 2013. A meeting was organized with all the AICRP Scientists and QRT members.



Fig. 67-68. XX Biennial Workshop of AICRP on Home Science



Fig. 69. XX Biennial Workshop of AICRP on Home Science



Fig. 70. Delegates attended the XX Biennial Workshop of AICRP on Home Science

3. WEATHER REPORT

In 2012, the average minimum and maximum temperatures in Bhubaneswar were 22.2 and 32.7 °C. May was the hottest month and December was the coldest month. Bhubaneswar has been quite humid throughout the year with the average relative humidity of 83.5%. The total annual rainfall was 1536 mm which was 10% less than that of last year. The total rainy days were 102. The south east monsoon, which sets in the second week of June, was the major contributor of rainfall and consequently, June, July and August contributed about 70% of total rainfall. However, sporadic rains were also recorded in January, April and May. July 18 was the wettest day with 134 mm rainfall. The high rainfall followed by dry period gives an opportunity for rainwater harvesting during June - September to meet the water requirement of crops during November to April.

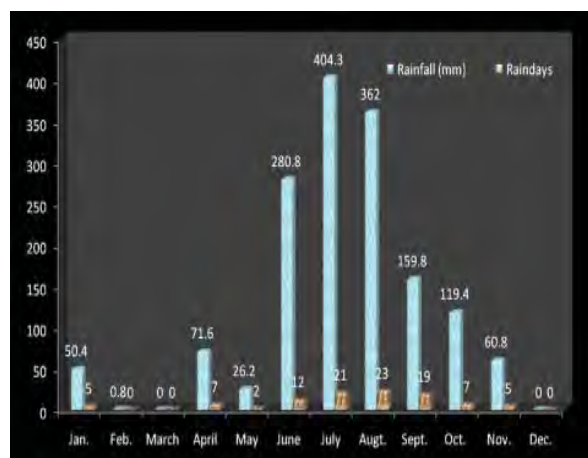


Fig. 71. Rainfall distribution

4. IMPORTANT MEETINGS

4.1.13th RAC meeting of DRWA, held during 22-23 June, 2012

The 13th Research Advisory Committee meeting was held during 22-23 June, 2012 under the Chairmanship of Dr K.Narayana Gowda, Vice Chancellor, University of Agricultural Sciences, Bangalore at Directorate of Research on Women in Agriculture, Bhubaneswar. The following RAC members were present in the meeting.

Dr K.Narayana Gowda	- Chairman
Dr V.S.Korikanthimath	- Member
Dr Malvika Dadalani	- Member
Dr V.K.Tewari	- Member
Dr Krishna Srinath	- Member
Dr S.K. Srivastava	- Member - Secretary

At the outset Dr Krishna Srinath, Director DRWA welcomed the Chairman and RAC Members and explained briefly the research achievements and other developments of the institute. She also highlighted objectives of DRWA, budget utilization, staff position, capacity building programmes and infrastructure as well as proposed areas of research for the XII Plan. Further the salient aspects of National Consultation on Women in Agriculture and Global Conference on Women in Agriculture organized by the Directorate at NASC complex New Delhi was also highlighted by her. These events provided an opportunity for better visibility of DRWA at global level which is the only institute of its kind in the world.

Dr K.Narayana Gowda, Chairman RAC in his opening remarks commended the efforts of DRWA in organizing the two major events during the last financial year 2011-12. He expressed happiness and congratulated the Director, DRWA and the Scientists for their enormous efforts. He then took up the agenda items for discussion. He felt that due to declining per capita land and migration of men to urban areas there is an increasing demand on womenfolk to take up farming responsibility of the household. He also observed that there is a tendency among rural youth to shy away from agriculture particularly due to increasing cost of production and decreasing financial returns. Therefore, he stressed that during the XII Plan it is essential to devise different mechanisms to empower womenfolk for self sustainability. He suggested that Institute should evolve various models which can be

adopted nationally and globally. The Member Secretary Dr S.K.Srivastava presented the Action Taken Report on the proceedings of the 12th RAC meeting which was discussed and confirmed. Salient achievements of the fourteen ongoing projects, including six Net work projects and eight institutional projects were presented. The results of the four completed projects were also presented along with two newly proposed projects. RAC recommended upgrading of DRWA as National Institute with more scientific strength in view of the enormity of the mandate provided to the Institute. The RAC members appreciated the number of publications brought out by the Directorate during the last five years. In the concluding remarks the RAC Chairman appreciated the important suggestions given by the Members of RAC. He emphasized the role of Directorate of Research on Women in Agriculture not only in India but also at global level. Director Dr. Krishna Srinath thanked the Chairman and Members for their valuable suggestions. The meeting was coordinated by Dr. S.K. Srivastava Member-Secretary, RAC.



Fig. 72. 13th RAC Meeting during 22-23 June, 2012



4.2 3rd Quinquennial Review Team Meeting

The 3rd Quinquennial Review Team (QRT) meeting of the Directorate of Research on Women in Agriculture, Bhubaneswar (ICAR) was held on 13-15 February, 2013. The QRT was headed by Dr. P Das, Ex-DDG with the following members; Dr. Mehtab S Bamji, NIN, Hyderabad; Dr. Vandan Dwivedi, Planning Commission; Dr. Vinita Sharma, DST, New Delhi; Dr. Ratna Tiwary, SNDT, Mumbai and Dr. V P Chahal, ICAR, New Delhi as the Member Secretary.



Fig. 73. 3rd Quinquennial Review Team Meeting

Dr Krishna Srinath, Director, briefly explained the research achievements and other developments of the institute including budget utilization, staff position, capacity building programmes and infrastructure and proposed areas of research for the XII Plan.

Dr. P Das, Chairperson, in his opening remarks mentioned that DRWA is emerging

as a world leader in the subject of research on women in agriculture. He emphasized that farm women directly influence the country's development and therefore, their roles and responsibilities should be identified in farm as well as at home to find out their problems which can be solved through suitable research programmes. He also pointed out the need to examine different ways to address the identified gender issues by developing gender friendly approaches for technology dissemination.

The experts emphasized to strengthen core competencies among scientists, gender data base, participatory action research, and outreach programme as well as development of good Case Studies and assessment of gender- based vulnerability. They also emphasized the importance of health, nutrition, immunization, food and environment for women. The expert visited the research farm, laboratories, data centre, exhibition hall and library and suggested measures for improvement. The first meeting of QRT was held at UAS Bangalore to review the AICRP activities and the experts emphasized upon the need-based technology generation in AICRP for poor rural farmers. Dr. V P Chahal and Dr. Kundan Kishore co-ordinated both the QRT meetings.

4.3. 15th Institute Management Committee Meeting

The Institute Management Committee Meeting was held on March 25, 2013 under the chairmanship of Dr. M.P.S. Arya, Director (Actg.). Shri R. S. Gopalan, Director of Agriculture & Food Production, Govt. of Odisha; Dr. S. C. Mahapatra, Dean, OUAT; Dr. Nandita Ptahak, Deendayal Research Institute, Chitrakoot; Dr. Akella Vani,

Principal Scientist, IIHR; Dr. Sandhya Shenoy, Principal Scientist, NAARM and Dr. K. Usha, Principal Scientist, IARI attended the meeting. The IMC reviewed the overall progress and suggested measures for better execution of programmes. Sh. G. S. Rao, AO, DRWA and the Member Secretary coordinated the programme.

5. RAJBHASHA IMPLEMENTATION

5.1. राजभाषा कार्यान्वयन सम्बन्धी वर्ष 2012-13 का व्यौरा

निदेशालय में राजभाषा कार्यान्वयन हेतु वर्ष 2012-13 में कई कार्यक्रम एवं बैठकें जो अनिवार्य रूप से आयोजन करना होता है वे नियमित रूप से आयोजित किए गए ! राजभाषा अधिनियम 1963 के निर्धारित लक्ष्य के प्राप्त करने हेतु निदेशालय में आवश्यक व्यवस्था की गई ! वर्ष के दौरान राजभाषा नीति के कार्यान्वयन से सम्बन्धित तिमाही बैठकों का आयोजन नियमित

रूप से किया गया एवं हिंदी पक्षवाड़ा 1-13 अक्टूबर 2012-के दौरान विभिन्न कार्यक्रम जैसे अंग्रेजी से हिन्दी अनुवाद, कविता पाठ, हिन्दी गीत, वाद-विवाद आदि प्रतियोगिता आयोजित की गयी ! निदेशालय के सभी सदस्यों ने उत्साह पूर्वक इस कार्यक्रम में भाग लिए !

क्र.सं.	कार्यक्रम	तिथि
१.	राजभाषा कार्यान्वयन समिति की तिमाही: अप्रैल-जून २०१२ तिमाही	१० अप्रैल २०१२
२.	राजभाषा कार्यान्वयन समिति की तिमाही : जुलाई-सितम्बर २०१२ तिमाही	०१ सितम्बर २०१२
३.	हिन्दी दिवस २०१३	१४ सितम्बर २०१२
४.	राजभाषा हिन्दी पक्षवाड़ा २०१३	१-१३ अक्टूबर २०१२
५.	राजभाषा कार्यान्वयन समिति की तिमाही : अक्टूबर-दिसंबर २०१२ तिमाही	२६ नवंबर २०१२
६.	राजभाषा कार्यान्वयन समिति की तिमाही : जनवरी - मार्च २०१३ तिमाही	२२ मार्च २०१३

5.2 Hindi Chetna Divas and Pakhawada

Hindi Chetna Pakhawada was observed at DRWA from 01- 13 October, 2012. Hindi Divas was organised on 14 September, 2013. Four competitions were organised for Hindi

and non-Hindi speaking staff of the institute during Hindi Chetna Pakhawada and prizes were distributed among the winners of competitions.



Fig. 74-75. Meeting of Hindi Chetna Divas



6. PUBLICATIONS

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- Council of Agricultural Research: Readiness to take up the leadership role. *The IUP Journal of Organizational Behavior*, IUP Publications. XI (2): 37-53.
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54. Moharana, G. 2012. Work place assessment techniques and advantage to farm women'. *Compendium of Trainer's training for KVK SMS/ Scientist on 'Drudgery Reducing farm technologies / equipments for farm women'*. Directorate of Research on Women in Agriculture, Bhubaneswar: 23-30.

Abstracts of paper published

1. Babu, N., Kishore, K., Shukla, A.K. and Tripathi, P.C. (2012). Coconut based cropping model for improving livelihood security of farmwomen. Global Conference on horticulture for food nutrition and livelihood option, Bhubaneswar. Pp 21-22.
2. Kishore, K., Shukla, A. K., Babu, N. and sarangi, D.N. (2012) Does pollination biology of *Ananas squamosa* L (Annonaceae) give an indication of pollination syndrome. Fifth International symposium on tropical and subtropical fruits, China. Pp 27.
3. K. Ponnusamy, Krishna Srinath, Ananta Sarkar and M.Prusty. 2013. Factors influencing employment opportunities of farm graduates. 11th Agricultural Science Congress during 07-09, February 2013 at Bhubaneswar organized by NAAS and OUAT. Abstract No. T6 10 P 91.
4. Kishore, K., Shukla, A.K., Mukherjee, A., Patnaik, S. and Sarangi, D.N. (2012) Optimization of invitro propagation of pineapple by direct organogenesis. Global Conference on horticulture for food nutrition and livelihood option, Bhubaneswar. Pp 143.
5. Mishra, Sabita (2012) Abstract on "Household food habits of tribal women: A case study in Koraput district of Odisha", Global Conference on *Horticulture for food, nutrition and livelihood options* at OUAT, Bhubaneswar, Odisha, India during 28-31, May, 2012, p.22.
6. Mishra, Sabita (2012) Abstract on "Stress of Women Agriculture Labourers and its Management", International Conference on *HWWE ERGO 2012: SAFETY FOR ALL* at G. B. Pant University of Agriculture and Technology, Pantnagar,



- Utterakhand, India during 6-8, December, 2012, pp. 149 – 150.
7. Mishra, Sabita, Dash, H. K., Ponnusamy, K. and Prusty, M. (2013) Abstract on “Assessment of Extension Needs of Gender in Agriculture and Allied fields”, National Seminar on *Future Agricultural Extension for Livelihood Improvement and Sustainable Development* at ANGRAU, Hyderabad, AP, India during 19-21, January, 2013, pp.387 – 388.
 8. Moharana.G and Nayak, J, Singh S.P. Workplace Layout for Cooking Place in Rural Household of Central India, in the *Souvenir* of International Conference on HWWE’ 2012:159.
 9. Nayk, J, Singh S.P and Moharana. G. Rural Women’s Risk at Household, Farm and Animal Rearing Work, in the *Souvenir* of International Conference on HWWE’ 2012:139.
 10. Ponnusamy, K, Nagarajan, R and Nayak, J, 2012. Community Mobilization for Enhancing Water Productivity: Lessons from Historical Perspective, *Souvenir* of National Conference on Water Crisis Management under Changing Climate: 18.
 11. Ponnusamy, K., and Meenakshi, S, 2012. Public Private Partnership for Sustainable Horticulture Farming: Scope and Limitations. Global Conference on Horticulture for Food, Nutrition and Livelihood Options at OUAT, Bhubaneswar organised by ASM Foundation, New Delhi and OUAT during 28-31 May 2012. Abstract No.TS2:P17, P.22-23.
 12. Ponnusamy, K., Nagarajan R and Jyoti Nayak. 2012. Community mobilization for enhancing water productivity: Lessons from historical perspective presented in National Conference on Water Crisis Management Under Changing sClimate during 16-17 November 2012 at Bhubaneswar organised by Gugly Centre for Biological Research, Bhubaneswar Abstract No. S2-09 P 18-19.
 13. Shukla, A. K., Kishore, K. and babu, N. (2012) Canopy management of old guava trees in gender perspective. Global Conference on horticulture for food nutrition and livelihood option, Bhubaneswar. Pp 184-185.
 14. Singh, S P and Srinath, Krishna. 2012. Ergonomics and safety related issues of women in farm mechanization. Lead Paper. Abstract & Souvenir of International Conference on Ergo 2012: Safety for all & HWWE 2012, College of Home Science, GBPUAT, Pantnagar, edited by Deepa Vinay and Anita Rani, 21-32p.
 15. Srivastava, S.K. (2012) Gender participatory agro-enterprises (plant protection and environment) first lead paper in Technical Session-IV.Proceedings and Recommendations of 3rd National Symposium on eco-friendly approaches to pest management for sustainable agriculture held at Bhubaneswar on 24-25 November 2012 , organised by Society for plant protection and environment Department of Entomology Orissa University of Agriculture and Technology , bhubaneswar Orissa.p-10.
 16. Srivastava, S.K., Naresh Babu, Arya, M.P.S. and Behera, B.C. (2012) Gender friendly pest management techniques in vegetables suitable for Organic farming. Abstracts. Global Conference on Horticulture for Food Nutrition and Livelihood Options, held on May 28-31, 2012 at Bhubaneswar, Odisha, organised by ASM Foundation, New Delhi and OUAT, Bhubaneswar

Books/ Technical Bulletin/ Training Manual

1. Agarwal, Suman; Srinath, Krishna; Sahoo, K. and Panda, I. (2013). Technologies for Women in Agriculture (AICRP on Home science). Published by Director, Directorate of Research on Women in agriculture, Bhubaneswar.
2. Arya, M.P.S., Srivastava, S.K. and Singh, S.P. (2012) Gender issues in crop production and suitable technologies to reduce drudgery, Chapter in Compendium of lectures of ICAR Model Training Course on Drudgery reducing options for farm women to increase their work efficiency and productivity, held at Directorate of Research on Women in Agriculture, Bhubaneswar, Orissa, during 01.11.2012 to 08.11.2012, published from DRWA, Bhubaneswar. 86-97.
3. Babu, N. Tripathi, P.C., Kundan Kishore, Shukla, A. K., Krishna Srinath and Sarangi, D.N. 2012 Horticulture based cropping models for gender mainstreaming. Published by Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha, pp 1-30.
4. Kishore, K., Ponnusamy, K., Shukla, A.K., Kumar, A. and Naik, J, (2012) Gender mainstreaming for resilient agriculture. Published by DRWA, Bhubaneswar, pp 1-250.
5. Kishore, K., Singh, A., Shukla, A.K., Babu, N., Patnaik, S. and Sarangi, D.N. (2012) Phal aum sabji mulyabardhan aum prasansakaran (Hindi). Published by DRWA, Bhubaneswar, pp 1-16.
6. Mishra, Sabita (2012) 'Income Generating Technologies Suitable for Farm women' during Trainers Training for KVK SMS/Scientists on "Drudgery Reducing
7. Babu, Naresh. S.K. Srivastava, M P S Arya, A K Shukla, Krishna Srinath and D.N. Sarangi (2013) Gender friendly organic farming technologies for vegetables. (Technical Bulletin No – 20) Directorate of Research on Women in Agriculture, (ICAR) Bhubaneswar, Odisha, pp.26.
8. Singh, Abha & Srinath, Krishna (2013). Low cost weaning mix (baby food) for combating malnutrition among rural infants in coastal Odisha. Tech. Bull.-21, Pp. 26.
9. Srivastava, S.K. (2012) Gender participatory agro-enterprises (plant protection and environment) for sustainable agriculture. Souvenir. 3rd National symposium on Eco-friendly approaches to pest management for sustainable agriculture held on 24-25 November 2012 at OUAT Bhubaneswar. 89-101.
10. Srivastava, S.K., Naresh Babu, Agarwal, Suman and Behera, B.C. (2013) Training manual on Gender mainstreaming in eco-friendly pest management with special reference to storage pest held at Directorate of Research on Women in Agriculture, Bhubaneswar, Orissa, during 20.2.2013 to 23.2.2013, published by Director, DRWA, Bhubaneswar pp.132.
11. Ponnusamy, K. Two Training manuals on Social Development in Watersheds were published during training programme organized at DRWA. Pp 1-108.
12. Ponnusamy, K., Nayak, Jyoti and Sarkar, Ananta. 2012. Training Manual on 'Social Development in Watersheds for WMT (Social)'. DRWA, Bhubaneswar-751003. pp.107.
13. Singh, S P. 2012. Operator manual on 'DRWA Hand Operated Maize Dehusker-sheller'. 2012/1, DRWA, Bhubaneswar



14. Singh, S P., Arya, M P S, Nayak, J and Singh, Abha. 2012. Drudgery reducing farm technologies/equipment for farm women. Trainers' Training Compendium, DRWA, Bhubaneswar, 1- 83.
15. Singh, S P., Nayak, J and Singh, Abha. 2012. Drudgery reducing options for farm women to increase their work efficiency & productivity. Compendium of Model Training Course. DRWA (ICAR), Bhubaneswar 1-164p.
16. Singh, S.P., Arya, M.P.S., Nayak, J., and Singh, A. (2012). Compendium on Drudgery reducing farm technologies / equipments for farm women. Developed during Trainer's training programme for KVK, SMS organized at DRWA, Bhubaneswar, during 11-15 September, 2012. pp.84.
17. Singh, S.P., Nayak, J., and Singh, A. (2012). Compendium on Drudgery reducing options for farm women to increase their work efficiency & productivity. Developed during Model training course organized at DRWA, Bhubaneswar, during 01-08 November, 2012. pp.164.
3. Shukla, A.K was awarded the Fellowship of Indian Society of Horticultural Research and Development, Uttarakhand on 31 May 2012.
4. Shukla, A.K invited as a Member of the Editorial board of the Progressive Horticulture.
5. Shukla, A.K worked as member of the Rajasthan Horticulture Development Plan.

Publications of AICRP on Home Science

i) Research articles

1. Bains, S. and Kaur, R. (2013). Comparison of whiteness index of pesticide contaminated cotton and cotton polyester. *Global Research Analysis*. 2 (3): 83-84.
2. Banu, N (2012). Impact of intervention programme on the communication skills of rural girls. *Indian Psychological Review*, 78(1).
3. Byadgi, S.A., Mahale, G., Kotur, R.S. and Vastrad, J.V. (2012). Natural dyes for silk fabrics. *Proceedings of International Symposium on Agricultural and Environment* Pp: 66-68.
4. Chaudhary and Babel, S. (2012). Deterioration and conservation of textiles in Museums. *Asian Journal of Home Science*, 7(2): 605-607.
5. Chawla, A. (2012). Family violence linked to children's height and weight, *Asian Science*, 7:1-4.
6. Chawla, A and Kang, T. (2012). Attitude towards modernization : A gender study. *Asian Journal of Home Science*, 7: 220-222.
7. Chawla, A. and Singal, P. (2012). Impact of domestic violence on morphological profile of girls ranging in age from 8 to 16 years. *Indian Journal of Sport Science and Physical Education*, 29-39.
1. Ponnusamy, K. received the Best Oral Presentation Award for research paper entitled, "Community mobilization for enhancing water productivity: Lessons from historical perspective" presented in National Conference on Water Crisis Management Under Changing Climate during 16-17 November 2012 at Bhubaneswar organised by Gugly Centre for Biological Research, Bhubaneswar.
2. Shukla, A.K was awarded the Fellowship of Confederation of Horticulture Association of India, New Delhi on 31 May 2012.

Awards/ Recognitions

8. Chitagubbi, G. and Hasalkar, S. (2013). Working atmosphere in rural enterprises and its effects of workers health. *International Journal of Farm Science*, 3(1):176-185.
9. Deka M.B., Saikia, R.M. and Saikia, S. B. (2012). Comparative analysis of role performed by rural women of Assam in post harvest management. *Advance Research Journal of Social Science*, 3(1):10-13.
10. Deka, M.B, Saikia, R.M., Saikia, P. (2012). Micro-finance and functioning of women SHG in Jorhat district of Assam, *Agriculture Update*, pp 372-375.
11. Deka, M.B., Saikia, P. and Saikia, R.M. (2012). Empowerment of women through entrepreneurial development. *Advance Research Journal of Social Science*, 3(2): 269-270.
12. Dhaka, P, Tiwari, G., Ahlawat, I. and Singh, D (2012). Stress management to achieve academic excellence. *Indian Psychological Review*, 78(2):67-74.
13. Dhanalaxmi, R.K., Vastrad, J.V., Pujari, M. and Bablad, H.B. (2012). Value addition to mesta fibres through wet processing. *Proceedings of International Symposium on Agricultural and Environment* pp. 80-82.
14. Gahlot, M., Arya, A. and Singh, A. (2013). Hemp, a good textile fibre source. *Textile Asia*. 44 (1): 15-16.
15. Hasalkar, S., Chitagubbi, G. and Huilgol, S. (2012). Improved technologies for enhancing work performance of women in agriculture. *Proceedings of International Symposium on Agriculture and Environment at University of Ruhuna, Mapalana, Srilanka*, 29 November.
16. Hasalkar, S., Uppar, Y., Chitagubbi, G. and Huilgol, S. (2012). Knowledge and awareness of rural women on energy sources. *Journal of Human Ecology* 40(10): 95-99.
17. Hasalkar, S., Uppar, Y., Chitagubbi, G. and Huilgol, S. (2012). Water conservation management and safe drinking water in rural areas. *Journal of Human Ecology*, 39(3):255-259.
18. Jain, S., Singh, V. and Chelawat, S. (2012). Chemical and physicochemical properties of horsegram (*Macrotyloma uniflorum*) and its product formulation. *J. Dairying, Foods & H.S.*, 31(3): 184-190.
19. Kaur, D. and Gandotra, V. (2013). Design development of traditional embroidery motifs in knitwear through computer aided designing. *Asian Journal of H.Sc.* 7(2): 500-03.
20. Kaur, R. and Bains, S. (2012). Starched fabric as protective cover for pesticide application. *Asian J H Sc.* 7 (2): 302 - 4.
21. Kaur, S., Sharma, S. and Sidhu, M. K. (2012). Gharelu Padhar Te Anaz De Sambh Sambal. *Kheti Dunia*. 30(25): 12.
22. Kishtwaria, J. and Rana, A. (2012). Ergonomic interventions in weeding operations for drudgery reduction of hill farm women of India. *Work: Medline Journal*, Vol.41:4349-55.
23. Kishtwaria, J. and Rana, A. (2012). Intervention of gender friendly land preparation technologies for drudgery reduction of hill farm women. *Work: Medline Journal, MedLine Citation*: Vol. 41: 4342-8.
24. Kotur, R., Mahale, G., Byadgi, S.A. and Vastrad, J.V. (2012). Organic dyes for cotton fabrics. *Proceedings of International Symposium on Agricultural and Environment* Pp: 63-65.
25. Nagnur, S., Hosamani, V. and Shapur, A. (2012). Training on Organic farming practices for women – An impact study.



- Karnataka Journal of Agricultural Sciences*, 25(2):253-255.
26. Nagnur, S., Rayanagoudar, R. and Yenagi, G. (2012). Assets created by National Rural Employment Guarantee Scheme in Dharwad Taluka of Karnataka. *Advance Research Journal of Social Science*, 3(2):190-195.
 27. Naik D., Zend J.P. and Revanwar M. (2012). Assessment of musculo-skeletal problems of women entrepreneurs performing tailoring activity-drafting and cutting. *Asian Jr. of Home Science*, 7(2): 461- 463.
 28. Naik, D., Zend, J.P. and Revanwar, M. (2012). Postural analysis of the entrepreneurs while conducting tailoring activity drafting and cutting. *Asian Journal of Home Science*, 7:2 pp 271- 274. ISSN: 0973-4732.
 29. Pathania, R, Chopra, G. and Katoch, M. (2012). Impact of intervention programme on life skills of adolescent girls in Kangra District of H.P. *Himachal Journal of Agricultural Research* 38(2): 118-121.
 30. Promila, K. and Sharma, N. (2012). Rainwater harvesting using Khatri in Himachal Pradesh: A viable technique for water conservation. *Asian Agri History*, 16 (2): 205-209.
 31. Rajkumari, Shukla, P. and Limbu, R. (2012). Nutritional quality, sensory evaluation and storage of food based iron rich supplements. *Asian Journal of Home Science*, 7 (2): 317-320.
 32. Rajkumari, Shukla, P. and Pandey, U. (2012). Poi leaves – Uncommon green leafy vegetable. *Indian Farmer Digest*, 45 (1): 42&44.
 33. Rana, B., Shukla, P. and Saini, P. (2012). Development of sprouted oat flour and its incorporation in vada at different levels, *Beverage and Food World*, 39 (1): 59-60.
 34. Rathore, H., Shukla, K., Singh, S and Tiwari, G (2012). Shift work - problem and its impact on female nurses in Udaipur, Rajasthan India. *Work: A Journal of Prevention, Assessment and Rehabilitation*, 41: 4302-4302.
 35. Sannapapamma, K.J., Vastrad, J.V., Manjula, S.M., and Patil, S.S. (2012). Prospects for naturally colour cotton blends. *Proceedings of International Symposium on Agricultural and Environment* Pp: 248-251.
 36. Shivalli, R., Chitagubbi, G. and Devendrappa, S. (2012). Perception of values of present college youth towards marriage. *International Journal of Farm Science*, 2(1):153-158.
 37. Sidhu, K (2012). Evaluation of an educational media package, *International Journal of Educational Sciences*, 4(1): 67-70.
 38. Singh, P. and Tewari, P. (2013). Gain in knowledge through different Media. 5th World Conference on Educational Sciences organized by SAPIENZA University of Rome, Italy, 5-8 February.
 39. Singh, P., Tewari, P. and Yadav, R. (2013). Farming and related health hazards. Indian Science Congress at University of Calcutta, Kolkata, 3-7 January.
 40. Tiwari and Babel, S. (2013). Thermo-insulating technical textile from animal fiber. *Textile Trends*, (12):40-41.
 41. Tiwari, M. and Babel. (2012). Causes of musculo-skeleton disorders in textile industry. *International Research Journal of Social Science*, 1(4):48-50.
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43. Vastrad, J.V., Dhanalaxmi, R.K., Mahale, G. and Sannapapamma, K.J. (2012). Utilization of mesta fibres for textile applications. Proceedings of International Symposium on Agricultural and Environment, pp: 76-79.

ii) Research Abstract

1. Tiwari, G. (2012). A comparative study of relationship between self concept and acceptance towards death during adolescence and old age. Abstract: in XXX International Conference of Psychology, Cape Town (South Africa), pp 402.
2. Tiwari, G. (2012). Empowerment of women in India through education and training. Abstract: In Regional Science Congress – Science for shaping the future of India at The Maharaja Sayajirao University of Baroda, Vadodara, Gujrat, 15-16 September. 2012, pp 111.
3. Hasalkar, S., Chitagubbi, G. and Bailur, K. (2012), Validation of the improved technologies for women in agriculture. Abstract: Proceedings of Second International South East Asian Network of Ergonomics Societies Conference at Langkawi Malayasia, 9-12 July.
4. Hasalkar, S., Chitagubbi, G. and Huilgol, S. (2012), Impact of technology Interventions on Musculoskeletal disorders among women in Agriculture, Abstract: In International Conference on Ergonomics and human factors at G.B.Pant University of Agriculture and Technology, College of Home Science, Pantanagar, Uttarakhand, 6-8 December.
5. Takhellambm, R. D., Bharti, P. and Hasalkar, S. (2012). Evaluation of storage practices of Tamarind in households of rural and urban Dharwad. Abstract: In 44th National Conference on Nutrition Society of India at Department of Home Science, Sri Venkateshwara University, Tirupathi, Andhra Pradesh. 16-17 November.
6. Bal, S., P, Sandhu. And Sidhu, M. (2012) Role of women as decision makers with respect to farm operations in Malwa belt of Punjab. Abstract: in National Seminar on Women and rural development: critical Issues, 2-3 May.
7. Bal, S., Sharma, S. and Kaur, H. (2012). Adoption and satisfaction level of drudgery reducing tools among farm women of Ludhiana District. Abstract: In National Seminar on Women and rural development: Critical Issues on 2-3 May.
8. Kaur, H., Sharma, S. and Bal, S. (2012). Assessment of drudgery experience of farm women while using traditional and modern tools. Abstract: in International Conference on HWWE “ERGO 2012: SAFETY FOR ALL” at College of Home Science G.B .Pant University of Agriculture and Technology Pantnagar, Uttarakhand, 6-8 December.
9. Bal, S. and Sharma, S. (2013). Ergonomic assessment of cotton picking activity with traditional and mechanical methods. Abstract: in 16th Punjab Science Congress at Baba Farid University of Health Sciences, Faridkot, 7-9 February, pp:56.
10. Kishtwaria, J., Patel, S. and Rana, A. (2012). An ergonomic approach for improving bamboo workers workstation. Abstract; In International Conference on HWWE at GBPUA&T, Pantnagar, 12-14 December. pp : 162.
11. Kishtwaria, J., Katoch, A., Rana, A. and Dadwal, M. (2012). Household tourism - As an enterprise in Himachal Pradesh. Abstract: In Souvenir National Seminar on Indian Agriculture: Present Situation, Challenges, Remedies and



- Road Map at CSKHPKV, Palampur, 4-5 August, pp : 116.
12. Deka, M. B., Saikia, R M. and Saikia, P. (2012). Micro-finance and functioning of women SHG in Jorhat district of Assam. Abstract: In Souvenir-cum-abstract of UGC sponsored National Seminar on Women empowerment for rural development at Bahona College, Jorhat, 10-11 August, pp.60.
 13. Singh, P. and Tewari, P. (2012). Livelihood security of farm families through efficient utilization of farm waste. Abstract: In International Conference on Extension Education in the perspective of advances in Natural Resource Management in Agriculture organized by Bikaner University of Agriculture, 19-21 December.
 14. Singh, P., Tewari, P. and Yadav. R. (2012). Role of hill women in attaining food security. Abstract: in International Symposium on Agricultural communication and sustainable rural development from information to knowledge to wisdom – Envisioning a food sovereign world in the Third Millennium organized by Directorate of Agricultural Communication, G.B.P.U.A.& T., Pantnagar, 23-25 November.
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 16. Singh, P., Tewari, P. and Yadav. R. (2012). Water crisis in India and its management. Abstract: In National Conference on Water crisis management under changing climate organized by Gugly Centre for Biological Research, Bhubaneswar from 16-17 December.
 17. Shet, S., Chimmad, B. and Nagnur, S. (2012). Abstract of 44th National Conference on Current Trends in Food Security to meet Nutritional Challenges on Impact of nutrition education in awareness creation about the significance of omega 3 Fatty Acid in health among Urban Women, Organized by NSI Tirupati Chapter.
 18. Saikia, P, Deka M.B., Saikia R.M., (2012). Gender roles in livestock Management: A study of Assam. Abstract: in Souvenir-cum-abstract of UGC sponsored National Seminar on changing perspectives of the socio economic condition of the rural women of India and measures for upliftment of their status with special reference to North Eastern Region at DKD College, Golaghat during 2nd & 3rd November, pp 50.
 19. Saikia, R.M., Deka M.B. and Saikia P., (2012). Impact of homestead gardening on Household food security and empowerment of women in Assam. Abstract: in Souvenir-cum-abstract of UGC sponsored National Seminar on changing perspectives of the socio economic condition of the rural women of India and measures for upliftment of their status with special reference to North Eastern Region at DKD College, Golaghat on 2nd & 3rd November, pp. 70.
 20. Dhanalaxmi, R.K., Vastrad, J.V., Mahale, G., Goudar, G., Byadgi, S.A., and Kotur, R. (2013). Phytochemical constituents of jamun (*Syzygium cumini*) leaf. Abstract: In Fifth International Symposium on

- Human health effects of fruits and vegetables at University of Agricultural Sciences, Dharwad and ICC Goa, 7-8 January, pp 183.
21. Mahale G., Kotur, R.S., Byadgi, S.A. and Vastrad, J.V. (2013). Capacity building of rural women through income generating activities. Abstracts: In National seminar on gender disparity – a challenge in the 21st century held at S.C.P. arts and D.D.S. commerce college, Mahalingpur from 15-16 February, pp 27.
 22. Saini P., Punia, P., Pruthi, N. and Singh, V. (2013). Microbial resistance through Karanja extracts for healthy life: A review. Abstract: Souvenir in National Seminar on Lifestyle changes: A national challenge at Guru Nanak Girls College, Santpura, Yamuna Nagar, Haryana.
 23. Vastrad, J.V., Byadgi, S.A., Dhanalaxmi, R.K., Goudar, G. and Kotur, R. (2013). Phytochemical screening of Indian gooseberry (*Emblica officinalis*) leaves. Abstracts: Fifth International Symposium on Human health effects of fruits and vegetables at University of Agricultural Sciences, Dharwad and ICC Goa from 7-8 January, pp 53.
 24. Pant, S., Singh, A. and Gahlot, M. (2012). Conventional handicrafts from unconventional fibres. Proceedings of National Seminar on Role of Home Science in development of community and nation at Mahila Mahavidyalaya, Banaras Hindu University, Varanasi, U.P, 2-3 November.
 25. Singh, A. and Gahlot, M. (2012). Designer handloom furnishing fabrics of Hemp : An approach for rural development. Abstract: In International Symposium on Agricultural communication and sustainable rural development: From knowledge to wisdom- envisioning a food sovereign world in the third millennium at GBPUAT, Pantnagar, 22-23 November. p. 202.
 26. Singh, A. and Gahlot, M. (2012). Fabrication of Hemp furnishing: An income generating path for women folk of Uttarakhand. Abstract: In proceedings of 7th Uttarakhand State Science & Technology Congress at Graphic Era, Dehradun, 21-23 November. p 197.
 27. Joshi, J., Singh, A. and Gahlot, M. (2012). Designing of chemical protective apron for pesticide applicators. Abstract: In proceedings of International Conference on Ergonomics and human factors ergo 2012: Safety at College of Home Science, GBPUAT, Pantnagar, 6-8 December, p 181.
 28. Tyagi, I. and Gahlot, M. (2012). Designing protective clothing for pesticide applicators. Abstract : In proceedings of International Conference on Ergonomics and human factors ergo 2012: Safety at College of Home Science, GBPUAT, Pantnagar, 6-8 December, p.179

Popular articles

1. Bains, S. and Kaur, R. (2012). Precautions while washing pesticide contaminated clothes, *Changi Kheti*, 15 (6) : 15.
2. Bakhshi, R., Sharma, S and Bal, S. (2012). Drying and preserving flowers for decorative use. *Progressive Farming*, pp. 10-12.
3. Bal, S. K., Sharma, S. and Sidhu, M. K. (2012). Gharalu padhar te anag de samb sambal. *Changi Kheti*. pp: 15-17.
4. Banu, N. (2012). Communicating with children *Navinavidya educational magazine*, 5(2): 26-27.
5. Banu, N. (2012). Communicating with teenagers, *JCI Hyderabad Trends Magazine*, 2: 6-7.



6. Banu, N. (2012). Creating play environment for young children. *Navinavidya educational magazine*, 7 (2): 28.
 7. Banu, N. (2012). Life skills. *Navinavidya educational magazine*, 8(3): 22-24.
 8. Banu, N. (2012). Managing emotions in children. *Navinavidya educational magazine*, 5(2) : 26-27.
 9. Banu, N. (2013). Self awareness, *Navinavidya educational magazine*, 9(3): 15-17.
 10. Bhalerao, V. and Shaikh, R. (2013). Ase Patle Bal Vikas Kendrache Mahatva, *Shetibhati*, p.14-15.
 11. Chopra, G., Sharma, S., Pathania, R. and Katoch, M. (2012). Kya aapka bachha anemic hai? *Vishvadhyanadhar*, 4(2).
 12. Khan, T. N., Nalwade, V.M. and Gaikwad, P. (2013). Bahuguni Kadipattaa, *Sheti bhati*, Mahila Visheshanka.
 13. Nalwade, V.M., Khan, T. N. and Umrikar, S. (2013). Garbhavasta va Aaha, *Sheti bhati*, Mahila Visheshanka,
 14. Raj, P., Goldy, C. and Katoch, M. (2013). The manners little angels should know, *Himachal Reporter*, XIV (7): 2.
 15. Revanwar, M. (2012). Gathode anubhavanche, *Interaction*, College Magazine, pp 120-121.
 16. Revanwar, M., Zend, J. and Admankar, S. (2013). Bochare Kate, *Shetibhati*, pp 38-39.
 17. Sidhu, M. K., Bal, S. and Sharma, S. (2012). Household grain storage practices. *Progressive Farming*. pp. 16-17.
 18. Thakur, S. and Kanwar, P. (2012) Why to use soybean in daily diet. *Himachal Reporter*.
 19. Yenagi, G. and Nagnur, S. (2012). Aadaya taruva halasu samyukta Karnataka. *A daily News Paper*.
 20. Zend, J. (2012). Surya chul tantra, Indhan Bachticha Mantra. *Interaction*, College Magazine, pp 116-117.
 21. Zend, J. (2013). Revolving milking stool and stand. *Dainik Agro won*, p.8.
 22. Zend, J. and Revanwar, M. (2013). Kabadkasta ani Mahila, *Shetibhati*, pp 27-29.
- Folder**
1. Deka, M.B., Saikia, P. and Saikia, R.M. (2012). Unnat aru bighansanmat ahila byabohar kori randhanisalar kosta laghab korar upai (drudgery reduction through use of improved and scientific tools in kitchen) in Assamese.
 2. Zend, J.P. and Revanwar, M.S. (2013). MKV Tailoring Table.
 3. Bal, S. and Sharma, S. (2013). Cotton picker.
 4. Kishtwaria, J., Rana, A. and Dadwal, M. (2013). Ghaas kutrne ka yantra : Fodder Chopper.
 5. Kishtwaria, J., Rana, A. and Dadwal, M. (2013). Gudayi karne ka naveen yantra: Medium Hoe.
 6. Kishtwaria, J. and Rana, A. (2012). Chaii patti todne ki saral taknikain (part I).
 7. Kishtwaria, J. and Rana, A. (2012). Chaii patti todne ki saral taknikain (part II).
 8. Kishtwaria, J. and Rana, A. (2012). Ghaas uthane ka yantra.
 9. Kishtwaria, J. and Rana, A. (2012). Aaloo nikalne ka yantra.
 10. Kishtwaria, J. and Rana, A. (2012). Ergonomic Interventions – A boon to bamboo craft workers.
- Paper presented at National/ International Conference/ Seminar/ Symposium**
1. Chawla, A. (2012). Creating creativity conducive classroom for young learner.

- Paper presented at EDUCON-2012 (World Conference of GERA) on Shaping of future classroom : A Global perspective at Lovely Professional University, Phagwara, 6-8 April.
2. Chawla, A. (2012). Impact of intervention programme on Status of mental health among rural adolescent girls. Paper presented at the National Seminar on Women and rural development : Critical issues at Punjab Agricultural University, Ludhiana, 2-3 May.
 3. Chawla, A (2012). Impact of domestic violence on morphological profile of girls ranging in age from 8 to 16 years. Paper presented at International Conference on Women, Peace and Security at Punjabi University, Patiala, 26-27 October.
 4. Gaikwad, N.B., Shaikh R.M and Shinde P.P (2013). Effects of agriculture base educational intervention on rural school students. Paper Presented at AGRESO 2013 on Awareness and attitudes toward agriculture.
 5. Tiwari, G. (2012). A comparative study of relationship between self concept and acceptance towards death during adolescence and old age. Presented poster in XXX International Conference of Psychology, Cape Town (South Africa).
 6. Ahlawat, I., Tiwari, G. and Dhaka, P. (2012). Empowerment of rural adolescent girls: Need of today. Presented a paper at National Seminar on Women empowerment : A challenge of 21st Century, RMV, Udaipur.
 7. Pathania, R. and Chopra, G. (2012). Enhancement of life skills of Adolescent girls though intervention. Paper presented at International Conference on Life skill education at Karamveer Bhaurao Patil College, Mumbai, 7-9 December.
 8. Pathania, R. (2012). Empowerment of adolescent girls through life skill education. Presented paper at National Seminar on Indian agriculture : Present situation, challenges, remedies and road map by Youth for Sustainable Development and CSK Himachal Pradesh Agricultural University, Palampur, 4-5 August.
 9. Pathania, R. (2013). Reproductive and sexual risk behaviour among married young women. Presented paper at 2nd international Conference on Psychology and allied science, Guru Jambheshwar University of Science and Technology Hisar, 21-22 March.
 10. Deka M.B. (2012). Empowerment of women through participation, presented key note paper in the National Seminar on Changing perspectives of the socio-economic condition of the rural women of India and measures for upliftment of their status with special reference to North Eastern Region at DKD College, Golaghat, 2nd & 3rd November.
 11. Zend, J. (2012). (Title of paper) participated and presented research paper in 10th ISE & 8th HWWE an International Conference on 'Safety for all' at G.B. Pant University of Agriculture & Technology, Pantnagar, 6-8 December.
 12. Singh, P. and Tewari, P. (2013). Traditional uses of medicinal and aromatic plants in Uttarakhand. Paper presented and participated at Asian Agri History Foundation: Uttarakhand Chapter at Pantnagar, 19 February.
 13. Kamala, T. S. (2013). Effectiveness of pro-poor initiatives for empowerment of SC & ST women in Andhra Pradesh : A pilot study of SAARC Countries. Paper presented and attended National Seminar on Development of Scheduled Castes



and Scheduled Tribes : Opportunities, Achievements and Challenges at National Institute of Rural Development at Rajendranagar, Hyderabad, 9-11 January.

14. Dr. T. Sarah Kamala (2013). Addressing Poverty by Empowering Rural Women SHGs through Pro-poor Initiatives: Study of the Project Initiated by UNDP. Paper presented and attended National Seminar on Millennium Development goals for Rural Development, at National Institute of Rural Development at Rajendranagar, Hyderabad, 18-20 February.

Book Published

1. Gaytri Tiwari (2012). Dimensions of personality, published by Himanshu Publications, Udaipur.
2. Gaytri Tiwari (2012). Educational psychology for extension personnel, Published by Agrotech Publishing Academy, Udaipur

Book Edited

Dharm Singh, Naveen Choudhary, Y.C Bhatt, Poonam Dhaka, Kalpana Jain, Amit Joshi, All India Seminar on Information and Communication Technology for Integrated Rural Development, Himanshu Publications, New Delhi pp 13-20, 2012.

Book Chapter

1. G. Tiwari, (2012). Impact of male migration on the status of rural women in Southern Rajasthan. Gender Empowerment: 2012 Choices and Chances. Eds. L. Chauhan, Jayshree Singh, Dolly Gandhi. (Page no)
2. Pratibha Singh, Poonam Tewari and Reeta Yadav (2012). Role and responsibility of women in agriculture in Uttarakhand : Work profile of rural women. In Climate change and

agriculture, Discovery Publishing House Pvt. Ltd., New Delhi. p.

3. Pratibha Singh and Poonam Tewari (2012). Empowerment of Rural Women - A need of the hour. Shaping a drudgery-free world : Concern of Food, Education, Sovereignty and Happiness, Vivekanand Swadhyay Mandal, GBPUAT, Pantnagar.
4. Promila Kanwar (2012). Inter-gender analysis of dairy farming in Himachal Pradesh, In Gender Analysis in Agriculture: Grass root realities. Eds. Indu Grover and Pushpita Das, published by Supriya Books, New Delhi. pp. 133-147.

Pamphlets

1. Rani, P., Pruthi, N., Singh, S S Jeet, Yadav, S. (2013). Keetnashak sambandhit karya karne vale pursho ke liye surkshatmak vastar (In Hindi): Deptt. of Textile and Apparel Designing, College of Home Science CCSHAU Hisar.
2. Rani, P., Pruthi, N., Singh, S S Jeet and Makkar, P (year). Threshing Karne Vale Pursho Ke Liye Surakshatmak Vastra (In Hindi): Deptt. of Textile and Apparel Designing, College of Home Science, CCSHAU Hisar.
3. Rani, P., Pruthi, N., Singh, S. Jeet S., Makkar, P. (year). Threshing karne vali mahilaon ke liye surakshatmak vastra (In Hindi), Deptt. of Textile and Apparel Designing, College of Home Science, CCSHAU Hisar.

Radio Talks

Dr. Shobha Nagnur talked on Medicinal value of Turmeric and ginger, Broadcasted on 25 May 2012 at AIR, Dharwad

TV talks:

- Promila Kanwar Chat show on Women in Agriculture, relayed at Doordarshan Shimla on 25 May, 2012.



- Promila Kanwar Chat show on Women Empowerment relayed at Doordarshan, Shimla on 30 September 2012.

Awards and Recognition

- Dr Jatinder Kishtwaria, A. Rana and N. Vyas won third prize in poster presentation on Involvement of hill farm women in paddy transplantation in the National Seminar on Women and Rural Development: Critical Issues at PAU Ludhiana, 2-3 May 2012.
- Promila Kanwar, Acted as a team leader of scientists and Chaired a session on International Conference on Climate Change, 12-2-2013 at University of Agricultural Sciences, Faisalabad, Pakistan, 11-13 February, 2013.
- Dr. Sapna Gautam has received best poster award during National seminar on Indian Agriculture: Present situation, challenges, remedies and Road map at CSKHPKV Palampur, 4-5 Aug 2012.
- Dr Suman Singh, Dr Hemu Rathore and Charu Sharma received Best Paper Award on Alleviating drudgery and enhancing environmental sanitation through technology interventions in Animal Husbandry, in Regional Science

Congress on Science for shaping the future on India jointly organized by M.S. University of Baroda and Indian Science Congress association, Vadodara Chapter, 15-16 September, 2012.

- Dr Suman Singh, Dr Hemu Rathore and Charu Sharma received Best Poster Presentation Award on Feasibility assessment of improved technologies for post harvest activity of groundnut crop of Indian farm women, in Regional Science Congress on Science for shaping the future on India, jointly organized by M.S. University of Baroda and Indian Science Congress Association, Vadodara Chapter, 15-16 September, 2012.
- Dr. Juri Baruah, Technical Coordinator was invited by India Sri Lanka Foundation to conduct sessions in a Workshop on Drama Therapy organized by Theatre Institute of Disability Oriented Research and Advocacy (THIDORA) at Colombo and Jaffna from 3-9 October, 2012.
- Jatinder Kishtwaria awarded Himachal Excellence Award, for her remarkable performance as a Scientist by Divya Himachal Society/ group of newspapers.

7. TRAINING PROGRAMME

1.	Exhibition during Celebration of 66 th Foundation Day of CRRI, Cuttack	23 April 2012	Dr. K. Ponnusamy Dr. Sabita Mishra
2.	Training on Social Development in Watersheds for WMT (Social) sponsored by Odisha Watershed Development Mission	04-08 June 2012	Dr. K. Ponnusamy Dr. Jyoti Nayak Dr. Ananta Sarkar
3.	13 th Research Advisory Committee meeting	22 – 23 June 2012	Dr. S.K. Srivastava
4.	Four days training for farm women on post harvest management	9 -12 July 2012	Dr. A.K. Shukla Dr. Kundan Kishore
5.	Exposure visit of the KIIT, Bhubaneswar students	09 July 2012	Dr. Sabita Mishra
6.	Exposure on gender sensitization	09 July 2012	Dr. K. Ponnusamy
7.	Training on Gender and improved methods of rice cultivation under model village project	13 July 2012	Dr. K. Ponnusamy
8.	Role of gender in agriculture	16 July 2012	Dr. K. Ponnusamy
9.	Exposure visit of OUAT, Bhubaneswar students to know gender sensitization for development	16 July 2012	Dr. Sabita Mishra
10.	Exhibition at CRRI, Cuttack on the occasion of Stakeholders Meet	30-31 July 2012	Dr. Sabita Mishra
11.	Summer School on Gender Mainstreaming for Resilient Agriculture	18 July - 07 August 2012	Dr. K. Ponnusamy Dr. A.K. Shukla Dr. Anil Kumar Dr. Jyoti Nayak Dr. Kundan Kishore
12.	21 Days training (FET) of ARS probationers	21 August – 10 September 2012	Dr. A.K. Shukla Dr. Anil Kumar Ms Gayatri Moharana
13.	Exhibition in Gandhinagar, Gujarat in connection with National Convention-The Next Frontier of Agri-Business and Technology	03 -04 September 2012	Dr. K. Ponnusamy
14.	Workshop cum Stake holder's meeting on Gender Mainstreaming in Agriculture	08 September 2012	Dr. A.K. Shukla Dr. Anil Kumar Dr. Kundan Kishore
15.	Farmers – scientist interface	11 September 2012	Dr. S.K. Srivastava
16.	Sensitization meeting/ workshop on RFD	11 September 2012.	Dr. S.K. Srivastava
17.	A five -days Trainers' Training Programme on 'Drudgery Reducing Farm Technologies/ Equipment for Farm Women' was organized at DRWA for the scientists/SMS of Odisha and Jharakhand states.	11-15 September 2012	Dr. S.P. Singh Dr. M.P.S. Arya Dr. Jyoti Nayak Dr. Abha Singh
18.	Exposure visit of M. S Samminathan	20 September 2012	Dr. Sabita Mishra
19.	KVK Knowledge Exchange Meet, 2012	27-29 September 2012	Dr. A.K. Shukla Dr. Kundan Kishore Dr. Anil Kumar
20.	Social Development in Watersheds for WMT (Social) of Odisha Watershed Development Mission	08-12 October 2012	Dr. K.Ponnusamy, Dr. Jyoti Nayak Dr. Ananta Sarkar

21.	Eight-days Model Training Course on 'Drudgery Reducing Options for Farm Women to Increase Their Work Efficiency & Productivity'	1-8 November 2012	Dr. S. P. Singh Dr. Jyoti Nayak Dr. Abha Singh
22.	Farmers – Scientist Interface	16 November 2012	Dr. S.K. Srivastava
23.	Exhibition at PAU on the eve of 7 th National KVK Conference	20-22 November 2012	Dr. K. Ponnusamy
24.	Training programme on Scientific methods of food grain storage, quality management and sustainable development practices in agriculture under FCLs Corporate Social Responsibility programme for farmers/ farmwomen in collaboration with Indian Grain Storage Management & Research Institute Hapur, Govt. of India Ministry of Consumer affairs, Food & Public distribution, department of food & Public distribution	23-24 November 2012	Dr. S.K. Srivastava Dr. Naresh Babu Dr. Suman Agarwal
25.	Vigilance awareness week 'Transparency in Public Procurement'	29 Oct – 3 Nov 2012	Dr. Suman Agarwal
26.	Exhibition at Global Symposium on Aquatic Resources for Eradicating Hunger and Malnutrition-Opportunities and Challenges at Mangalore AFS (IB)	03-06 December 2012	Dr. K. Ponnusamy
27.	Women in Agriculture Day	4 December 2012	Dr. K. Ponnusamy
28.	Exhibition at National Workshop on Recent Trends in Impact Assessment and Best Practices at CIFA organized by Association of Aquaculturists and CIFA	12-13 December 2012	Dr. K. Ponnusamy
29.	Exhibition at 11 th Agricultural Science Congress at OUAT, Bhubaneswar organized by NAAS	7-9 February 2013	Dr. K. Ponnusamy Dr. Jyoti Nayak Ms Gayatri Moharana
30.	Gender sensitization programme for DST funded project beneficiaries (SHG members) of WELCOME NGO, Gop block, Puri district of Odisha	18 February 2013	Dr. K. Ponnusamy
31.	National level Trainers training programme on Gender mainstreaming in eco-friendly pest management with special reference to storage pest	20- 23 February 2013	Dr. S.K. Srivastava Dr. Naresh Babu
32.	One day gender sensitization in agriculture event	25 February 2013	Dr. K. Ponnusamy
33.	Field day on protected cultivation of vegetables crops on the occasion of International Women's Day	08 March 2013	Dr. A.K. Shukla Dr. Anil Kumar Dr. Kundan Kishore
34.	Training programme on Sensitization of Rural Youth for Future Agriculture	23 March 2013	Dr. K. Ponnusamy



8. Participation in Conferences/Symposia/Seminars/Workshop

1. Scientists participated in Global Conference on Horticulture for Food, Nutrition and Livelihood Options at OUAT, Bhubaneswar organized by ASM Foundation, New Delhi and OUAT during 28-31 May 2012:
 - K. Ponnusamy
 - Kundan Kishore
 - Shukla, A.K.
 - Sabita Mihra
 - S.K. Srivastava
2. Scientists attended International conference on HWWE “ ERGO 2012: Safety for all” during 6-8 December, 2012 at GBPUA&T, Pantnagar:
 - Gayatri Moharana
 - Jyoti Nayak
 - S. P. Singh
3. Scientists participated in the XI Agricultural Science Congress ‘Agriculture Education: Shaping India’s Future’, held at OUAT, Bhubaneswar from 7-9 Feb. 2013, organized by National Academy of Agricultural Sciences, New Delhi:
 - Suman Agarwal
 - Ananta Sarkar
 - Gayatri Moharana
 - Jyoti Nayak
 - K. Ponnusamy
 - Kundan Kishore
 - S. P. Singh
 - Shukla, A.K.
4. Suman Agarwal participated in the Orientation programme for senior officials on ISO 9001- 2008 held at DRWA, on 12-13 March 2013.
5. Suman Agarwal represented DRWA in the International Symposium on Sustainable Rice production and Livelihood security: Challenges & Opportunities, held at CRRI, Cuttack, on 2nd March, 2013, organized by Association of Rice research workers.
6. Ananta Sarkar participated in the exhibition during ‘National Convention - The Next Frontier of Agri-Business and Technology’ organized by Industrial Exhibition Bureau, Government of Gujarat in coordination with Confederation of Indian Industry (CII) at Mahatma Mandir, Gandhinagar, Gujarat during September 03-06, 2012.
7. Jyoti Nayak and Gayatri Moharana participated in a brainstorming session on “Water policy- Issues and strategies for future”, organized at DWM, Bhubaneswar on 12th May 2012.
8. Gayatri Moharana, Jyoti Nayak and Kundan Kishore attended a stakeholders meeting to prepare a roadmap for research in urban waste water management for safe use in agriculture under the Indo European joint research project “Reuse options for marginal quality water in urban and peri-urban agriculture and allied services” organized at DWM, Bhubaneswar on 30th August 2012.
9. Gayatri Moharana and Tanuja S. participated in the Summer School on “Gender Mainstreaming for Resilient Agriculture from 18th July, 2012 to 7th August 2012 organized at DRWA, Bhubaneswar.



10. Jyoti Nayak attended Agribusiness Camp organized by Zonal Technology Management- Business Planning and Development unit, NIRJAFT, Kolkata in association with agribusiness incubation, ICRISAT, Hyderabad at Kolkata on March 18, 2013.
11. Jyoti Nayak and Gita Saha attended training programme in Gender Mainstreaming in Eco-friendly Pest Management with Special reference to storage Pest at DRWA on 20-23 February, 2013.
12. Suman Agarwal, Jyoti Nayak, Gayatri Moharana and Kundan Kishore attended XX Biennial workshop of AICRP of Home Science held at college of Rural Home Science, University of agricultural Sciences, Dharwad, and Karnataka on January 29-30, 2013.
13. K. Ponnusamy participated in 7th National KVK Conference at PAU, Ludhiana during 20-22, November 2012
14. K. Ponnusamy participated in Annual General Body meeting of Society for Management of Information Learning and Extension (SMILE) at VOTI, Bhubaneswar on 29.09.2012.
15. K. Ponnusamy participated in Launching of Expert Systems of Network Project on Development of Crop and Animal Enterprises on 25.01.2013 at ZPD-8, Bangalore.
16. K. Ponnusamy participated in National Conference on Water Crisis Management Under Changing Climate during 16-17 November 2012 at Bhubaneswar organised by Gugly Centre for Biological Research, Bhubaneswar
17. K. Ponnusamy participated in National Convention-The Next Frontier of Agri Business and Technology at Gandhinagar, Gujarat during 03.09.2012 to 04.09.2012
18. K. Ponnusamy participated in National Workshop on Recent Trends in Impact Assessment and Best Practices at CIFA organised by Association of Aquaculturists and CIFA during 12-13 December 2012 at CIFA, Bhubaneswar.
19. K. Ponnusamy participated in National Workshop on Urban and Peri-urban Horticulture at Bangalore organised by CHAI, New Delhi on 02.03.2013
20. K. Ponnusamy participated in State Level Extension Council Meeting at OUAT on 17.05.2012
21. K. Ponnusamy participated in Workshop on Exploring Potential Technologies for Marginalised districts of Odisha at Bhubaneswar on 29.01.2013 organised by IFPRI, New Delhi
22. K. Ponnusamy participated in XIX Zonal Workshop of KVKs of Zone-VII, ICAR at Jagdalpur in Bastar district of Chhattishgarh during 4-6 May 2012.
23. Kundan Kishore participated in International symposium on tropical and subtropical fruits held on June 18-20 in Guangzhou, China
24. S. P. Singh attended Lead paper presentation in International Conference on Ergo 2012: Safety for all- HWWE 2012' on December 8, 2012 at College of Home Science, GBPUAT, Pantnagar.
25. S. P. Singh was present as Co-chairman of Technical Session III B on 'Agriculture & Ergonomics' in International Conference on Ergo 2012: Safety for all- HWWE 2012' on December 8, 2012 at College of Home Science, GBPUAT, Pantnagar.
26. Sabita Mishra attended The Foundation Day, 23rd April, 2012, CRRI, Cuttack.



27. Sabita Mishra participated in RAC meeting at Door Darshan Kendra, Bhubaneswar on 14.6.2012
28. Sabita Mishra participated in Stakeholders Meet at CRRI, Cuttack from 30-31, July, 2012
29. Sabita Mishra participated in Stakeholders Meet at DRWA, Bhubaneswar on 8.9. 2012
30. A.K. Shukla attended MDP Workshop on Policy and Prioritization, monitoring and Evaluation (PME) Support to Consortia-based Research in Agriculture from 11-17 September, 2012 at NAARM, Hyderabad.
31. A.K. Shukla attended National Workshop on "Foresight and Future Pathways of Agricultural Research through Youth in India from 01.03.13 to 02.03.13.
32. S.K. Srivastava (2012) Gender participatory agro-enterprises (plant protection and environment) for sustainable agriculture (Lead paper). Souvenir. National symposium on Eco-friendly approaches to pest management for sustainable agriculture held on 24-25 November 2012 at OUAT Bhubaneswar. 89-101.
33. S.K. Srivastava participated in 3rd National Symposium on eco-friendly approaches to pest management for sustainable agriculture held at Bhubaneswar on 24-25 November 2012, organised by Society for plant protection and environment Department of Entomology Orissa University of Agriculture and Technology, Bhubaneswar Orissa.
34. S.K. Srivastava participated in Global Conference on Horticulture for Food Nutrition and Livelihood Options, held at Bhubaneswar, Odisha on 28-31 May, 2012, organised by ASM Foundation, New Delhi and OUAT, Bhubaneswar.
35. The progress report of ITMU of DRWA, Bhubaneswar was presented in the Agribusiness Camp organized by Zonal Technology Management- Business Planning and Development Unit, NIRJAFT, Kolkata, 18 March'2013.

Workshop/ Training / Demonstrations/ Awareness programme organized

1. Dr. Shobha Nagnur organized XX Biennial Workshop on Home Science on 29-30 January 2013, at University of Agricultural Sciences, Dharwad
2. Promila Kanwar organized Awareness camp on health issues at Gankhetar village on 24 May 2012.
3. Promila Kanwar organized Awareness camp on activities of mahila mandals at village Banuri.
4. Promila Kanwar organized Demonstration on Tofu making at Banuri village on 4 July 2012.
5. Dr. M.B. Deka organized training on Vermicompost at the Department of Extension Education, 29 - 30 September 2012.
6. Dr. M.B. Deka organized training on Organic farming through application of biofertilizer at Konhar Gaon village Assam, 11 March 2013.
7. Dr.M.S.Chaitanya Kumari, conducted awareness campaigns in the field for mobilisation of rural farm women for organising orientation programme in Bakaram and Nagireddiguda, 17 & 18 July 2012.
8. Dr.T.Sarah Kamala organised demonstrations on Herbal bath powder and herbal shampoo, pain balm, Face pack to adolescent and young women with resource person at village Bakaram, 18 December 2012.

Meetings Attended by the Director

Dr. Krishna Srinath

1. Meeting chaired by DDG (AE) to finalize the EFC of DRWA for XII of DRWA at New Delhi, 30 April, 2012.
2. Meeting chaired by Executive Secretary, APAARI to review the first draft version of Synthesis Report and proceedings and recommendations of GCWA at TASS, New Delhi, 01 May, 2012.
3. Meeting chaired by DG, ICAR in connection with Finalization of EFC of DRWA for XII Plan and pre-meeting work at New Delhi, 8-11 May, 2012.
4. As guest of honour, the meeting on the eve of Regional Golden Jubilee Celebration at KVK, OUAT G. Udayagiri, Kandhamal and also visited the DRWA Network projects sites at villages of Kandhamal at Kandhamal Odisha, 05 June, 2012.
5. Policy dialogue on Prioritizing demand-driven agricultural research for development in South Asia at New Delhi, 02 July, 2012.
6. Regional priority-setting workshop for the CGIAR Research Programme on Policies, institutions and markets to strengthen Food security and income for rural poor at New Delhi, 03 July, 2012.
7. 21st Meeting of the Regional Committee of Zone II at NAARM, Hyderabad, 19-20 July, 2012.
8. Visited AICRP Centre and the programme village at ANGRAU, Hyderabad, 21 July, 2012.
9. ASRB work as DG's nominee at New Delhi, 23 July, 2012.
10. Work related to GCWA proceedings at New Delhi, 24 July, 2012.
11. Knowledge Meet called by Director General, ICAR at New Delhi, 21-22 August, 2012.
12. Finalization of Proceedings of GCWA with DDG (AE) at New Delhi, 05 September, 2012
13. Meeting of the Tenure Renewal Committee at New Delhi, 6 September, 2012.
14. Delivered a lecture on Engendering agricultural research at the 96th Foundation Course for Agricultural Research Service (FOCARS-96) at NAARM, Hyderabad, 17 September, 2012.
15. Selection committee meeting for considering the assessment proposals of Senior Scientists submitted by DRWA under the revised CAS at ASRB, New Delhi, 20 September, 2012.
16. Selection committee meeting for considering the assessment proposals of Senior Scientists submitted by DRWA under the revised CAS at ASRB, New Delhi, 25 September, 2012.
17. Workshop on Defining the Role of Women Scientists and Teachers in Promotion and Application of Science and Technology at NASI, Allahabad, 5-6 October, 2012.
18. Selection committee meeting at ASRB, New Delhi, 16 October, 2012
19. Global Conference on Agricultural Research for Development (GCARD 2012) at Punta del Este, Uruguay, 29 October – 01 November, 2012
20. CABI south Asia-India-mobile



- telephony-Brainstorming session at CABI office, NASC Complex, Pusa, New Delhi, 06 November, 2012.
21. QRT Consultation Meeting at NAARM, Hyderabad, 15 November, 2012.
 22. 7th National Conference on KVK-2012 at Punjab Agricultural University, Ludhiana, put up exhibition stall and interacted with AICRP coordinating units, 20 November, 2012.
 23. 3rd International Agronomy Congress at New Delhi and Chaired the Session on Agricultural Innovations for gender empowerment, 28 November, 2012.
 24. Gave special lecture on gender and fisheries in the Global symposium at Mangalore, 3-4 December, 2012.
 25. Meeting of AICRP on Home Science called by DG, ICAR at NBPGR Auditorium, New Delhi, 5-6 December, 2012.
 26. EFC meeting at SMD, New Delhi, 3-4 January, 2013.
 27. Launching of Expert Systems on Agriculture and Animal Husbandry Enterprises at Zonal Project Directorate, Zone- VIII, Bengaluru, 25 January, 2013
 28. Conducted the Biennial Workshop of AICRP on Home Science at UAS, Dharwad, 29-30 January, 2013.
 29. An urgent meeting called by DDG (AE), ICAR at New Delhi, 04 February, 2013.
 30. Meeting on Divisional matters at New Delhi, 25 February, 2013

Dr M.P.S. Arya

31. Meeting of Head of the Division called by DG, ICAR at New Delhi, 17-18 March, 2013
32. Directors' Conference meeting at New Delhi, 19-20 March, 2013

9. RESEARCH PROJECTS - 2012-13

S No	Title	PI & Co PI
INSTITUTE PROJECT		
1	Development of gender information system for Agriculture	Dr H.K. Das Dr Sabita Mishra
2	In vitro Multiplication of Pointed Gourd and Pineapple for Income Enhancement of Farm Women	Dr Kundan Kishore Dr A.K. Shukla
3	Refinement and development of Horticulture based cropping models for gender mainstreaming	Dr Naresh Babu Dr Kundan Kishore Dr A.K. Shukla
4	Reducing the gender gap in nutritional status of family members in rice based farming system	Smt Abha Singh Dr M.P.S. Arya
5	Technology Application and Gender Mainstreaming in Agriculture for developing a Model Village	Dr. K. Ponnusamy Dr M.P.S. Arya Dr A.K. Shukla Dr. Anil Kumar Dr Sabita Mishra Dr H.K. Das Dr. Jyoti Nayak Ms. Gayatri Moharana
6	Assessment of women's role in traditional livestock dependant societies: Kangayam grasslands	Dr. Anil Kumar Dr. K Ponnusamy Mrs. Tanuja S.
7	Development of gender friendly hand cum power driven three/four row rice transplanter	Dr S.P. Singh Dr Jyoti Nayak
8	Refinement of storage pest management techniques in selected cereals, pulses, condiments and spices with gender perspective	S. K. Srivastava Suman Agarwal Naresh Babu
NETWORK PROJECT		
1	Assessment of gender issues, identification and refinement of selected women specific technologies in Horticulture crops Network Centre: DRWA, Bhubaneswar, IIHR, Bangalore, CTCRI, Thiruvananthapuram, CIPHET, Abohar, CISH, Lucknow and CITH, Mukteswar	Dr A.K. Shukla Dr Naresh Babu Dr Kundan Kishore Dr K. Ponnusamy
2	Gender issues in rice based production system and refinement of selected technologies in women perspective Network Centre: 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
3	Enhancing livelihood of rural women through livestock production. Network Centre: DRWA, Bhubaneswar, IVRI, Izatnagar, ICAR, Research Complex for NEH Region, Umiam, VC&RI, Namakkal and PGIV&AS, Akola	Dr. Anil Kumar Mrs. Tanuja S. Dr. Abha Singh
4	Development of expert system for crop and animal enterprises. Network Centre: DRWA, Bhubaneswar, ZCU, Zone VIII, Bangalore, DOEE, TNAU, Coimbatore and DOEE, TANVASU, Chennai	Dr. K. Ponnusamy Dr S. K. Srivastava
5	Public-private partnership for Gender Mainstreaming in Agriculture Network Centre : 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
AICRP ON HOME SCIENCE		
1	All India Coordinated Research Project on Home Science	Dr Suman Agrawal

10. PERSONNEL

1	Dr. (Mrs.) Krishna Srinath	Director (up to 28.02.2013)- Retired on Superaannuation
2	Dr. Mahendra Pal Singh Arya	Principal Scientist (Agronomy) & Director (Actg.) w. e. f. 01. 03. 2013
3	Dr. Suman Agarwal	Principal Scientist (HDRM)
4	Dr. Santosh Kumar Srivastava	Principal Scientist (Agri. Entomology)
5	Dr. Anil Kumar Shukla	Principal Scientist (Horticulture)
6	Dr. Anil Kumar	Principal Scientist (Livestock Production Management)
7	Dr. K. Ponnusamy	Principal Scientist (Agri. Extension)
8	Dr. Naresh Babu	Principal Scientist (Horticulture)
9	Dr. Sabita Mishra	Senior Scientist (Agri. Extension)
10	Dr. Shiv Pratap Singh	Senior Scientist (Farm Machinery & Power)
11	Dr. Hemanta Kumar Dash	Senior Scientist (Agri. Economics)
12	Dr. Jyoti Nayak	Senior Scientist (Family Resource Mangement)
13	Dr. Kundan Kishore	Senior Scientist (Horticulture)
14	Dr. Ananta Sarkar	Senior Scientist (Agri. Statistics)
15	Smt. Laxmi Priya Sahoo	Scientist (Seed Technology)
16	Dr. Abha Singh	Scientist (Food & Nutrition)
17	Mrs. Tanuja S.	Scientist (Fish Processing Technology)
18	Miss Gayatri Moharana	Scientist (Family Resource Mangement)
19	Shri G. S. Rao	Administrative Officer
20	Shri V. Ganesh Kumar	Assistant Administrative Officer
21	Shri Janardan Biswal	Assistant Finance & Accounts Officer
22	Smt. Geeta Saha	Technical Officer (T-5)
23	Smt. Parisima Sen	Personal Assistant
24	Smt. Bishnupriya Moharana	Assistant
25	Shri Debendra Nath Sadangi	Technical Assistant, T-4
26	Shri Bhikari Charan Behera	Technical Assistant, T-4
27	Shri Manoranjan Prusty	Technical Assistant, T-4
28	Shri Bishnu Chanran Sahu	Technical Assistant, T-3
29	Shri Sujit Kumar Nayak	Technical Assistant, T-3
30	Shri Parikshit Mallick	Stenographer Gr. III
31	Shri Jyoti Ranjan Das	Lower Division Clerk
32	Shri Biswanath Biswal	Skilled Support Staff

Appoinment

Dr. Ananta Sarkar joined as Senior Scientist (Agricultural Statistics) on 27th April 2012 .

Transfer

Shri S. S. Verma, Private Secretary (on deputation) was transferred to his parent department i. e. ICAR Research Complex for Eastern Region, Patna on 10th July 2012.

Retirement

Dr. (Mrs.) Krishna Srinath, Director retired on 28th February 2013.