
कृषिरत महिला अनुसंधान निदेशालय
(भारतीय कृषि अनुसंधान परिषद)
भुवनेश्वर-751 003, ओडीशा, भारत
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# वार्षिक प्रतिवेदन
# Annual Report
## 2013-14


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**Annual Report**
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# Preface

Being an equal stakeholder in the society, women's participation at all the levels of developmental process plays an important role in the sustainable development of the country. Several concepts such as Women in Development (WID), Gender and Development (GAD) and Environment and Alternative Development (EAD), have been put forward to mainstream women into the process of agriculture and development. These days, all the research, extension and development programmes are screened through a gender lens with a strong objective of gender equity. Women's key role in the production of major grains and minor millets illustrates their invaluable contribution to the food and nutrition security. In addition, women play a crucial role in ensuring supply of food as food vendors and post-harvest processors of livestock and fishery products. As primary providers of nutrition to the children, women are the major decision-makers in ensuring nutrition to the next generation. Research programmes are carried out in the Directorate for the development of resource efficient horticulture model for livelihood improvement of rural women and establishment of integrated farming model for improved food security and livelihood in rural households.

The available farm equipment/ technologies are primarily developed keeping male workers in mind. Many such equipment are not suitable to farm women as such due to different ergonomical considearations. Keeping this in view, research has been carried out to address the drudgery issues of farm women engaged in different orchards and refinement of farm tools & equipment with women's perspective. Another programme has been initiated under Rashtriya Krishi Vikas Yojana (RKVY) to replicate the existing women friendly farm tools & equipment and disseminate those for enhancing their working efficiency.

Post *Phailin*, the Directorate adopted two clusters of cyclone affected tribal villages in Mayurbhanj and Gajapati districts in Odisha for implementation of the Tribal Sub Plan (TSP) Scheme. Scientists-Farm Women interfaces, awareness cum skill upgradation on drudgery reducing implements, scientific storage of foodgrains, animal health camps, knowledge debate, demonstration of maize dehusker cum sheller and nutritional assessment studies were carried out under TSP. The Directorate celebrated 'Technology Week for Women in Agriculture' from 22nd-27th January, 2014. The celebrations consisted of three off-campus and two on-campus programmes. Animal health camp, knowledge debate, training and demonstration programmes on backyard poultry rearing and high-tech horticulture were conducted at different villages during the off-campus programmes. As a part of on-campus programmes, farm women from different villages of Odisha undertook an exposure visit to the Directorate, to see the technological models on integrated farming systems, and visit the fields and laboratories of horticulture, livestock, fisheries, farm machinery and home science, that showcased various models of livelihood and nutrition security.

Farm and homestead being inseparable units dealing with human development, research programmes under AICRP continued to address the food and nutritional security, 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 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 Directorate in this Annual Report. I am grateful to Dr. S. Ayyappan, Director General, ICAR for his keen interest in the development of the Directorate. I gratefully acknowledge the guidance and support given by Dr. K.D. Kokate, Former Deputy Director General (Agricultural Extension) and Dr. A.K. Sikka, Deputy Director General (Agricultural Extension) in achieving the goals set for the Directorate.

न ग्रेवाल

**(Neelam Grewal)**
**Director**

Bhubaneswar
31st May, 2014

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# Executive Summary

Directorate of Research on Women in Agriculture (DRWA) is a unique research institution under ICAR that has the mandate of carrying out research exclusively on gender issues in agriculture. During 2013-14, the Directorate implemented a number of research projects the outputs of which have the potential of benefitting women, and undertook large number of development related activities that have benefitted the stakeholders including farm women.

The problem of shoot tip necrosis (STN), a major limiting factor for *In-vitro* regeneration of *Trichosanthes dioica*, was overcome by transferring the affected cultures to Murashige and Skoog medium, supplemented with 0.68 mm calcium chloride. Additionally, calcium supplemented medium gave maximum multiplication index and axial and lateral shoot length.

Under the resource efficient horticultural model, various components like high density planting of banana, meedow orcherding of guava, high density planting of papaya, pineapple, lime, growing of vegetable crops in open field and protective condition, tuber crops etc. were evaluated. This model developed on 2000m$^2$ area, adopting recommended package of practices and gender friendly pest management of techniques gave 790kg fruits (banana- 530kg, papaya- 210kg and guava -50 kg), 275kg green leafy vegetables (amaranthus, coriander leaves, fenugreek leaves and palak), 280 kg root and tuber crops (radish, elephant foot yam, yam and colocasia) and 1490 kg other vegetables (bitter gourd, bottle gourd, cauliflower, capsicum, okra, tomato, brinjal, chilli, cowpea and cauliflower).

Study on mulching in tomato, brinjal, chilli and cabbage indicated that black polythene (0.25 mm thickness) was found to be most effective, as it registered significantly higher fruit yield of 4.42 kg/plant in tomato, 3.84 kg in brinjal, 312 g in chilli and 654g weight of head in cabbage with negligible weed growth (1.97g/m$^2$ dw) than the other mulches.

Performance of cucumber and capsicum was evaluated under protected conditions in the hot and humid tropical climate of Odisha. The experiment conducted on two promising varieties each of cucumber (Klon and Hilton), and Swarna and Natasa of capsicum showed that Klon variety of cucumber recorded 4kg/ plant and Swarna variety of capsicum recorded 1.5kg/plant). Study on intercropping in banana with cowpea, amaranthus, elephant foot yam and radish was also undertaken to identify best combination in terms of yield and income.

A hi-tech and low cost model of vermicompost unit was developed for preparing need based herbal pesticides with neem leaves and neem cake and the vermicompost, using green wastes of the crop and FYM.

Fruit based cropping models not only provide fresh vegetables and fruits but also generate income for the farm families. Participation of women is less in establishing orchards but there is enough scope to enhance women's participation in orchards. With this objective, multi-storey cropping model in coconut orchard was developed through diversification of crops. In coconut based multi-storey cropping model, banana, papaya and guava were used as second storey crops. Different ground storey intercrops like cowpea, turmeric, elephant foot yam and pineapple were taken in the interspaces of the main crop. The Bucket trap was installed for the management of pests in coconut. Result revealed that intercropping did not show any adverse effect on the increment in the height of plant, girth of trunk and area of canopy spread of main crop as well as second storey crops. Among the different intercropping combinations, highest yield were recorded by turmeric (180.46 q/ha) followed by elephant foot yam (150.20q/ha). Yield of cowpea was recorded 52.30 q/ha from July to September.

Under the project 'Technological Empowerment of Farmwomen in Production of Quality Seeds and Planting Materials of Vegetables' implemented with the collaboration of Division of Seeds Science and Technology, IARI, New Delhi, 40 women from four villages of Khurda were imparted training on different steps such as stages of seed collection, planting material production, timing of harvest, seed extraction, seed processing, labelling and packing, to enable them to take up seed production. After this, seed production in brinjal, chilli, tomato, bottle gourd, french bean, cluster bean and amaranthus was taken up by women. Evaluation of results revealed that 95% of the seeds sampled after two seasons of guided production i.e. in $S_2$ phase, could meet seed certification standard as against 23% before training. thus skill upgradation of farm women not only increased seed production but also improved the quality.

Physiological and biochemical changes during storage of sunflower (*Helianthus annuus*.L) seeds were studied under coastal agroclimate of Odisha. Seeds of one hybrid (APSH 11), its parental lines( 234 A & 6 D-1), and two open pollinated varieties were procured from the Directorate of Oilseed Research, Hyderabad. Information on sunflower seed storage practices was collected from sunflower growing areas of Basudevpur and Jamujhadi village of Bhadrak district of Odisha. Of the four different containers used for seed storage i.e., glass jar, metal box, polythene bags and gunny bags, glass jar was found to be most effective for germination percentage and seed length.

During the period, a project entitled 'Technological Interventions for Drudgery Reduction with Increased Work Efficiency through Women Friendly Farm Tools/Equipment/Technologies in the State of Odisha' was initiated under RKVY with the objective of reducing the drudgery faced by farm women and to produce appropriate women friendly farm tools and equipment for farm women of Odisha. Based on the area of production, five districts of Odisha viz., Cuttack (for rice), Dhenkanal (for maize), Kendrapara (for groundnut), Rayagada (for cotton) and Ganjam (for vegetables) were identified for project implementation.

Under the project 'Ergonomic Evaluation of Selected Manually Operated Farm Equipment in Mango & Cashew nut' survey was conducted in different orchards in Dhenkanal district of Odisha. Basic information related to the orchards, working pattern, gender issues, technological needs and gaps were collected. Data revealed that the major activities which were carried out manually by them were preparation of soil mixture (70%), filling mixture in poly bags (100%), plantation (60%), weeding (100%), clipping of shoots(100%) application of fertilizer (80%), harvesting (60%) and management of mango orchard except grafting (30%). Among these activities, filling of soil mixtures in poly bags, plantation, clipping of shoots, weeding and application of fertilizer were perceived to be very tedious, and hazard-prone. Technological interventions were made in some of the selected activities to reduce the drudgery. Trowels was introduced for filling soil mixtures in poly bags where the work was carried out manually 48-60 bags/hr, whereas 80-120 bags/hr were filled with the help of trowel. Traditionally, the farm women remove shoots from mango & cashew nut plants 360-400 shoots /hr which increased to 550-600 shoots/hr when small secateurs were introduced.

In order to strengthen the village level backyard poultry among rural women, a model called Multi-Agency Participatory Extension Model (MAPEM) was conceptualized and initiated for testing its efficacy in improving production of eggs at village level through convergence of livestock/poultry related services. Interventions for improving access to inputs and services for poultry rearing were identified based on a benchmark survey that identified constraints, opportunities and needs.

Under the project 'Gender and Work Participation Scenario in Agriculture', scenario of female work participation rate (WPR), gender gap in work participation rate and gender composition of agricultural researchers in ICAR were studied. Among the States and UTs, 15 showed a decline and 20 showed an improvement in female WPR between 2001 and 2011. Some of the States and UTs that registered significant decline in female WPR are Dadra and Nagar Haveli (13.5 points), Mizoram (11.4 points), Haryana (9.4 points), Punjab (5.10 points), Gujarat (4.5 points), Daman & Diu (3.7 points) and Jammu & Kashmir (3.3 points). The States and UTs which registered an improvement in female WPR during the period are Nagaland (6.7 points), Lakshadweep (3.7 points), Kerala (2.8 points), Jharkhand (2.7 points), Odisha and Tripura (2.5 points).

Data on scientific manpower in the ICAR system indicate that total number of scientists in ICAR institutes as on 31st December, 2013 was 4725 of which 17.4% are women. Domicile based analysis of the data indicate that about 35% of male scientists are from north and 30% from south, while 45.5% of female scientists are from south while 32.8% are from north. The share of female scientists in ARS has been increasing over the years, which is a positive sign towards engendering agricultural research.

Under the project 'Study on Gender Related Indices in Agriculture', conceptual frameworks along with dimensions were developed for indices related to gender in agriculture viz., women's empowerment in agricultural activities, gender based tagging of crops/ farming systems and gender friendly technologies.

Under the project 'Assessment of Sustainable Livelihood Interventions and Entrepreneurial Skills among Coastal Women Self Help Groups using Participatory Methodologies', need-based sustainable livelihood interventions required for the coastal women's self help groups, resource availability, marketing scope, and sustainability

issues of the livelihood interventions were identified and documented. Entrepreneurial skills for managing micro-enterprises were also assessed. There was a need to focus on women fisheries cooperatives and strengthen these through proper credit and technology back up.

Study on refinement of storage pest management techniques in selected cereals, pulses, condiments and spices with gender perspective suggested that different types of ashes such as dung ash (30gm/kg), paddy straw ash (30gm/kg), paddy straw ash (20 gm/kg), maize cob ash (30gm/kg), paddy straw ash (10gm/kg) and maize cob ash (20gm/kg) could be effectively used for storage of pigeon pea up to seven months by the farm women.

Under the project 'Identification of Gender Issues in IPM and Suitable Intervention with Women's Perspective', a multi institutional participatory IPM model is being worked out to empower women in integrated pest management based on inputs. The project being implemented in ten agro-climatic zones of Odisha with collaboration of KVKs and other agencies would identify climatic zone based intervention suitable for farm women on IPM in identified crops/ vegetables. The concept of *Krishi Rakshak* - one male and one female in each selected village would be adopted under the project.

For better utilization of the by-products from the fishing industry as protein supplements in aquaculture and livestock feed, a project entitled 'Aqua and Poultry Feed from Fish and Shellfish Wastes for Employment Generation of Coastal Women' was initiated. From the fish dressing waste obtained from the local market, fish silage was prepared by adding a mixture of organic and inorganic acids. The ensiled fish waste had a crude protein of 38.97±1.46 %, crude fat of 38.75±1.08% and ash content of 4.56±0.23%. Importantly, the fish silage prepared from fish wastes was found to have excellent keeping quality. Feeding trials of fish silage was also carried out on Japanese quail *(Coturnix japonica)* to assess the growth, feed efficiency, feed consumption, egg production, egg quality, etc.

The Kangayam grasslands in the rain-shadow region of south India presents a unique production system where 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. The project on Kangayam grasslands has not only brought out the important role played by women in sustaining the grass land, but also identified issues that have implications for sustainability of the system.

In the grassland management, women played a major role in weeding of paddocks (87.6%), harvesting of grasses (89.6%) and collection of fallen pods of acacia (100%). In livestock management activities, women's role was high in cleaning of livestock shed (88.4%), disposal of placenta (83.2%), identification of sick animals and deworming (60%), feeding and watering of animals (59.6%) and care during pregnancy (56.4%). On the other hand, issues such as increased frequency of occurrence of drought in recent years, decreasing productivity of the grassland, decreasing number of traditional cattle population and high cost of feeding the animals coupled with absentee landlordism have put big questions on the sustainability changes.

A study on gender based differences in nutritional status of family members in rice based cropping systems conducted in (rice-rice, rice-wheat, rice-pulse, and rice-millet) four states: Odisha, Uttarakhand, Uttar Pradesh and Madhya Pradesh revealed that among the four states, highest malnutrition- Chronic Energy Deficiency of 41.12% in men & 54.45% in women and low haemoglobin count, 46.67% in men and 63.33% in women was found in rice-rice cropping pattern in Puri district of Odisha. It was in the rice-pulse cropping pattern- Chronic Energy Deficiency of 27.78% in men & 31.12% in women and low haemoglobin count, 36.56% in men and 42.23% in women was found in Hoshangabad district of Madhya Pradesh. As a part of the interventions to improve consumption of proteins and iron, kitchen gardens with more leafy vegetables and pulse cultivation were promoted in participatory mode in rice-rice cropping pattern (in Puri district of Odisha) to supplement the protein and iron content.

The Directorate adopted two clusters of cyclone affected (Post *Phailin*) tribal villages in Mayurbhanj and Gajapati districts, under Tribal Sub Plan (TSP) Scheme with the objectives of assessing the perceived needs, gaps, and plan interventions accordingly. A number of interventions such as distribution of metallic food grain storage bins, demonstration and distribution of gender-friendly drudgery reducing farm tools, animal health camps & nutritional assessment studies were carried out.

Apart from research under various projects, a number of activities such as trainings, scientist-farmer interfaces, and workshops were conducted during the years. Significantly, the Directorate celebrated 'Technology Week for Women in Agriculture' during

22nd-27th January, 2014 under which both off-campus and on-campus programmes of awareness generation and exposure to various technologies were undertaken.

The All India Coordinated Research Project (AICRP) on Home Science is in operation in ten State Agricultural Universities. The main thrust of the project is on empowerment of women in agriculture for their improved nutrition and livelihood security and drudgery reduction for quality living. It focused on food & nutrition security in selected farming system, drudgery assessment and mitigation, mitigating occupational health hazards, capacity development of youths engaged in agriculture and women empowerment.

For characterization of nutritional diversity in selected farming systems, ninety rural families were selected with equal representation of the three categories on the basis of socioeconomic profile as low, medium and high. Data were analysed in terms of food consumption pattern, dietary adequacy and nutritional status of vulnerable group. Availability of foods assessed for three seasons indicated that all the food groups are available in summer, rainy and winter seasons. However, availability of various types of fruits and vegetables are more in winter season as compared to summer season. Fifty-two recipes were standardized with the iron content ranging between 4.5mg to 41.7mg per 100g finished product. To characterize drudgery of women, ten production systems namely cotton, strawberry, soyabean, chilly, groundnut, paddy, tea leaves, dairy, flower and potato were identified. A total of 13 technologies were developed and ergonomically tested under the project during the year under report. About seventeen technologies were up-scaled as per the use and for introduction among SHGs. These include harvest bags (back), harvest bags (front), harvest bags (basket), capron, seed bag cum fertilizer bag, seed placement tube, milking stand and stool, head load managers, revolving milking stool and stand, tailoring table, gopal khore, brinjal and okra mitters, trishul weeder, cotton picking apron, potato picker, potato digger and medium hoe. Occupational health problems of workers engaged in agricultural activities, agro-allied sector and textile sector were identified. To mitigate the problems of workers engaged in soyabean harvesting, three types of gloves were developed. Sixty three training programmes were conducted by the ten centres on life skill education and skill development in agriculture and allied areas for 1991 rural adolescents and youths (both male & female) who discontinued studies. The techno-socio-economic dimensions of empowerment of women were studied. The rice farming eco systems of the States were identified from secondary data sources. Data were collected from 4,500 small land holders from nine States (500 from each state) to study the dynamics and performance of Women Self Help Groups across the country and come out with indicators for sustainability of women SHGs.

# 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 in 1996. The Institute was upgraded to the status of Directorate of Research on Women in Agriculture (DRWA) during XI Plan. Since its inception, DRWA has been in the forefront of undertaking research on issues affecting women and the opportunities in agriculture. It has focused on participatory action research in different technology based thematic areas involving rural women to develop and test suitability of technologies for women and suggest for their refinement. The Directorate is also working to catalzye and facilitate R & D institutions to bring in farm women's perspectives in their programmes.

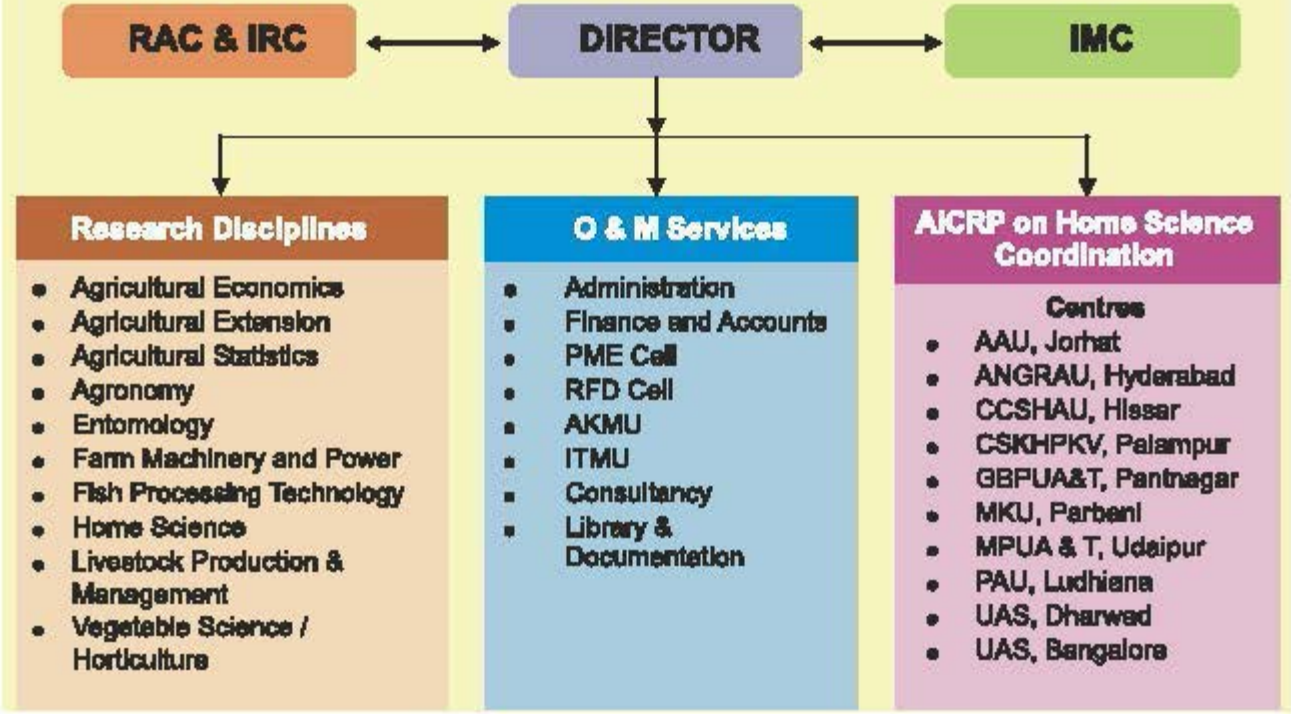
## 1.2 Mandate

Carrying out basic, strategic and applied research to identify gender issues, testing appropriateness of farm-technologies / programmes / policies with women's 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 farm women 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



## 1.5 Budget & Expenditure of DRWA for the year 2013-14

(₹ in lakhs)

| S. No. | Head of A/C | Plan | | | Non-Plan | | |
|---|---|---|---|---|---|---|---|
| | | BE | RE | Exp. | BE | RE | Exp. |
| **A. Recurring** | | | | | | | |
| 1 | Establishment Charges | 50.00 | 41.50 | 41.50 | 323.00 | 275.00 | 248.38 |
| 2 | OTA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | TA | 12.00 | 10.00 | 9.99 | 5.00 | 4.50 | 4.34 |
| 4 | Contingency | 275.00 | 114.50 | 114.45 | 32.00 | 32.00 | 27.41 |
| 5 | H.R.D. | 8.00 | 8.00 | 7.82 | 0.00 | 0.00 | 0.00 |
| 6 | Minor Works | 0.00 | 0.00 | 0.00 | 15.00 | 14.34 | 13.48 |
| 7 | Loans & Advances | 0.00 | 0.00 | 0.00 | 3.00 | 3.00 | 1.01 |
| **Sub Total (A)** | | **345.00** | **174.00** | **173.76** | **378.00** | **328.84** | **294.62** |
| **B. Non- Recurring** | | | | | | | |
| 8 | Equipment | 25.00 | 0.00 | 0.00 | 3.00 | 3.00 | 3.00 |
| 9 | Furniture / others | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | Works | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | Library | 10.00 | 6.00 | 5.56 | 0.00 | 0.00 | 0.00 |
| 12 | Minor Works | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Sub Total (B)** | | **145.00** | **6.00** | **5.56** | **3.00** | **3.00** | **3.00** |
| **Grand Total (A) + (B)** | | **490.00** | **180.00** | **179.32** | **381.00** | **331.84** | **297.62** |

## AICRP on Home Science

(₹ in lakhs)

| S. No | Head | BE | RE | Exp. |
|---|---|---|---|---|
| **A** | **Recurring** | | | |
| 1 | Establishment Charges | 989.25 | 767.00 | 767.00 |
| 2 | TA | 34.34 | 20.00 | 19.66 |
| 3 | Recurring Contingencies | 433.06 | 148.00 | 147.57 |
| | **Sub-Total (A)** | **1456.65** | **935.00** | **934.23** |
| B | Non-Recurring Contingencies | 104.63 | 0.00 | 0.00 |
| | **Sub Total (B)** | **104.63** | **0.00** | **0.00** |
| | **Grand Total (A+B)** | **1561.28** | **935.00** | **934.23** |

## Cadre Strength as on 31/03/2014

| Category | Existing | | |
|---|---|---|---|
| | Sanctioned | Filled | Vacant |
| Director | 01 | 01 | 00 |
| Scientific | 20 | 15* | 06* |
| Technical | 13 | 12 | 01 |
| Administrative | 11 | 07 | 04 |
| Supporting | 01 | 01 | 00 |
| **Total** | **46** | **36** | **11** |

* One post of Scientist under Vegetable Science is surplus as per revised cadre strength



# 2. RESEARCH ACHIEVEMENTS

## 2.1 Multi Agency Participatory Extension Model for Livelihood Improvement of Rural Women through Backyard Poultry

Sabita Mishra, Anil Kumar and Ananta Sarker

### 2.1.1 Multi Agency Participatory Extension Model (MAPEM) approach

There are limited studies on the methodology of using extension approaches/methods to provide sustainable extension services to farm women. Also, there is no strong mechanism for imparting skill training, providing information on sources of inputs and marketing agencies, etc. for techno-economic empowerment of farm women. Therefore, the approach of involvement of local multi-agencies is required to create a mechanism to make the farm women aware of local institutions for their sustainable livelihoods. Under this project, backyard poultry technology was selected for implementation for the livelihood improvement of rural women, considering different factors such as marketing scope, assured profit, ease of adoption, previous experience and availability of chicks and other critical inputs. The technology was introduced in participatory action research mode in four villages of Khurda district *viz.*, Angarpada, Haridamada, Guptapada and Padasahi. Different stakeholders involved in implementation of the project were: Directorate of Research on Women in Agriculture (DRWA), Central Poultry Development Organization (CPDO), State Department of Animal Husbandry (AH), National Bank for Agriculture and Rural Development (NABARD), Orissa State Poultry Products Co-operative Marketing Federation Ltd. (OPOLFED), Institute on Management of Agricultural Extension (IMAGE) and Agricultural Technology Management Agency (ATMA). Four core groups consisting of one male and one female unemployed youth in each group were formed for care and maintenance of mother units as well as day old chicks. The target group consisted of 100 women (housewives and part-time wage earners) from SC, ST, OBC and BPL families from the four selected villages. The conceptual framework of the research is given in Fig. 1.

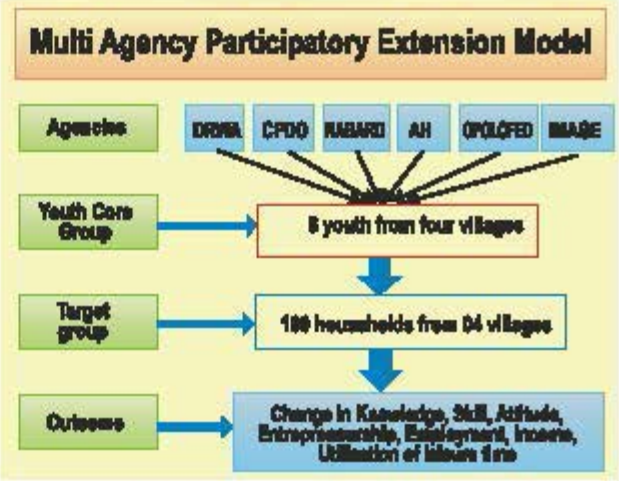



Fig. 1. Multi Agency Participatory Extension Model

### 2.1.2 Perceived constraints in poultry rearing

Constraints in poultry rearing were identified through mix-method approach consisting of household surveys and focused group discussions which is reflected in the following table.

Table 1. Perceived constraints in poultry rearing

n=68

| S. No. | Constraints | Mean score | Rank |
|---|---|---|---|
| 1 | Ignorant about source of supply of inputs and supporting agencies | 2.30 | III |
| 2 | Rare chance for any skill training | 2.22 | IV |
| 3 | Lack of scientific knowledge on rearing of day old chicks | 2.51 | I |
| 4 | Lack of scientific skills on poultry production | 1.86 | V |
| 5 | Lack of any strong mechanism for TOT | 2.37 | II |

The data in the above table reveal that lack of scientific knowledge on rearing of day old chicks was the major constraint (mean score: 2.51), followed by lack of mechanism for transfer of technology (ToT) (2.37), ignorance about source of supply of inputs and supporting agencies (2.30), lack of access to training/ skill upgradation programmes (2.22) and lack of scientific knowledge on poultry production (1.86).

Fig. 2-3. Vaccination of poultry birds by farm women

## 2.2 Technology Application and Gender Mainstreaming in Agriculture for Developing a Model Village

**Sabita Mishra, S. Agarwal, A. K. Shukla, Anil Kumar, H. K. Dash, J. Nayak and G. Moharana**

Based on the need assessment through focused group, a multifaceted intervention module was planned to make it a model village.

Rice is the major crop cultivated in 400 acres in both *kharif* and *rabi* seasons in Giringaput village. The gender analysis indicated that women continued to perform conventional method of rice planting which is a time consuming and drudgery prone activity. A comparison of the improved method with the conventional method revealed that promotion of line planting alone increased 15 to 20% paddy yield. The area under line planting in the ensuing *rabi* season has increased significantly from the normal *rabi* season area in the village. Men are involved in carrying seedling to main field (80.20%) and stretching rope for line planting (49%). The ergonomical assessment of activities performed by the farm women revealed that 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. Despite strong extension delivery mechanism and incentives as rendered by government under several schemes, farmers are yet to catch up even with the least cost technological interventions. More popularization efforts and reinforcement mechanisms are required for realizing higher paddy productivity.

Nutrition and livelihood intervention of elephant foot yam, mushroom and backyard poultry were introduced. It was decided to introduce acrid free elephant foot yam of *Gajendra* variety.The farm women were encouraged to adopt this tuber crop as it requires less water and are resistant to diseases. It has also high nutrient content. About 360 kg of planting material was distributed among 60 farm families @ six kg of planting material per family. The training on scientific package of practices was imparted to the farm women. After six months, the crop was harvested and the yield ranged from 48-50 kg/family which costs around Rs 1500/- to Rs 1800/- in a season with investment of Rs. 200/-. It was observed that all the 60 farm women had stored their own seed for the next season for homestead utilization.

The lean period of the farm women and the availability of local resources were studied in the model village. It was found that the women remain unemployed after kharif season (December to May) and the available resources are: leisure time, paddy straw, homestead land and pulse powder. Training-cum-demonstrations on mushroom cultivation to build the capacity of the women for income generation were undertaken. The group utilized their homesteads to grow straw

Fig. 4-5. Demonstration on mushroom cultivation

Fig. 6. Training programme on 'Fodder production and rejuvenation of cashew orchard'

mushroom with 50 beds where DRWA had provided good quality spawn as critical input. It was observed that the farm women could obtain a profit of Rs.50/- per bed within one month against investment of only Rs.30/-. The average yield was 1kg per bed totaling 50kg, out of which 30kg was kept for family consumption and the rest-20kg sold @Rs.60/- per kg. The women faced no constraint in selling the mushroom and got hard cash which promote economic activities. Through mushroom cultivation, there was supplementary family nutrition and income. Hence, there is ample opportunity for undertaking mushroom cultivation as one of the women friendly agro-enterprise provided quality spawn will be available in rural areas.

The existing backyard poultry rearing practices of tribal women of Giringaput village were studied to identify the opportunities and constraints and initiate them into scientific backyard poultry keeping. Based on the focused group discussion held with the women farmers, constraints in backyard poultry were identified as high incidence of diseases, non-availability of improved strains of birds, high cost of feed, lack of proper housing, low hatching and attack by predators. Ten women were initiated into scientific backyard poultry by providing them with 20 chicks of dual purpose breed (colour cross) developed by Central Poultry Development Organization, Bhubaneswar. The women were educated regarding importance of vaccination of birds, preparation of low cost poultry ration and need for proper housing.

Cattle rearing in Giringaput village is mainly based on grazing in open fields while supplementary feeding of only paddy straw is done with no green fodder or concentrate supplementation, resulting in low productivity of animals. The fodder cultivation was non-existent in the village. Therefore, a training programme on 'Fodder production and rejuvenation of cashew orchard' was organized in Giringaput village on 30th September, 2013 in which 36 farmers including 23 farm women participated. The farm women were educated about the importance of feeding green fodder to animals and the different types of fodder that could be grown in the villages. Planting material of hybrid napier and fertilizers were distributed among the farm women on this occasion. Seven farmers who owned cattle, planted the hybrid napier in their backyard for feeding the livestock.

The farm women of Giringaput village were found to be involved in perboiling of paddy which is one of the major post harvest activities performed by them traditionally. It is a tedious, drudgery prone activity

Fig. 7. Demonstration of paddy parboiling unit

and requires 12-16 hrs/day to parboil about 30-35 kg of paddy. The effect of load carriage, improperly adopted postures and repetitive movements throughout the whole parboiling process induces a lot of drudgery. A paddy parboiling unit developed by CRRI, Cuttack was introduced. Data revealed that the improved method helped in saving time, fuel, energy and reduces drudgery. However, the heavy weight of the equipment posed a problem.

## 2.3 Gender Work Participation Scenario in Agriculture

H.K. Dash and Ananta Sarkar

### 2.3.1 Female work participation scenario

The project 'Gender work participation scenario in agriculture' proposes to study the trend and structure of work participation and understand the gender dynamics in selected cropping and livestock systems. The project will thus help the researchers identify the changing pattern of gender participation in the economy and agriculture, understand the underlying factors better and likely consequences. As per census data (2011), the female Work Participation Rate (WPR) declined slightly from 25.6% in 2001 to 25.5% in 2011. Among the States and UTs, in 2011, Delhi had the lowest female WPR (10.58%) followed by Lakshadweep (10.96%), Punjab (13.91%), Daman & Diu (14.89%), Chandigarh (16.0%) and Uttar Pradesh (16.75%). On the other hand, Himachal Pradesh had the highest female WPR (44.8%) followed by Nagaland (44.74%), Sikkim (39.57%), Manipur (38.58%), Mizoram (36.2%), Andhra Pradesh (36.16%) and Arunachal Pradesh (35.44%). Among the States and UTs, 15 showed a decline and 20 showed an improvement in the female WPR between 2001 and 2011. Some of the States and UTs that registered considerable decline in female WPR are Dadra and Nagar Haveli (13.5 points), Mizoram (11.4 points), Haryana (9.4 points), Punjab (5.10 points), Gujarat (4.5 points), Daman & Diu (3.7 points) and Jammu & Kashmir (3.3 points). The states and UTs which registered an improvement in female WPR during the period are Nagaland (6.7 points), Lakshadweep (3.7 points), Kerala (2.8 points), Jharkhand (2.7 points), Odisha and Tripura (2.5 points) (Fig. 8.).

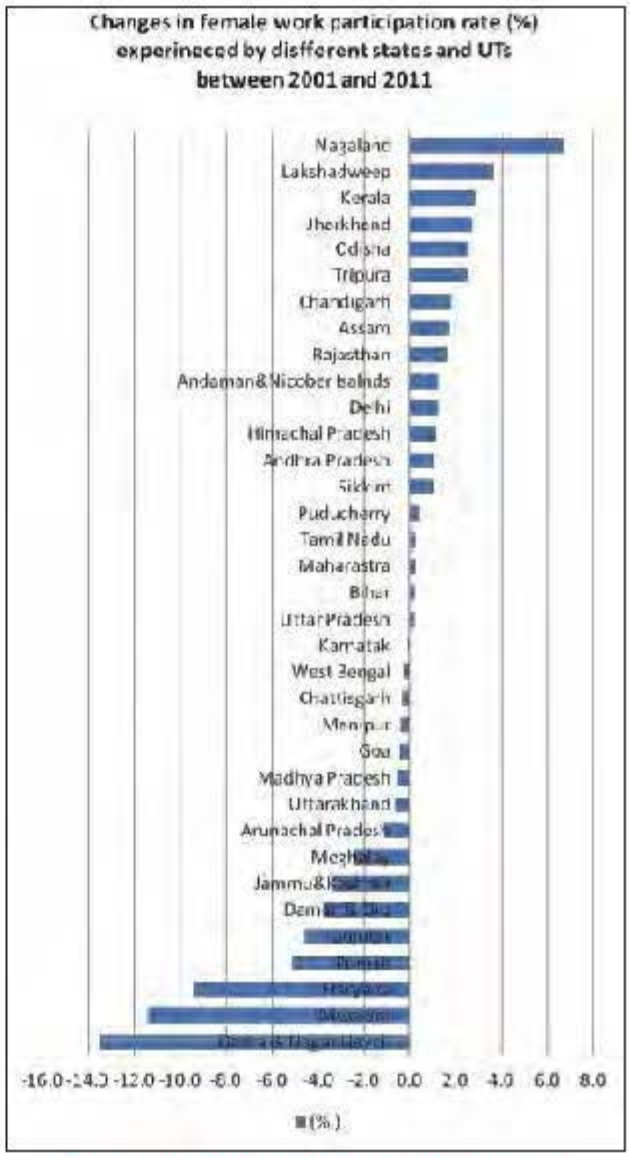



Fig. 8. Change in female work participation rate in different States and UTs during 2001 and 2011

### 2.3.2 Gender gap in work participation

Gender gap in work participation rate, which is measured as the difference between male WPR (percentage of workers in working age male population) and female WPR (percentage of workers in working age female population), is an important indicator for gender equality in work participation. Ideally, gender gap should decline with development. The available data suggest that between 2001 and 2011, the gender gap in work participation rate has widened at the national level and in many states. At the national level, the gender gap of 26 points in 2001 increased to 27.7 points in 2011.

Based on the extent of gender gap, states and UTs were categorized into low (< 15% points), moderate (15-24.9% points) and high (25% points and above) categories. According to Census 2011, out of 35 States and UTs in India, only 5 had low gender gap, 9 had moderate gender gap, 21 had high gender gap as against 7, 10 and 18 States/UTs, respectively in 2001. Chattisgarh and Mizoram which were in 'low gender gap' category in 2001 slipped into 'moderate gender gap' category in 2011. Haryana, Dadra and Nagar Haveli and Karnataka which were in 'moderate gender gap' category in 2001, slipped into 'high gender gap' category in 2011. During the period, 26 States and UTs showed a widening of gender gap in WPR to varying degrees, indicating deterioration of gender equality. Some of these are: Dadra & Nagar Haveli (12.7points), Daman & Diu (9.7 points), Haryana (9.6 points), Gujarat (6.8 points), Punjab (6.7 points) and Mizoram (6.4 points). Decline in female WPR is the major reason for deterioration in gender parity in work participation in the above States and UTs. In some States like Daman & Diu, Gujarat, Manipur, Uttarakhand, Tripura and Madhya Pradesh, increase in male WPR, though a positive development, contributed to widening of gender gap. Only a few States and UTs, *viz.*, Chandigarh, Bihar, Arunachal Pradesh, Kerala, Andhra Pradesh and Jharkhand showed a decline in gender gap in work participation.

### 2.3.3 Gender composition of scientific manpower in ICAR system

Data on scientific manpower in the ICAR system until 31st December, 2013 were collected from IASRI and analyzed to understand the trend and changing composition of gender in scientific manpower. The total number of scientists in ICAR institutes was 4725 of which 17.4% were women. Age-group wise distribution of scientists indicates that majority of the women scientists (46.3%) belong to age group of 35-50 years, followed by 33% in less than 35 years category. Most of the male scientists (over 87%) are over 50 years of age. Discipline-wise classification of scientists was done to know the distribution of scientists, both male and female into different disciplines like agriculture, animal science, fishery science and agriculture engineering. Domicile based analysis of the data indicate that about 35% of male scientists are from north and 30% from south, while 45.5% of female scientists are from south while 32.8% are from north. The share of female scientists in ARS has been increasing over the years, which is a positive sign towards engendering agricultural research.

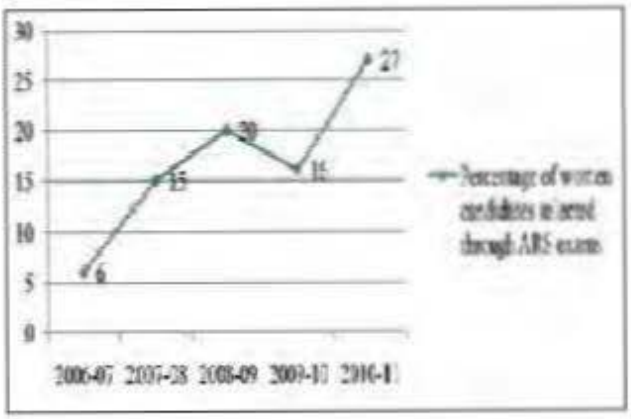



Fig.9. Percentage of women candidates selected through ARS exams

## 2.4 Study on Gender Related Indices in Agriculture

**Ananta Sarkar and H.K.Dash**

Literature on nine gender related indices -Gender Parity Index (GPI), Gender Inequality Index (GII), Global Gender Gap Index (GGGI), Gender related Development Index (GDI), Gender Empowerment Measure (GEM), Gender Equity Index (GEI), Women's Empowerment in Agriculture Index (WEAI), Social Institutions and Gender Index (SIGI) and Women's Economic Opportunity Index (WEOI), were collected and reviewed. The indices were classified based on the source, dimensions and indicators considered in computation of the indices, formulae, value range and interpretation. Significant dimensions considered were education, health, leadership, participation and income. In addition, the dimensions related to production, resources, time and decision were also considered in WEAI, SIGI and WEOI. The WEAI was found to be the most suitable for measuring empowerment of women in agriculture. Conceptual frameworks for developing new indices related to different dimensions of empowerment of women in agriculture, farming systems and gender friendly technologies have been prepared.

**Table 2. Classification of indices based on dimensions**

| | Dimensions of gender related indices | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Index** | **Education** | **Health** | **Leadership** | **Participation** | **Income** | **Production** | **Resources** | **Time** | **Decision** |
| GPI | √ | | | | | | | | |
| GII | √ | √ | √ | √ | | | | | |
| GGGI | √ | √ | √ | √ | √ | | | | |
| WEAI | | | √ | √ | √ | √ | √ | √ | √ |
| GDI | √ | √ | | | √ | | | | |
| GEM | | | √ | | √ | | | | |
| GEI | √ | | √ | √ | √ | | | | |
| SIGI | | √ | | | | | √ | | √ |
| WEOI | √ | √ | | √ | √ | √ | √ | √ | √ |

## 2.5 Assessment of Sustainable Livelihood Interventions and Entrepreneurial Skills among Coastal Women Self Help Groups using Participatory Methodologies (Externally Funded by the Indian Council of Social Science Research, New Delhi)

**J. Charles Jeeva**

Need-based sustainable livelihood interventions required for the coastal women's self help groups, resource availability, marketing scope, and sustainability issues of the livelihood interventions were identified and documented. Assessment of the entrepreneurial skills for managing micro-enterprises using participatory tools was also completed using a sample of 240 women representing 24 self help groups from eight fishing villages in four coastal districts of Kerala viz., Kollam, Ernakulam, Trichur and Kannur. Data on the village resources and other basic details of the sampling locations were collected through PRA tools.

### 2.5.1 Socio-economic profile of women SHG members in coastal areas

The average age of the women SHG members was 45 years. Nearly 75% of the respondents were educated upto higher secondary school level and none was illiterate. All the respondents were married. A declining trend in joint family system was observed among the fishermen communities in the study area, as almost all the respondents belonged to nuclear families with an average family size of four. The average annual family income was Rs. 1,95,000/- with the self income of Rs. 48,000/-. The mean value of assets was Rs. 13.57 lakhs and the value of household articles was Rs. 59,000/-. On an average, the respondents were indebted upto Rs. 2.83 lakhs. More than 95% of the

Fig.10. Documenting the socio-economic profile of women's SHG members

respondents reported that the 'decision making pattern' was jointly by men and women in the family.

### 2.5.2 Potential alternate livelihood options

Considering the availability of resources, the potential livelihood options preferred were, aqua-tourism based micro-enterprises and oyster cultivation on small-scale basis (Fig. 11). Through the need-

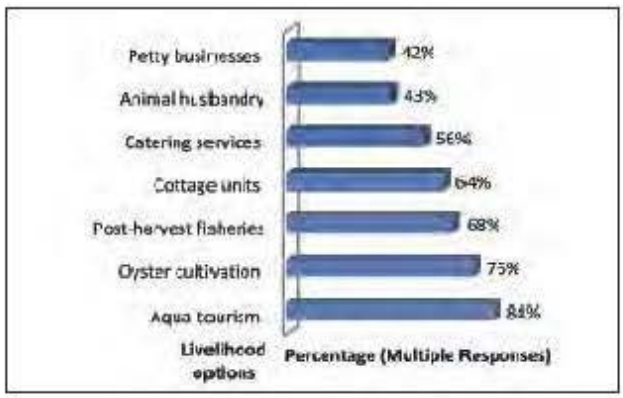



Fig. 11. Potential livelihood options preferred by coastal SHGs

assessment, the other potential microenterprises suitable for coastal women self help groups were identified such as: post-harvest fishery activities-dry fish preparation, preparation of value added fishery products, fish/prawn feed manufacture and fish marketing; other small-scale/ cottage units such as tailoring, pickle making, candle making, artificial flower making, soap making, DTP units, rice flour making, jute product making, cora-grass product making, traditional art/ handicrafts making units etc. In addition to that, alternate livelihood options like catering services, animal husbandry and petty businesses also supported their well-being. Marketing channels adopted were mainly wholesalers, retailers, door-to-door sale and homesteads. Nearly 60% of the respondents preferred 'wage earning' rather than starting their own microenterprises due to their low level of risk bearing ability.

Fig.12. Successful livelihood activities of women self help groups

### 2.5.3 Entrepreneurial skills of women's SHGs in coastal areas

The entrepreneurial's skills for managing the micro-enterprises and the group performance among fisherwomen self help groups were assessed using a participatory monitoring and evaluation tool viz., 'H form method' (Fig. 13).

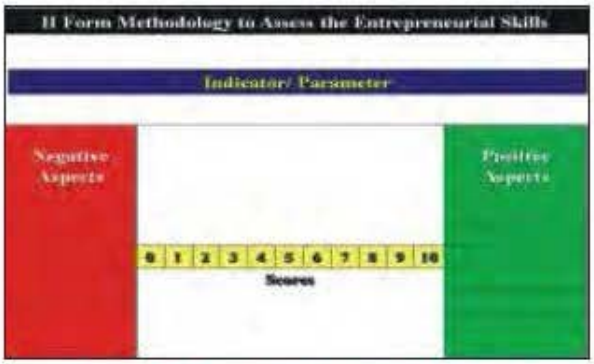



Fig. 13. Conceptual diagram of 'H Form'

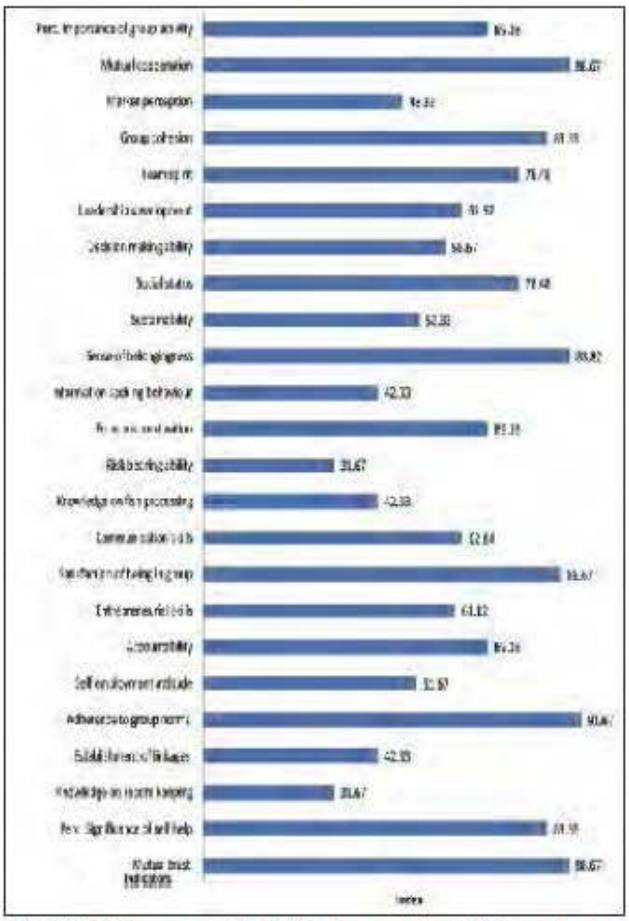


Fig.14. Entrepreneurial skills of women's SHG members

The results of the evaluation (Fig.14) were encouraging with respect to the parameters viz., adherence to the norms and values of the group (mean index: 91.67%), sense of belongingness/ 'we' feeling (88.82), mutual trust among the group members (88.67) and mutual cooperation (88.67). The group performance index was observed to be low with respect to the indicators such as, knowledge on record keeping (31.67), risk bearing ability (31.67), establishment of linkages with external institutions (42.33), knowledge on fish processing (42.33) and information seeking behavior (42.33). Policy development to support the women in coastal ecosystem requires appropriate institutional arrangements, which extends assistance in the areas of training, credit, technology and marketing through SHGs. Focus on the strengthening of fisheries cooperatives, including the promotion of those of fisherwomen, making it necessary to link microfinance to appropriate technology development and transfer and organized markets are crucial for the success of women's microenterprises.

## 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

Available household ashes viz., paddy straw ash, cow dung ash, maize cob ash, pigeon pea wood ash, household chulha ash and fly ash (Fig. 23) each @ 10, 20 and 30 g/kg of pigeon pea, along with standard check, sand @ 600 gm/kg and neem oil @ 5ml/kg, were tested for their efficacy against *Callosobruchus chinensis* Linn. during storage. *Callosobruchus chinensis* stock culture was maintained in the laboratory in earthen pots throughout the period of experimentation and used for infestation in the experiment. Infestation free healthy seeds of pigeon pea (one kg) were sun-dried and kept in earthen pots. Seeds were then thoroughly mixed with different treatments. Ten mating pairs of *Callosobruchus chinensis* were collected from stock culture and released into each earthen pot. Thereafter, the pots were covered with muslin cloth and fastened tightly with the help of rubber band and kept in the laboratory at ambient. Observation on test weight, number of eggs laid per 100 seeds and number of bored seeds was recorded at monthly interval up to seven month of storage. Weight loss of the seeds was recorded at the end of the experiment. Seed weight loss was computed by the formula as suggested by Harris and Limblad (1978).The data was analyzed through Duncan's Multiple Range Test for test weight loss and for percent damage.

On the basis of the Duncan Grouping, the best treatments that showed less than 10% test weight loss were- cow dung ash (30 gm/kg), paddy straw ash (30 gm/kg), paddy straw ash (20 gm/kg), maize cob ash (30 gm/kg), paddy straw ash (10gm/kg), maize cob ash (20 gm/kg), pigeon pea wood ash (10 gm/kg), pigeon pea wood ash (20 gm/kg) and household chulha ash (20 gm/kg) which showed 4.74, 4.96, 4.98, 5.20, 6.01, 6.16, 6.82, 7.66 and 9.50 percent loss, respectively. However, these treatments do not differ significantly among themselves. Therefore, farm women can use any of the above treatments for the storage of pigeon pea. There was no significant difference on the number of eggs laid and number of bored seed per 100 seeds at monthly interval basis. Effect of various treatments on the pigeon pea weight loss caused by *Callosobruchus chinensis* during storage is given in (Fig. 16).

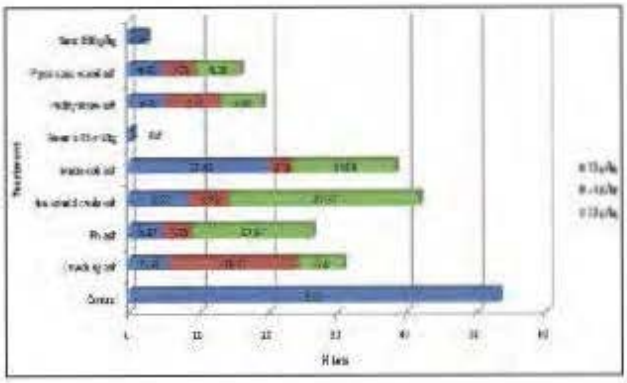


Fig. 16. Different ashes used during storage of pigeon pea



Fig. 16 . Effect of various treatments on percent weight loss caused in pigeon pea by *Callosobruchus chinensis* during storage

These treatments can be easily adopted by the farm women for the storage of pigeon pea up to seven months without any pesticidal hazard. Farm women were also exposed to all the treatments and they were sensitized regarding efficacy of treatments and could see that neem oil 5ml/kg was the most effective treatment, followed by sand 600 gm/kg and maize cob ash 20 gm/kg for storage of pigeon pea (Fig. 17).

Fig. 17 . Exposure of farm women to various treatments for pigeon pea storage

## 2.7 Identification of Gender Issues in IPM and Suitable Intervention with Women Perspective

S.K. Srivastava, M.P.S.Arya, Naresh Babu and Sabita Mishra

The interview schedule for the identification of gender issues in IPM and suitable intervention with women's perspective was developed and pre-tested for modification and finalization. Resource persons from the KVKs were identified and data collection in four agro climatic zone of Odisha was initiated. Ten KVKs from each agro-climatic zones of Odisha have been identified for collaboration, and to give agro-climatic zone based intervention on IPM in identified crop/vegetable. A Stakeholders' Meet was organized on 12th-13th September, 2013, with the aim of understanding the problems of farmers/ farmwomen in IPM and to bridge the technological gap through institutional mechanism.

The Meet was attended by 27 stakeholders including Programme Coordinators and Plant Protection Officers / District Agriculture Officers of all 10 agro climatic zones of Odisha, scientists of Orissa University of Agriculture and Technology and Plant Protection Officer of Central IPM Centre, Govt of India. A multi-institutional participatory conceptual model for IPM was proposed, discussed and the action plan was finalized (Fig. 18). The concept of *Krishi Rakshak* - one male and one female in each of the selected villages was proposed. These *Krishi Rakshaks* will work as a link between the village and the Institutes for the implementation of various activities in the village, for which they will be trained. Multi-institutional action points, responsibilities, time frame and benefit sharing were also finalized. Training was imparted to *Krishi Rakshaks* on identification of pests, scouting, monitoring and their eco-friendly management. A field visit was also made to identify the constraints of the standing crop of urd/moong. Constraints identified during the visit such as lack of participation in the on-farm pest management practices due to social taboos and those raised by the farm women during the training such as lack of exposure to training, lack of access to technical information on IPM and non availability of sprayers/ technical inputs were also documented.

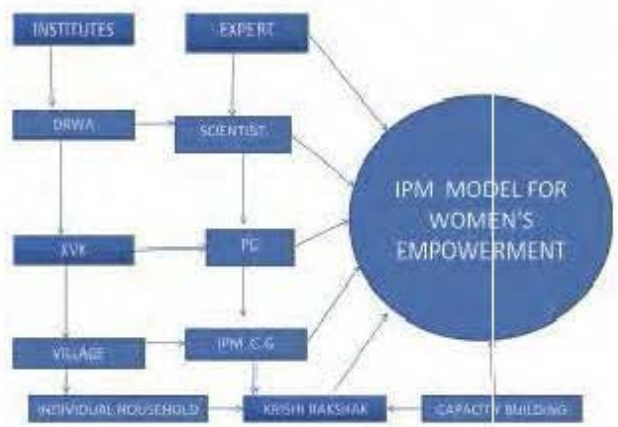



Fig. 18. Multi-institutional participatory conceptual model for IPM

Nagori leaf | Poiang leaf

Poiang tree | Bagoria leaf

Fig. 19. Locally used plants for storage pest management

## 2.8 In-vitro Multiplication of Pointed Gourd and Pineapple for Income Enhancement of Farm Women

A. K. Shukla, Naresh Babu, L. P. Sahoo and Kundan Kishore

Sterilized explants of pine apple were cultured on solidified MS medium, supplemented with various combinations of Benzylaminopurine (2.5 to 10.0 mg/l) and Naphthalene acetic acid (1 to 4 mg/l) hormones. The best initial micro-shoot response was obtained when the explants were cultured on the medium containing BAP 2.5 mg/l and NAA 1.0 mg/l

### 2.8.1 Optimization of method to alleviate in-vitro shoot tip necrosis in *Trichosanthes dioica* Roxb

Shoot tip necrosis (STN) was observed to be the major limiting factor for *in-vitro* regeneration of *Trichosanthes dioica*. The intensity of necrosis at shoot multiplication stage was relatively higher (82%) compared to rooting stage (64%). The necrosis

Fig. 20-21 & 22. Optimization of method to alleviate in-vitro shoots tip necrosis in pointed gourd, capacity building of farm women

appeared after a week of first subculture (14 days) manifesting with yellowing of apical leaves and increased progressively, resulting in leaf burn and death of more than 80% of cultures within five weeks. Among various parameters *viz.*, sub culturing intervals, manipulation in media salt strength, levels of plant growth regulators, sucrose, calcium and boron tested to control STN, only calcium significantly alleviated the intensity of necrosis. Transfer of effected cultures to Murashige and Skoog medium, supplemented with 0.68 mm calcium chloride, reduced the STN intensity by 90% both at shoot multiplication and rooting stages. Additionally, calcium supplemented medium gave maximum multiplication index and axial and lateral shoot length. Apart from calcium sub culturing interval, boron (0.64M) also reduced the incidence of STN, though at a lower level (up to 24%). Sub culturing at one week interval had 52% STN incidence compared to sub culturing at two week (85%) and three week intervals (100%).

## 2.9 Development of Resource Efficient Horticulture Model for Livelihood Improvement of Rural Women

A. K. Shukla, Naresh Babu, S. K. Srivastava, Abha Singh and Kushagra Joshi

The low per capita income and subsistence production system act as catalysts for poor livelihood of farming community. Hence, a resource efficient horticulture-based model is being developed to improve the income of the rural people (15-25%) and generation of employment opportunities (10-20%). An area of 2000 $m^2$ is being used with different components like high density banana, meadow orcharding of guava, high density planting of papaya, pineapple, lime and diffecrent green leafy vegetables *viz.*, coriander, menthi, palak and amaranth; roots and tuber crops *viz.*, elephant foot yam, yam and colocasia and other vegetables *viz.*, tomato, brinjal, cauliflower, chilli, cowpea and French bean. The main objective of the model is to increase crop productivity and profitability, with increased resource use efficiency.

### 2.9.1 Development of Resource Efficient Horticulture Model

Different components of the resource efficient model-consisting of various components like high density planting of banana, meadow orcharding of guava, high density planting of papaya, pineapple, lime, growing of vegetable crops in open field and protective condition, tuber crops etc. were evaluated.

#### 2.9.1.1 Study on mulching in tomato, brinjal, chilli and cabbage

In tomato, brinjal, chilli and cabbage four different mulches *viz.*, $M_0$, $M_1$, $M_2$ and $M_3$ representing no mulch, mulching with transparent polythene, black polythene and with locally available Glyricidia leaves were used. Observations revealed that black polythene (0.25 mm thickness) was the most effective, as it registered significantly higher fruit yield 4.42kg/plant in tomato, 3.64kg in brinjal, 312g in chilli and 654g weight of head in cabbage with negligible weed growth (1.97g/$m^2$ dw) than other mulches. Number of fruits/ head weight and water use efficiency under black polythene mulch and Glyricidia leaves was statistically at par. It has been observed that mulching with black polythene plot registered significantly lower weed dry weight (67.3% less) than control.

**Table 3. Effect of different mulching on yield and weed growth and weed control efficiency in tomato, brinjal, chilli and cabbage**

| Treatment | Yield (per plant) | Weed growth ($g/m^2$ dw) | Weed control efficiency (%) |
|---|---|---|---|
| **Tomato** | | | |
| $M_0$ No mulch | 3.60 | 75.60 | - |
| $M_1$ Mulching with transparent polythene | 3.58 | 34.80 | 61.43 |
| $M_2$ Mulching with black polythene | 4.42 | 1.97 | 87.54 |
| $M_3$ - Mulching with locally available *Glyricidia* leaves | 4.25 | 2.60 | 75.60 |
| **Brinjal** | | | |
| $M_0$ No mulch | 2.18 | 78.60 | - |
| $M_1$ Mulching with transparent polythene | 2.57 | 44.80 | 64.35 |
| $M_2$ Mulching with black polythene | 3.84 | 2.98 | 82.30 |
| $M_3$ - Mulching with locally available *Glyricidia* leaves | 3.59 | 4.60 | 77.28 |
| **Chilli** | | | |
| $M_0$ No mulch | 210 | 82.60 | - |
| $M_1$ Mulching with transparent polythene | 246 | 34.80 | 64.75 |
| $M_2$ Mulching with black polythene | 312 | 3.57 | 85.10 |
| $M_3$ - Mulching with locally available *Glyricidia* leaves | 296 | 5.47 | 78.46 |
| **Cabbage** | | | |
| $M_0$ No mulch | 370 | 73.50 | - |
| $M_1$ Mulching with transparent polythene | 410 | 31.26 | 58.37 |
| $M_2$ Mulching with black polythene | 654 | 3.46 | 90.60 |
| $M_3$ - Mulching with locally available *Glyricidia* leaves | 626 | 5.84 | 84.60 |

### 2.9.1.2 Fertigation scheduling in tomato

Experiment was conducted on various major and micro nutrients *viz.*, N, P, K ,Ca, Mg, S, Fe, B, Cu, Mn, Zn and Mo on different stages: $S_1$- transplanting to 1st cluster, $S_2$-1st cluster to 2nd cluster, $S_3$-2nd cluster to 3rd cluster, $S_4$-3rd Cluster to 5th Cluster and $S_5$-5th cluster to termination stage of tomato. Doses of N, K, Ca, Mg and S were increased as the plant growth increased. The doses of rest of nutrients *viz.*, P 50 ppm, Fe 2.8 ppm, B 0.7, Cu 0.2, Mn 0.8, Zn 0.2 and Mn 0.05 ppm were applied from transplanting to termination of crop.

Fig. 23. Exposure visit of farm women

### 2.9.1.3 Evaluation of protected cultivation of cucumber and capsicum

Under the hot and humid tropical climate of Odisha, vegetable cultivation is difficult in summer and rainy seasons. Cucumber and capsicum are very important vegetable crops having lot of demand. To evaluate the performance of cucumber and capsicum under protected conditions, an experiment was conducted on two promising varieties each of cucumber (Kion and Hilton), and Swarna and Natasa of capsicum. Observation on number of fruits and yield were recorded. Among these varieties, more yield was recorded in Kion (4kg/ plant) variety of cucumber and Swarna (1.5kg/ plant) variety of capsicum.

Fig. 24. Protected cultivation of tomato

Fig. 25. Protected cultivation of cucumber

### 2.9.1.4 Intercropping in banana

Different intercropping i.e. cowpea, amaranthus (leafy vegetable), elephant foot yam and radish in banana along with a control (Banana sole crop) were evaluated. Among the intercrops, banana + cowpea gave the with maximum bunch weight (21.32 kg) and yield per ha (52.84 MT). Maximum additional income could be earned from elephant foot yam-about Rs. 80000/- per ha/year, followed by cowpea (Rs 45000/-).

Table 4. Yield and economics of banana based intercropping system

| Treatment | Fruit yield (t/ha) | Intercrop yield (t/ha) | Gross return (Rs/ha) | Total cost of cultivation (Rs/ha) | Net return (Rs/ha) |
|---|---|---|---|---|---|
| Banana (Sole) | 61.24 | - | 118110 | 82540 | 35570 |
| Banana + cowpea | 52.17 | 7.20 | 143190 | 98190 | 45000 |
| Banana + Amaranth | 52.84 | 8.45 | 129204 | 88560 | 40844 |
| Banana + Elephant foot yam | 64.53 | 22.12 | 286543 | 206543 | 80000 |
| Banana + Radish | 55.40 | 13.67 | 160700 | 118200 | 42500 |

### 2.9.1.5 Nutrient management in banana

A field experiment was conducted to find out the effect of organic and inorganic inputs on growth, yield and quality of banana variety G-9. Seven treatments *viz.*$T_1$- fresh cow dung @ 500g/ plant; $T_2$- fresh cow dung @ 250g/ plant + pond soil@ 250 g; $T_3$-fresh cow dung @ 500g /plant + 5g urea; $T_4$- 500g fresh cow dung + 5g ammonium sulphate, $T_5$- 500g fresh cow dung + 10g sulphate of potash, $T_6$- fresh cow dung @ 500g/plant + 5g ammonium sulphate and 10g sulphate of potash and $T_7$-removal of male bud after completion of female phase (control) were applied to the selected plants. An application of 5g ammonium sulphate and 10 g sulphate of potash blended with 500g of fresh cow dung to the distal end of bunch showed 20% higher fruit yields and 22 days earlier fruit maturity in fruit yields as compared to control in G-9 variety of banana.

**Table 5. Effect of organic and inorganic inputs on fruit yield and quality of banana variety Grand Naine (G-9)**

| Treatments | Number of fruits/ bunch | Weight of fruit (g) | Fruit size (cm) Length | Breadth | Yield (kg/ bunch) | Maturity period (days) |
|---|---|---|---|---|---|---|
| 500g fresh cow dung | 67.34 | 104.24 | 11.02 | 3.31 | 18.80 | 115.20 |
| 250g fresh cow dung + 250g locally available pond's soil | 72.42 | 116.30 | 11.31 | 3.41 | 20.46 | 110.67 |
| 500g fresh cow dung + 5g urea | 113.00 | 123.96 | 12.20 | 3.55 | 20.08 | 110.56 |
| 500g fresh cow dung + 5g AS | 89. 46 | 177.33 | 13.11 | 3.70 | 18.03 | 94.45 |
| 500g fresh cow dung + 10g PS | 49.68 | 106.06 | 10.10 | 3.29 | 17.46 | 106.36 |
| 500g fresh cow dung + 5g AS +10g PS | 46.79 | 96.75 | 10.02 | 3.12 | 22.10 | 100.20 |
| Control | 42.54 | 52.43 | 9.35 | 3.04 | 17.38 | 122.76 |

Note: AS (Ammonium sulphate), PS (Sulphate of potash)

### 2.9.1.6 Meadow orcharding of guava

In meadow orcharding, production starts from the very first year of planting and the productivity is higher with superior fruit quality besides the ease of plant management. In this method, planting of guava accommodates 5000 plants /ha at 1.0 x 2.0 m spacing. The plant canopy was managed judiciously with regular pruning. Plants were topped after 2 months of planting i.e. in the month of October. After appearance of new shoots, 50% of the shoots were pruned again in December-January for further induction of new shoots. Growth was initiated, flower differentiates, and well spread plant canopy was attained by the end of May. An average fruit weight of 123.45g and yield of 0.5 kg/plant was recorded.

**Table 6. Meadow orcharding of guava**

| S. No. | Parameter | Number |
|---|---|---|
| 1 | Plant Intensity | 5000/ha |
| 2 | Plant spacing | (1.02 x 2.0)m |
| 3 | Pruning | 50% |
| 4 | Fruit weight | 123.45g |

Fig. 26-27. Meadow orcharding of Guava

### 2.9.1.7 Economic feasibility of the horticultural model

Even after the severe damages caused to the eco-system by cyclone *Phailin* in October, 2013, this model sustained and gave 790 kg fruits (banana- 530 kg, papaya- 210 kg and guava-50kg), 275 kg green leafy vegetables (amaranth, coriander leaves, fenugreek leaves and palak), 280 kg root and tuber crops (radish, elephant foot yam, yam and colocasia) and 1490 kg other vegetables (bitter gourd, bottle gourd , cauliflower, capsicum, okra, tomato, brinjal, chilli, cowpea and cauliflower).

**Table 7. Nutrient contribution from different perennial fruits and vegetables**

| Crops | Total area ($m^2$) | Yield (kg) | Protein (g) | Fat (g) | Calcium (mg) | Iron (mg) | Carotene (µg) | Vitamin C (mg) |
|---|---|---|---|---|---|---|---|---|
| Perennial fruits | 420 | 790 | 8070 | 1950 | 130800 | 3320 | 1812000 | 596700 |
| Vegetables | | | | | | | | |
| Green leafy vegetables | 185 | 275 | 10195 | 1510 | 919800 | 8010 | 15369300 | 258850 |
| Roots and tubers | 195 | 280 | 1440 | 100 | 38000 | 720 | 37200 | 6000 |
| Other vegetables | 860 | 1490 | 24900 | 2990 | 394900 | 12882 | 2103500 | 445000 |
| **Total** | **1660** | **2835** | **44605** | **6550** | **1481500** | **24942** | **19322000** | **1306550** |

(Ref: Gopalan, C. *et al.*1991, Nutritive value of Indian foods, NIN, ICMR, Hyderabad)

**Table 8. Economic feasibility of horticultural crops**

| Crops | Total area ($m^2$) | Yield (kg) | Total Expenditure (Rs.) | Gross Income (Rs.) | Net Income (Rs.) | BCR |
|---|---|---|---|---|---|---|
| Perennial fruits | 420 | 790 | 5100.00 | 15800.00 | 10700.00 | 3.09 |
| Vegetables | | | | | | |
| Green leafy vegetables | 185 | 275 | 900.00 | 2750.00 | 1850.00 | 3.05 |
| Roots and tubers | 195 | 280 | 1200.00 | 2800.00 | 1600.00 | 2.33 |
| Other vegetables | 860 | 1490 | 9200.00 | 22350.00 | 13150.00 | 2.42 |
| **Total** | **1660** | **2835** | **16400.00** | **43700.00** | **27300.00** | - |

### 2.9.1.8 Gender friendly insect pest management in resource efficient horticultural model

In order to manage pests in a gender friendly manner in brinjal, Pheromone trap was installed on 13th December, 2013 and lure were replaced at an interval of 25 days. Maximum *Leucinodes* incidence was recorded in the second fortnight of January. However, the second peak incidence was observed in the third week of December. Population of the pests was brought down with the installation of Pheromone Traps which was found to be a gender friendly option of pest management that does not result in health hazards. During exposure visit of farm women this technology was shown to them and they were trained in installation of Pheromone trap and proper placement of Lure.

Fig. 28. Installation of Pheromone trap by farm women

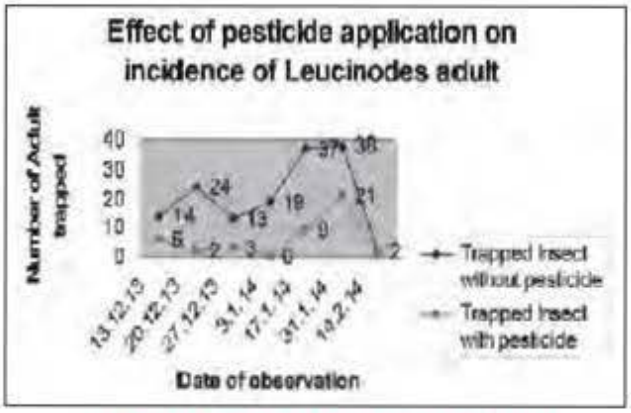



Fig. 29. Effect of pesticide application on incidence of leucinodes adult

### 2.9.1.9 Development of a model of vermicompost unit for recycling of bio mass in resource efficient horticulture model

A hi-tech and low cost model of vermicompost unit was developed and one pit was prepared for the need based herbal pesticide preparation. Green and herbal pesticides *viz.*, neem leaves and neem cake were soaked overnight prior to spraying. The pit can also be utilized for storing water for watering the vermicompost unit. The close proximity of both the structures reduces the farm women's work load of fetching the water to the composting unit from a distance. Another structure for collection of green farm waste has been also constructed for storing the green waste temporarily. It is then mixed with FYM in a proportionate manner for the decomposting to be done by earthworms, to enhance the soil structure and composition. Earthworm *Eisenia foetida* were released in the vermicompost unit for recycling of bio mass. Regular watering as and when required is done. Farm women were exposed to this technique during the Technology Week for Women in Agriculture organized at DRWA.

Fig. 30. Hi-tech vermicompost unit and pit for need based preparation of herbal pesticides

## 2.10 Enhancing Productivity of Fruit Based Cropping Models for Income Generation of Farmwomen

**Naresh Babu, A.K. Shukla and S.K. Srivastava**

Fruit based cropping models not only provide fresh vegetables and fruits for the family but could also generate income for the farm family. Participation of women is less in established orchards but it can be enhanced by undertaking various types of intercrops of vegetables.

### 2.10.1 Development of multi-storey cropping model in coconut

To develop fruit based cropping model an effort was made to standardize suitable intercrops in coconut based multistorey cropping model with banana, papaya and guava as the second storey crops. Different ground storey intercrops like cowpea, turmeric, elephant foot yam and pineapple were taken in the interspaces of the main crop. Observations revealed that intercropping did not show any adverse effect on increment in the height of plant, girth of trunk and area of canopy spread of main crop as well as second storey crops. Growth of second storey crops was also not influenced by intercropping. Among the different intercropping combinations, highest yield were recorded by turmeric (180.46 q/ha) followed by elephant foot yam (150. 20q/ha). Yield of cowpea was recorded 52.30 q/ha from July to September.

Table 9. Yield of ground storey crops under multistorey cropping model in coconut

| Plot No | Crop | Yield (q/ha) | Period |
|---|---|---|---|
| 1. | Cowpea-Coriander | 52.30<br>12.10 | July-September<br>October-January |
| 2. | Turmeric-Okra | 180.46 | June -January/February |
| 3. | Elephant foot yam-<br>Cowpea | 150.20<br>16.60 | July- December<br>January |
| 4. | Pineapple | 260.00 | May-June |

Fig. 31. Multistorey cropping model in coconut

**Table 10. Layout of the model**

| S. No. | Main Crop | Spacing |
|---|---|---|
| 1 | Coconut (main crop) | 6.0 x 6.0 m |
| 2 | Banana, Papaya, Guava (second storey crops) | 3.0 x 3.0 m |
| 3 | Pine apple, | 60 x 60 cm |
| | Elephnat foot yam, | 60 x 60 cm |
| | Cow pea, | 40 x 20 cm |
| | Turmeric (ground storey crops) | 60 x 60 cm |

### 2.10.2 Scouting of insect pest and their management in coconut

Bucket traps were installed for the management of pest in coconut orchards. After installation of traps on 30th December, 2013, mixed incidence of Rhinoceros Beetle (*Oryctes rhinoceros*) and Red Palm Weevil (*Rhyncophorus ferrugineus*) was recorded. Since installation, total number of Red Palm Weevil and Rhinoceros Beetle trapped were 42 and one, respectively. Continuous trapping of Red Palm Weevil indicated presence of overlapping generations of the pest. Various stages like larvae and pupae were recorded continuously in the field. Farm women were trained in installation of the trap and for the right placement of RB lure and RPW lure in the trap, i.e. at the height of 4 feet from ground. Basically, the trap is placed at the branch initiation point which varies from tree to tree.

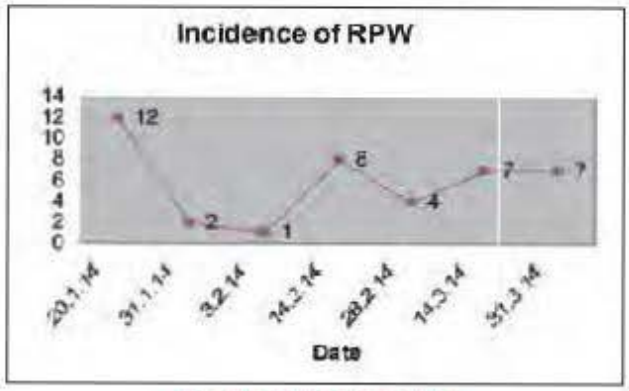



Fig. 32. Incidence of RPW

Fig. 33. Installation of Bucket Trap by the farm women

### 2.11 Technological Empowerment of Farmwomen in Production of Quality Seeds and Planting Materials of Vegetables

**Laxmi Priya Sahoo**

Four villages were identified for participatory research. Two rainfed villages of Khurda district were selected for seed production of vegetables in home steed garden. One irrigated village was identified for production of seeds on commercial scale. A village predominantly growing pointed gourd was selected for production of planting materials. Ten farm women from each village were identified for participation in the project. Seed production programme involving farmwomen was planned based on access to good quality source seed, seed requirement, resource availability, skill and scope of marketing.

Seeds of open pollinated varieties of different vegetables and parental lines of brinjal hybrids were obtained from Division of Seeds Science and Technology, IARI, New Delhi. Skill training was imparted to farm women on different activities like planting, rouging, seed collection, planting material production, time of harvest, seed extraction, seed processing, labelling, packing and micropropagation to enable them to take up seed production. Later,

seed production was taken up by 40 women in different modes such as seed production in homestead garden in rainfed area of Simore and Kantamalim villages in Khordha district and in the irrigated area in large scale in the main field for production of French bean and cucumber seeds in Maldharpada & Padasahi of Cuttack and Khordha district respectively and planting material production and nursery preparation for both situations.

The crops taken up for seed production were : Brinjal (Var Utkal Tarini, Utkal Madhuri), Chilli (Var Utkal Abha), Tomato (Var BT-2, BT-10), Ridge Gourd, French Bean (Var Pant Anupam), Cowpea, Amaranthus (Var Arka Suguna), Okra and Pumpkin.

### 2.11.1 Evaluation of quality of seeds produced by farm women

Quality of produced seed before intervention of the project was tested for appearance and germination potential and termed as seed collection phase 0 or control ($S_0$). Subsequently, seeds were collected for two seasons and termed as seed collection phase 1 and 2 ($S_1$, $S_2$).

**Table 11. Seed production by farmwomen in homestead nutrition garden cum seed production unit of village Simore, District Khordha**

| Seed crops | Seed produced by Farmwomen (In Kg) | | | | | | | | | | Total village production (Crop wise) | Mean production (Crop wise) | Rank of seed producing crop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | | | |
| Amarantha | 1.80 | 5.00 | 2.00 | 2.00 | 1.00 | 0.50 | 0.30 | 0.50 | 0.20 | 3.00 | 16.3 | 1.63 | I |
| French Bean | | 0.50 | 0.25 | 0.10 | 0.25 | 0.05 | 0.05 | 0.05 | 0.10 | 0.03 | 1.38 | 0.153 | II |
| Okra | 0.20 | 0.25 | 0.02 | 0.10 | 0.05 | 0.05 | 0.05 | 0.05 | 0.10 | 0.25 | 1.12 | 0.112 | III |
| Cowpea | 0.10 | 0.05 | 0.20 | 0.10 | 0.05 | - | - | 0.05 | 0.03 | - | 0.58 | 0.083 | IV |
| Tomato | 0.05 | 0.05 | 0.02 | - | 0.10 | 0.02 | 0.05 | - | - | 0.10 | 0.38 | 0.054 | V |
| Pumpkin | 0.05 | - | 0.03 | 0.01 | 0.01 | 0.05 | 0.03 | 0.03 | 0.05 | 0.10 | 0.36 | 0.039 | VI |
| Ridge gourd | 0.25 | - | - | - | - | 0.03 | - | - | - | 0.05 | 0.325 | 0.108 | VII |
| Chilli | - | 0.01 | 0.25 | 0.01 | 0.01 | 0.02 | - | - | - | 0.01 | 0.31 | 0.052 | VIII |
| Brinjal | 0.02 | 0.03 | 0.02 | 0.01 | 0.05 | 0.02 | 0.02 | 0.02 | 0.05 | 0.01 | 0.24 | 0.024 | IX |
| Total (Farmer wise production) | 2.25 | 5.89 | 2.79 | 2.33 | 1.52 | 0.73 | 0.49 | 0.70 | 0.53 | 3.55 | 20.8 | 2.07 | |
| Mean (Farmer) | 0.35 | 0.84 | 0.35 | 0.33 | 0.19 | 0.09 | 0.06 | 0.12 | 0.09 | 0.44 | | | |
| Rank | III | I | IV | V | VI | VIII | X | VII | IX | II | | | |

**Table 12. Evaluation of quality of seeds produced by farmwomen of different crops at different seed collection phase**

| Crops | Germination Percentage (Percentage of farmers' seed samples) | | | | | | | | | Appearance of seed (colour and luster) in 10 point scale | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | <50% | | | 50-75% | | | >75% | | | | | |
| | $S_0$* | $S_1$ | $S_2$ | $S_0$ | $S_1$ | $S_2$ | $S_0$ | $S_1$ | $S_2$ | $S_0$ | $S_1$ | $S_2$ |
| Brinjal | 10 | - | - | 70 | 25 | - | 20 | 75 | 100 | 20 | 5-8 | 7-10 |
| Cowpea | - | - | - | 77.5 | 25 | - | 12.5 | 75 | 100 | 4-7 | 5-9 | 8-10 |
| Pumpkin | 15 | - | - | 50 | 58.5 | 12.5 | 14 | 42.5 | 87.5 | 3-6 | 5-8 | 8-10 |

*$S_0$- control or seed collection phase 0, $S_1$- seed collection phase 1, $S_2$- seed collection phase 2.

The results revealed that total amount of seed produced in the village Simore was 20.76kg in homestead nutrition garden cum seed production unit out of which Amaranthus was 78.5% followed by french bean (6.6%) and okra (5.4%). Farmer wise total seed production ranged from 0.49 to 5.89kg. However, it was observed that all the farmwomen contributed to total seed production.

The farmwomen were also trained for seed extraction and quality maintenance. Hence, the produced seed was sampled in-between for testing its viability and acceptability by external appearance. The results from Table 12 show that at $S_0$ (seed collection phase before intervention of the project), average of 77% seed samples were below seed certification standards out of which more than 10% were below 50% germination. In $S_1$, when seeds were sampled after one season of guided seed production, 36% of seed samples were below seed certification standard whereas in $S_2$, 95% seed samples were above seed certification standard. The skill upgradation of farm women had not only increased seed production, but also improved the seed quality.

Orientation training to farm women in micro-propagation was conducted from 4th-6th February, 2014. Ten farm women from Maldharpada village of Cuttack district were given exposure on different aspects of tissue culture. Visits were organized to tissue culture laboratories of OUAT and RPRC.

Fig. 34. Demonstration on seed extraction of tomato

Fig. 35. Demonstration on hybrid seed production


Fig. 36. Demonstration on Micropropagation

## 2.12 Physiological and Biochemical Changes in Stored Sunflower (*Helianthus Annuus*.L) Seeds as Influenced by Storage Conditions under Coastal Agroclimate of Odisha

**Laxmi Priya Sahoo**

The seed storage conditions of sunflower under coastal agro climatic condition, the effect of different storage containers on the physiological and biochemical changes of seed, better storage condition for maintenance of viability and vigour of sunflower seed and the relationship between changes in biochemical parameters and loss of germinability were studied.

Seeds of one hybrid (APSH 11), its parental lines( 234 A & 6 D-1), and two open pollinated varieties were procured from Directorate of Oilseed Research, Hyderabad. Data on sunflower seed storage practices was collected from sunflower growing areas of Basudevpur block of Bhadrak District of Odisha. Analysis was done in RBD with three replications. Observations were taken on moisture content, germination, seedling length, conductivity of seed leachate and enzyme activity (Dehydrogenase, peroxidase and volatile aldehydes).

Most of the cultivated areas were covered by hybrids. Less than 20% lands are covered with open pollinated varieties where some seed is saved for one season i.e. for 9 months from April to December with uncertain viability. Polythene bags and gunny bags are the main means of storage. Being a short duration crop cultivated from January to March, women's involvement is high in all cultivation aspects. Maximum women's involvement was observed in guarding the crop from bird damage (100%) followed by harvesting (85 %) and interculture (77.5%).

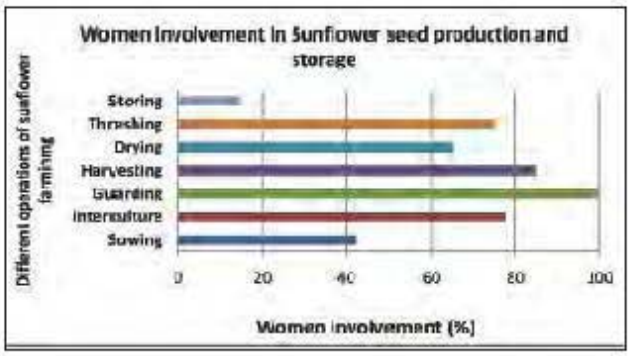



Fig. 37. Women's involvement in sunflower seed production and storage

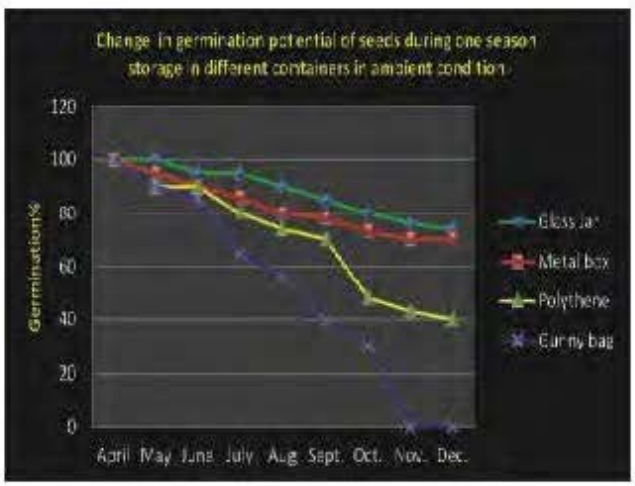
### 2.12.1 Changes in quality of seeds stored in different containers in ambient condition

Practices revealed that the seeds are being stored for 6-9 months in gunny bags or polythene bags without any treatment. To assess the seed storage requirement of sunflower, physiological parameters like germination percentage, seedling length and vigour index using different storage containers were tested for 9 months storage period.

**Table 13. Changes in germination percentage of seeds during storage for one season in different containers in ambient condition**

| Storage Container | Germination Percentage | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | April | May | June | July | Aug | Sept | Oct. | Nov. | Dec. |
| Glass Jar | 100 | 100 | 95 | 95 | 90 | 85 | 80 | 75 | 74 |
| Metal box | 100 | 95 | 90 | 86 | 80 | 78 | 73 | 70 | 70 |
| Polythene bag | 100 | 90 | 90 | 80 | 74 | 70 | 48 | 43 | 40 |
| Gunny bag | 100 | 90 | 86 | 65 | 56 | 40 | 30 | 0 | 0 |
| Mean | 100 | 93.75 | 90.25 | 81.5 | 75 | 68.25 | 57.75 | 47.25 | 46 |

Vigour and viability of sunflower seed was reduced after monsoon shower. Moisture pervious containers like cloth bag showed a concomitant loss of vigour at the time of sowing (December), while the moisture proof containers were better, as seed vigour deteriorate slowly. The period from July to September was most critical, for which protection measures should be taken before commencement of monsoon.



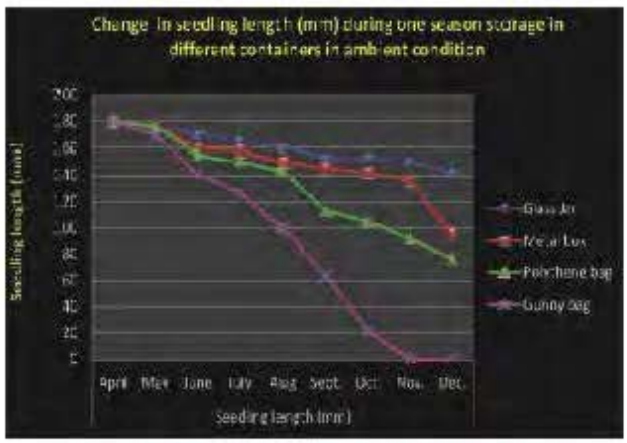
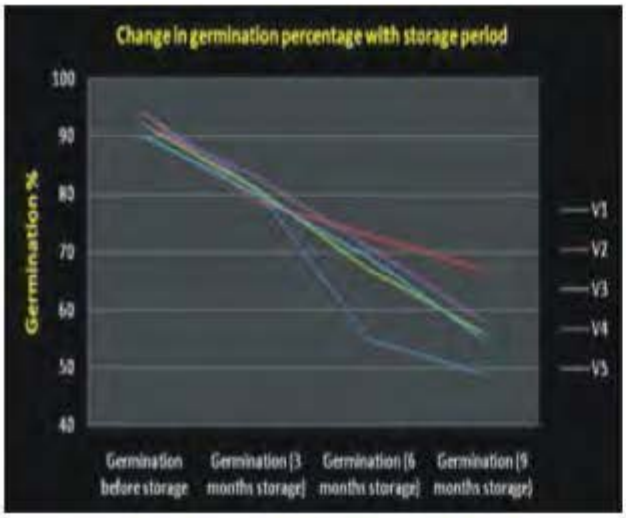




Fig. 38-39. Changes in quality of seeds stored in different containers in ambient condition

### 2.12.2 Physiological and biochemical parameters of seed during storage

Biochemical parameters like change in sugar content, volatile aldehyde, lipid peroxidation and dehydrogenase activity was determined for 9 month storage period at 3 months interval using 4 types of storage containers.



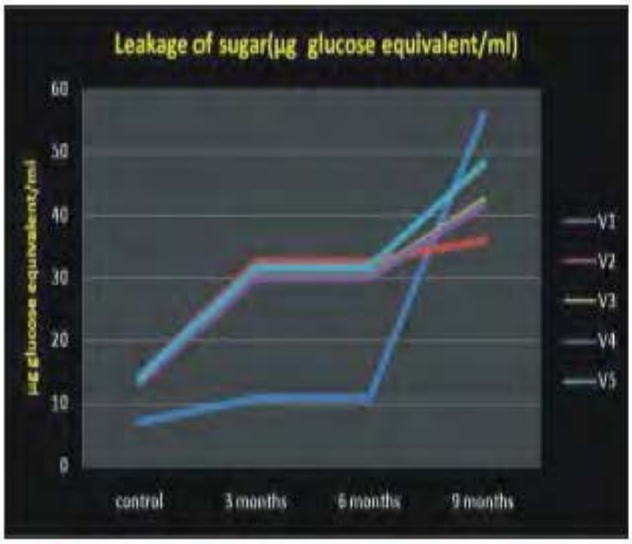




Fig. 40-41. Physiological and biochemical parameters of seed before and after storage

Average germination of 5 genotypes declined by 92.4% to 57% over a period of nine moths of storage. After three months it started reducing and by the end of nine months, it came to an average of 67%. Average seed vigour index also reduced from 8777.6 to 3371.4 over nine moths of storage. Sugar content increased in seed leachate showing loss of dry matter both due to membrane leakage and respiration resulting in reduction of viability and vigour. Due to increased lipid peroxidation over duration of storage, more sugar and electrolytes in the form of seed leachate came out indicating reduced seed vigour. Dehydrogenase activity reduced indicating difficulty in germination and increase of abnormal seedlings over the storage period. So there is sufficient quality loss of seed during storage under coastal agroclimate of Odisha.

## 2.13 Aqua and Poultry Feed from Fish and Shellfish Wastes for Entrepreneurship Development of Rural Women

Tanuja, S. and Anil Kumar

### 2.13.1 Aqua and poultry feed from fish and shellfish wastes for employment generation of coastal women

Large quantities of fish are wasted in tropical countries like India during capture, processing and marketing. By-products from the fishing industry have great potential to be used as protein supplements in aquaculture and livestock feed. Fish silage, a liquid product produced from whole fish or parts of it, can be a feasible alternative for use of these residues.

### 2.13.2 Shelf life study of acid added silage prepared from fish waste

Fish silage was prepared from fish dressing waste obtained from the local market by adding a mixture of organic and inorganic acids. The method of preparation of acid added fish silage is given below:

**Preparation of acid added fish silage**

↓

Dressing waste of fish washed and minced

↓

1.5% of Organic and Inorganic acid added to the mince

↓

200 ppm Butyl hydroxy toluene (BHT) added to prevent auto oxiadtion and 0.1% Potassium sorbate added as mould inhibitor

↓

Mixed well and kept in airtight plastic containers at 28-30 degree Celsius

↓

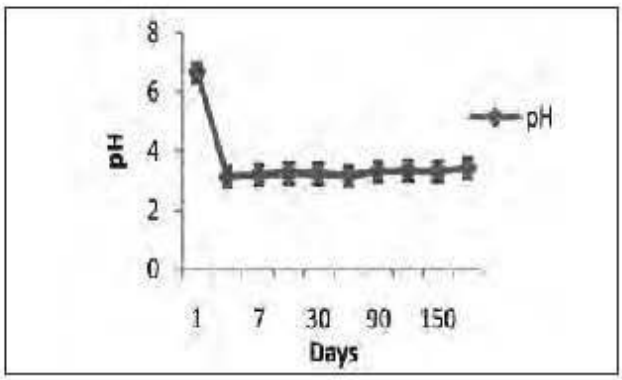
Stirred twice daily till pH stabilizes around 3.5-4

Fig. 42. Preparation process of acid added fish silage

The ensiled fish waste had crude protein - 38.97±1.46 %, crude fat - 38.75±1.08% and ash content - 4.56±0.23%.

Fig. 43. Silage prepared from dressing waste of fish

In the study of the biochemical parameters *viz.*, pH, Total Volatile Base Nitrogen (TVBN), Thio Barbituric Acid (TBA) value and microbiological quality (Total Viable Count of Bacteria) analyzed for six months, the pH of the acid added silage fluctuated till the 180th day of storage but did not increase above 3.5 (Fig. 44). This indicated excellent keeping quality of the silage. The maximum Total Volatile Base Nitrogen (TVBN) value was 33.33 mg% (Fig. 45) which was much less than that obtained in commercial fish meal stored under similar conditions. The addition of synthetic antioxidant, Butyl Hydroxy Toluene (BHT) significantly slowed down the rate ($p<0.05$) of auto oxidation in silage (Fig. 46). The Total Viable Count (TVC) of bacteria in the silage remained below 3 log cfu units /g because of the bacteriostatic action induced by the low pH (Fig. 47).



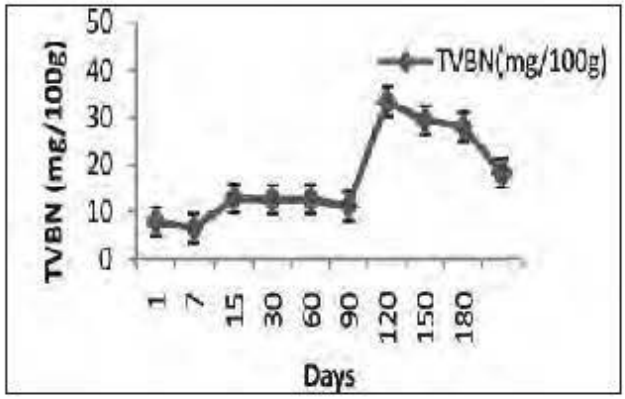
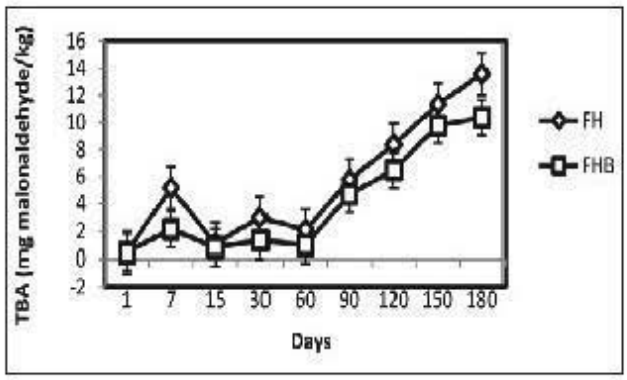




Fig. 44-45. Changes in pH and TVBN of ensiled dressing waste of fresh water fishes stored at 28±2 °C




*FH- Fish waste silage without synthetic antioxidant; FHB- Fish waste silage with synthetic antioxidant*

Fig. 46. Effect of synthetic antioxidant Butyl Hydroxy Toluene (BHT) on Thio Barbituric Acid (TBA) value of ensiled dressing waste of fresh water fishes stored at 28±2 °C

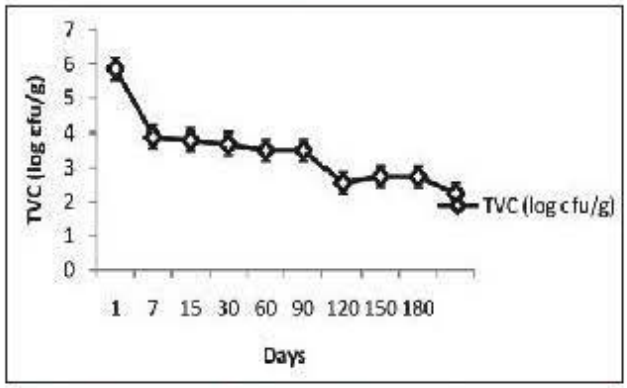



Fig. 47. Changes in TVC (Total Viable Count) of ensiled dressing waste of fresh water fishes stored at 28±2°C

### 2.13.3 Co-drying of fish silage with rice bran

Since drying of liquid silage is an energy consuming process, it was dried along with feed ingredient- rice bran in the ratio of 65:35, 75:25 and 85: 15. Quality of

the co-dried fish silage was evaluated for 180 days. The proximate composition of the co dried silage rice bran mixtures is shown in Table 14.

**Table 14. Proximate composition of fish silage co-dried with rice bran**

| Proximate composition (%) | Co dried silage (85%) | Co dried silage (75%) | Co dried silage (85%) |
|---|---|---|---|
| Moisture | 4.1 | 6.51 | 6.67 |
| Crude protein | 16.55 | 17.93 | 21.22 |
| Crude fat | 20.98 | 23.42 | 30.42 |
| Ash | 15.30 | 13.70 | 10.83 |

### 2.13.4 Feeding trials of fish silage on Japanese quail *(Coturnix japonica)*

Feeding trials of fish silage were conducted on 180, five month old, Japanese quails *Coturnix japonica* (120 females and 60 males). The birds were divided into 4 groups of 45 birds each with 3 replicates of 15 birds in each replicate. The individual body weights of quails were recorded upto the nearest 1g. Rice husk was used as litter. Isonitrogenous and isocalorific diets to supply nutrients to birds were formulated by replacing 25%, 50% and 100% of the crude protein of fish meal in the feed with fish silage. The birds were acclimatized with the control feed for one week before the start of the study. They were kept under hygienic conditions and provided with food and water adlibitum.

The experiment was carried out for a period of 100 days to study the effect of varying levels of fish waste silage on the growth, feed efficiency, feed consumption, egg production, egg quality, biochemical parameters and immunological profile.

**Table 15. Effect of fish waste silage on the growth and production performance of Japanese Quails *(Coturnix japonica)***

| Parameters | Control | T1 | T2 | T3 |
|---|---|---|---|---|
| Initial weight (g) | 150.02±13.23 | 157±13.84 | 149±12.46 | 152.3±12.65 |
| Final weight (g) (after 12 weeks) | 202.8±26.6 | 204.88±29.11 | 201.61±23.42 | 201.5±26.604 |
| % increase in weight | 35.09 | 30.41 | 35.31 | 32.3 |
| Mean egg production (nos) | 500.67 | 538.67 | 499 | 490.33 |
| Mean feed consumption (kg) | 33.39±2.02 | 33.4±0.7 | 33.68±1.53 | 33.19±0.22 |
| Mean FCR | 0.80±0.04 | 0.74±0.03 | 0.86+0.03 | 0.86+0.02 |

Where, Control-0% fish silage, T1-25% replacement, T2-50% replacement, T3-100% replacement.

## 2.14 Assessment of Women's Role in Traditional Livestock Dependant Societies: Kangayam Grasslands

Anil Kumar, J. Charles Jeeva and Taruja, S.

The Kangayam grasslands is located in the rain-shadow region of south India. It is a drought-prone area where 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, freeing the farmers from tending the animals, and use their time productively in other vocations. A study was conducted to assess the women's contribution in management of grassland and livestock rearing and management by analyzing field data from 50 farmers from Veerancholapuram and Popini-Menakshivasasu villages in Kangayam taluk of Tirupur district in Tamil Nadu. The study revealed that in the grassland management (Fig. 50), women's major role was in weeding of paddocks (87.6%), harvesting of grasses (89.6%) and collection of fallen pods of acacia (100%). In livestock management activities (Fig. 51), women's role was high in cleaning of livestock shed (68.4%), disposal of placenta (63.2%), identification of sick animals and deworming (60%), feeding and watering of animals (59.6%), care during pregnancy (56.4%). Gender participation in feeding, breeding and health care of livestock and in fodder cultivation is given in Table 16. A typical farmer of the Kangayam grassland having 25 acres of land (8 acre irrigated, 17 acre pasture land) owns 30 *Mecheri* sheep and 2 cattle/buffalo. The pasture land is divided into 4 to 5 grazing paddocks of 3-4 acres each. Every year, the

farmer sells on an average 35 lambs @ Rs.3000/- each fetching Rs. 105000/- and sells about 1350 litres of milk @ Rs.19/- per litre getting Rs. 250,000/-. The present study revealed that women's role was important in many activities undertaken for the sustainable management of the Kangayam grassland. Recognizing the women's role in management of the grassland, improving their skill through capacity building programmes and exposure visits, and promoting backyard poultry to supplement

Fig. 48. A woman collecting fallen pods of *Acacia leucophloea* to feed sheep

Fig. 49. A woman in the grassland taking animals to paddocks in the morning

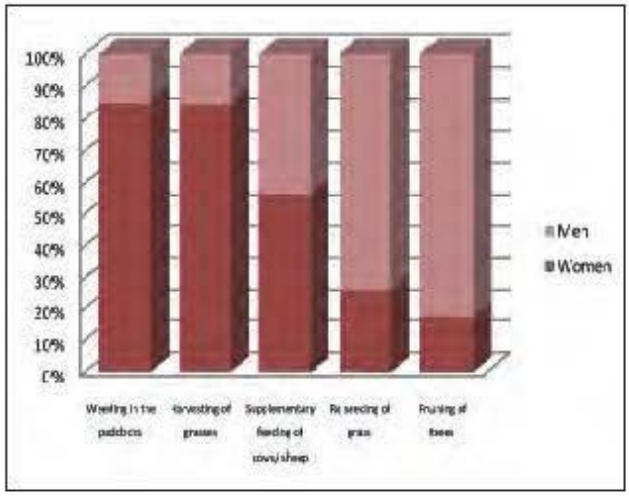



Fig. 50. Gender profile of grassland management activities

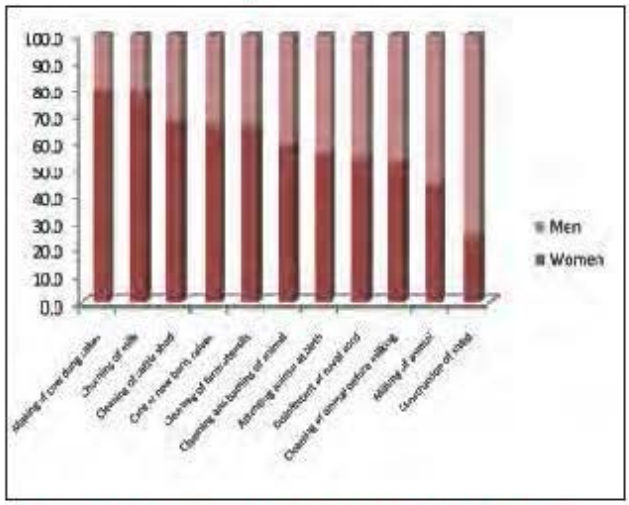



Fig. 51. Gender profile of management of livestock

Table 16. Gender profile of livestock activities

| Activities | Percentage participation | |
|---|---|---|
| | Men | Women |
| **Breeding activities** | | |
| Observing animal for signs of heat | 77.2 | 22.8 |
| Taking animal for Artificial Insemination/ natural service | 80.0 | 20.0 |
| Care of animal during pregnancy | 43.6 | 56.4 |
| Care of animals during parturition and post parturition | 40.4 | 59.6 |
| Disposal of placenta | 36.8 | 63.2 |
| **Feeding activities** | | |
| Taking animals in and out of the paddocks for grazing | 42.0 | 58.0 |
| Watering animals in paddocks | 40.4 | 59.6 |
| Mixing and giving feed to animals | 40.4 | 59.6 |

| | | |
|---|---|---|
| Giving water to animals in the shed | 43.6 | 56.4 |
| Fodder collection | 68.0 | 32.0 |
| Chopping of fodder/straw | 55.2 | 44.8 |
| Purchase of concentrate/feed | 70.8 | 35.4 |
| **Fodder Cultivation** | | |
| Preparation of land | 64.4 | 35.6 |
| Sowing of fodder seeds | 53.6 | 46.4 |
| Intercultural operations | 55.2 | 44.8 |
| Harvesting of fodder crops | 20.0 | 80.0 |
| Storage of fodders and seeds | 35.2 | 64.8 |
| **Health Care** | | |
| Identification of sick animals | 40.0 | 60.0 |
| Taking animals to hospital for treatment | 70.0 | 30.0 |
| Administering medications | 45.2 | 54.8 |
| Vaccination | 63.6 | 36.4 |
| Deworming | 40.0 | 60.0 |
| Deticking and delicing | 43.2 | 56.8 |
| Care of sick animals | 48.4 | 51.6 |

## 2.15 Livelihood Improvement of Rural Women through Non-conventional Feed and Food

**Anil Kumar, M.P.S. Arya, A.K. Shukla, Kundan Kishore, Jyoti Nayak and Tanuja, S**

In the first year of the project, five lines of sweet potato (Keonjahr, ST-13, ST-14, Sree Kanak and Kamala Sundari) were collected from Keonjhar and CTCRI, Bhubaneswar and have been multiplied in the nursery at DRWA farm for transfer to the field. The dry matters of foliage of different lines were Keonjhar (15.0%), ST-13 (18%), ST-14 (17.6%), Sree Kanak (14.99%) and Kamla Sundri (20.3%). In another experiment, a non-conventional food/forage plant, Chaya (*Cnidoscolus aconitifolius*) was taken to study the growth potential under eastern coastal region. A field experiment was laid out at DRWA farm with a spacing of 1x1 m (T1), 1 x 0.75 m (T2), 1.25x1 m (T3) and 1.25x0.75 m (T4) with 5 replications each. For developing economic ration for poultry, a separate block of *Chaya* plantation has been developed to harvest leaves for the experiment. The overall survival of the planting material of *Chaya* was 92.3% which varied from 90.4 % (T1), 92.0% (T2), 93.0% (T4) and 93.0% (T4). The average height (cm) of the plants under different treatment groups at nine months were 90.17±18.81 (T1), 106.94±30.00 (T2), 104.26±26.52 (T3) and 100.80±21.03 (T4).


Fig. 62. Plantation of sweet potato

## 2.16 Reducing the Gender Gap in the Nutritional Status of Family Members in Rice Based Cropping System

**Abha Singh, M.P.S. Arya and L. P. Sahoo**

The project was carried out in four rice based cropping systems (rice-rice, rice-wheat, rice-pulse, and rice-millet) in four states: Odisha, Uttarakhand,

Uttar Pradesh and Madhya Pradesh. Nutritional status of men and women based on their anthropometric measurements, haemoglobin estimation, blood pressure and status of diabetes in these four rice based cropping systems were measured and assessed critically. For assessment of nutritional status and identification of gender gap in the nutritional status and knowledge level, data were collected from 360 households (90 households from each rice cropping system) covering 720 respondents. The gender gap in the nutritional status and the level of knowledge on various aspects of nutrition were identified along with the cropping pattern in four rice based cropping systems. A Scientists-Farmers interaction meet was organized to identify the social issues for higher malnutrition and gender gap in the nutritional status. Intervention was given for promotion of cultivation of pulses (green gram and black gram), cowpea, maize and green leafy vegetables in rice-rice cropping system. Nutrition education programme was organized on various aspects of nutrition for incorporating good practices in their habit and upgrading the knowledge of rural women. Demonstration on locally available low cost nutritious recipes and value addition of horticultural crops and low cost fishes were organized for target groups. The nutritional status and knowledge level were assessed after the completion of the project.

Assessment of nutritional status revealed that among the four studied rice cropping systems, the highest malnutrition (Chronic Energy Deficiency of 41.12% in men & 54.45% in women and low haemoglobin count, 46.67% in men and 63.33% in women) was found in rice-rice cropping pattern in Puri district of Odisha and lowest in rice-pulse cropping pattern (Chronic Energy Deficiency of 27.78% in men & 31.12% in women and low haemoglobin count, 35.56% in men and 42.23% in women) in Hoshangabad district of Madhya Pradesh. Gender gap in the nutritional status was the highest in rice-rice cropping system and lowest in rice-wheat cropping system. Hypertension and diabetes problem was not prevalent in all the rice based cropping system households and level of knowledge was found almost similar in all the rice based cropping systems and majority of men and women had medium level of knowledge.

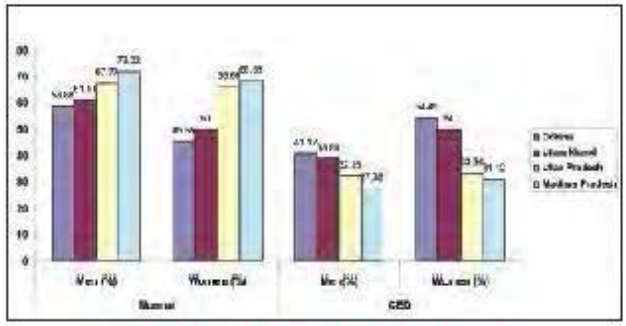


Fig.53. Chronic Energy Deficiency in four rice based cropping systems

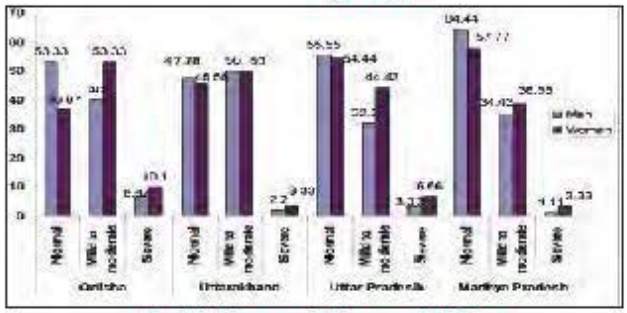


Fig.54. Haemoglobin count in four rice based cropping systems

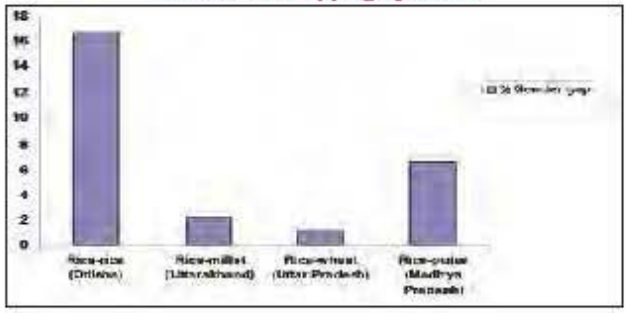


Fig. 55. Gender gap in haemoglobin count in four rice based cropping systems

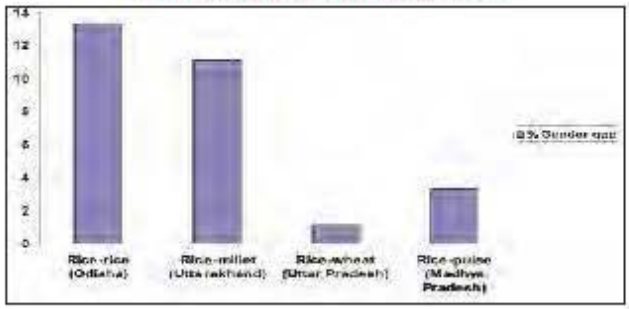


Fig. 56. Gender gap in Chronic Energy Deficiency in four rice based cropping systems

### 2.16.1 Intervention to reduce the gender gap in rice-rice cropping system

As an intervention in rice-rice cropping pattern (Puri district of Odisha), kitchen garden/ vegetables and pulse cultivation was promoted in participatory mode

to incorporate more vegetables especially green leafy and pulses in their diet for improvement of their protein and iron content. Fifteen kitchen gardens/ vegetable plots and thirty half acre plots (15 green grams and 15 black grams) of pulses were laid down in Satyavadi block of Puri district to incorporate vegetables and pulses in their cropping pattern. Pulse and maize cultivation especially QPM and sweet corn in rice-rice cropping system were promoted. Promotion of vegetable cultivation especially green leafy vegetables/ pulse cultivation in rice-rice cropping system was adopted by 90% of the selected farm families. Nutrition education was imparted to farm women on various aspects of nutrition to improve the nutritional knowledge and incorporate good practices in their daily routine. Preparations of low cost nutritious recipes (nutritious laddu, khichdi, chilla, mixed paratha etc.) were demonstrated to the farm women to increase variety and nutrition of their daily diet.

Fig. 57. Demonstration on low cost nutritious recipes

## 2.17 Assessment of Integrated Farming Model for Improved Food Security and livelihood in Rural Households

Jyoti Nayak and Abha Singh

PRA was conducted in villages of Mahanga block of Cuttack district to assess the resources, priorities and opportunities for promoting IFS. The main sources of livelihood of these villages are agriculture and other land based activities. More than 70% of income comes from agriculture and allied activities. The soil is sandy loam and majority of land holdings are small and marginal. Irrigation facilities and backyard ponds are available. The important crops in these villages are paddy, gram and vegetables.

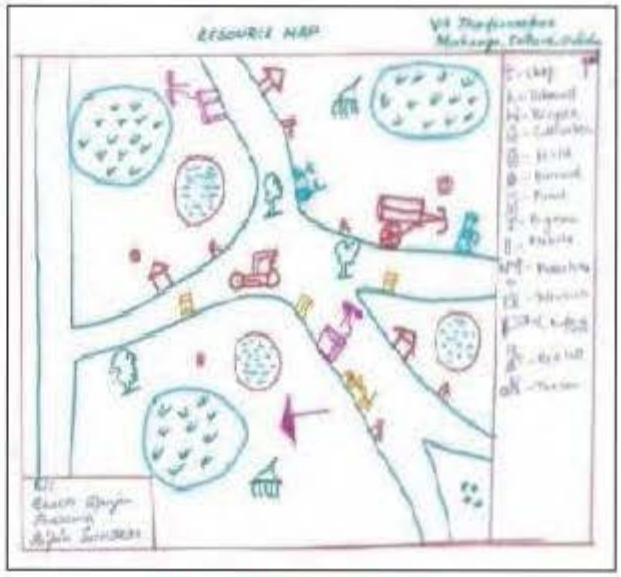



Fig. 58. Resource map

Table 17. Identified households

| S. No. | Name | Village | Area for IFS (Acre) | Proposed Layout |
|---|---|---|---|---|
| 1 | Bhakta Ranjan Praharaj | Jhadeswarpur | 1.5 | Crop+ Plantation+ Duckery+ Bee Keeping |
| 2 | Bharati Pal | Dulharpur | 4.0 + 1.0 pond | Crop+ Plantation+ Poultry+ Fishery |
| 3 | Kamininatha Sharma | Dulharpur | 2.0 + Pond | Crop+ Plantation+ Poultry+ Fishery |
| 4 | Jagendra Kumar Nayak | Nahanga | 1.5 + Pond | Crop+ Plantation+ Poultry+ Duckery |
| 5 | Bharat Chandra Pradhan | Gobindpur | 2.5 + 1.0 pond | Crop+ Plantation+ Poultry+ Fishery |
| 6 | Prasant Kumar Mishra | Pandia | 4.0 + Pond | Crop+ Plantation+ Duckery |
| 7 | Sunakar Sahoo | Nahanga | 1.5 | Crop+ Plantation+ Poultry |
| 8 | Bipin Kumar Tripathy | Nahanga | 1.5 + Pond | Crop+ Plantation+ Duckery |
| 9 | Sukanta Behera | Apilo | 1.5 | Crop+ Plantation+ Poultry |
| 10 | Prakash Ch. Pradhan | Gopalpur | 2.0 + Pond | Crop+ Plantation+ Fishery |

Fig. 59. Availability of local resources

Ten households as per their resource availability were identified to establish IFS in Mahanga block of Cuttack district. Farmers- Scientists interface was organized at Jhadeswarpur village of Cuttack district and discussed on different cropping patterns followed in the villages and the involvement of farmwomen in different farm activities. The owners of ten identified households, along with other villagers attended the meetings and learned the package of practices for important plantation crops like guava, mango, banana & pine apple.

Fig. 60. Scientists'-farmers' interfaces

## 2.18 Ergonomic Evaluation of Selected Manually Operated Farm Equipment in Mango & Cashewnut

Gayatri Moharana, Naresh Babu and S. P. Singh

### 2.18.1 Participation of women in mango & cashew nut cultivation/ orchards

A survey was conducted in different orchards in Dhenkanal district of Odisha for assessment of package of practices followed by farm women in mango and cashew nut orchards. Group discussion and interviews were conducted in a participatory mode. It was found that more than half of the workers of orchards were women and most of them had the working experience of 3-4 years. Data were collected for general information about the orchards, working pattern, gender issues and technological gaps. Ergonomic assessment of selected traditional practices adopted by farm women was also undertaken. The major activities which were carried out manually by the women were preparation of soil mixture (70%), filling mixture in poly bags (100%), plantation (80%), weeding (100%), irrigation (60%), application of fertilizer (80%), harvesting (60%) and management of mango orchard except grafting (30%). The farm women worked for more than 6hrs/day with a half hour break. The work output for each activity performed by women in the traditional method was quantified and the data have been given in following table.

Table 18. Gender perspective of activities performed by farm women in mango and cashew nut orchards

| S. No. | Activities performed by women | Output/day |
|---|---|---|
| 1. | Sowing of seed | 1000 seeds/hr |
| 2. | Filling mixture in the poly bags | 500-600 bags/day |
| 3. | Uprooting the nursery plant | 600 plants/ day |
| 4. | Transplanting/potting plant in poly bags | 600 bags/day (cashew), 400-500 bags/day (mango) |
| 5. | Manual irrigation | 1000 plants/day |
| 6. | Application of fertilizer | 2000 plants/day |
| 7. | Grading and sorting | 500-600 bags/day |

| | | |
|---|---|---|
| 8. | Clipping or removal of shoots | More than 5000 plants |
| 9. | Filling and removal of caps | 2000 plants/day |
| 10. | Cutting the polythene layer of grafting | 1200-1500 plants /day |
| 11. | Weeding | 1500-2000 plants /day |
| **Activities performed by men** | | |
| 12. | Preparation of nursery bed | (40ft length x 3ft breadth x 0.5ft depth)/ person/ day |
| 13. | Pit digging | 15pit/day (3 ft length x 3ft breadth x 3 depth ft) |
| 14. | Application of pesticides(with sprayer) | 30000 plants/hr with pedal operated sprayer<br>20000 plants/hr with power sprayer<br>12000 plants/hr with 15l hand sprayer |
| 15. | Pruning & training | 7-10 plants/day |
| 16. | Grafting | 500-700 plants/hr |
| 17. | Cutting the polythene layer of grafting | 1200-1500 plants/day |

Fig. 61-62. Activities carried out by farm women in mango and cashew nut orchards

### 2.18.2 Drudgery and hazards of farm women engaged in mango & cashew nut orchards

Among different activities carried out by farm women, filling of soil mixtures in poly bags, plantation, clipping of shoots, weeding and application of fertilizer were perceived to be very tedious, and hazard prone. In case of cashew nut, the liquid secreted from the plant is harmful for skin and causes lesions and patches in the palm. Drudgery as well as musculoskeletal pain in different parts of the body were induced by working continuously for more than 3 hrs in awkward static postures with repetitive movements of upper and lower limbs while filling of soil mixtures in poly bags, planting, weeding, clipping of shoots, and application of fertilizer. The respondents perceived grafting and cutting the layer of grafting as the most drudgery prone activities as they adopted a static squatting posture for hours with repetitive movements of upper and lower limbs. Preparation of nursery (56%) was considered to be the least drudgery prone activity.

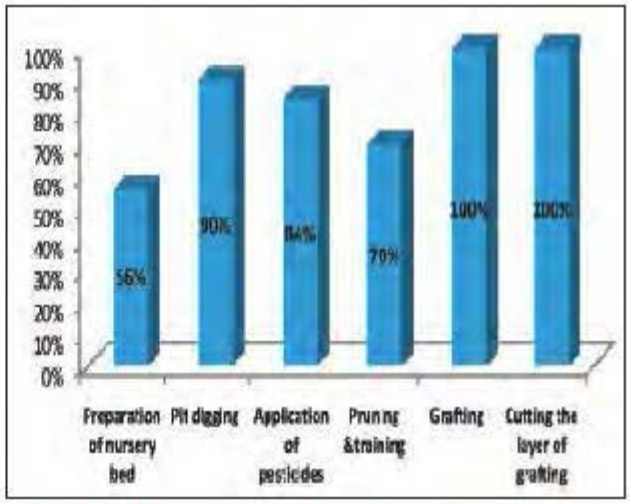



Fig.63. Perceived strain reported by male workers

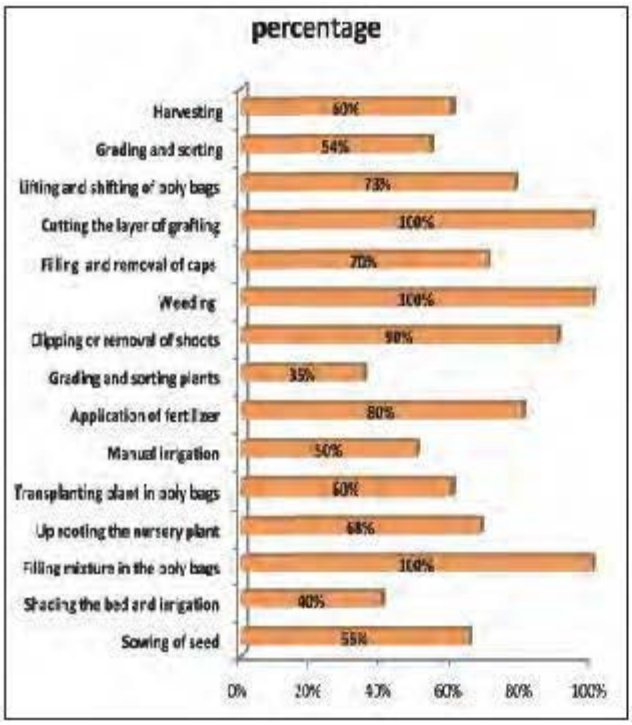



Fig.84. Perceived strain reported by female workers

A need to introduce women friendly farm tools and equipment and protective clothing for the farm women engaged in mango and cashew nut orchards was also observed. Therefore, technological interventions were made in some of the selected activities to reduce drudgery. Trowels were introduced for filling soil mixtures in poly bags. When the work was carried out manually 48-60 bags/hr were filled whereas, with the help of trowels 80-120 bags/hr were filled. Traditionally the farm women remove shoots from mango and cashew nut plants 360-400 shoots /hr which increased to 550-600 shoots /hr when small secateurs were introduced. Farmers-Scientists interface was organized under the project at two different orchards on 28th March, 2014, wherein a total of 85 farmers and farm women and other stakeholders participated. The farm women were sensitized towards the use of women friendly farm tool and equipment for drudgery reduction and increasing working efficiency for higher output.

**Table 19. Change in the working efficiency after intervention introduced**

| Activities (manual) | Present method | Intervention | After intervention | % increase in output |
|---|---|---|---|---|
| Filling of soil mixtures in poly bags | 48-60 bags/hr | Trowel | 80-120 bags/hr | 85.18 |
| Removal of shoot | 360-400/hr | Secateurs | 550-600/hr | 51.32 |

## 2.19 Technological Interventions for Drudgery Reduction with Increased Work Efficiency through Women Friendly Farm Tools/ Equipment/ Technologies in the State of Odisha (RKVY)

Jyoti Nayak, Sabita Mishra, Abha Singh and Gayatri Moharana

This project has been taken up with the objective of reducing drudgery faced by farm women and multiplying appropriate women friendly farm tools and equipment for farm women of Odisha. Based on the area of production during *kharif*, five districts of Odisha *viz.*, Cuttack (rice), Dhenkanal (maize), Kendrapara (groundnut), Rayagada (cotton) and Ganjam (vegetables) were identified to assess the participation of farm women in different farm activities. It was observed that in groundnut cultivation, the participation of women was highest in storage (90%) and lowest in fertilizer application (8%) (Table.20). Major activities like transplanting, harvesting and threshing were done mechanically, but weeding and fertilizer application was done manually by farm women. Based on this baseline data, drudgery saving tools will be introduced to farm women to reduce physiological cost of activity.

**Table 20. Participation of women in groundnut and rice cultivation**

| Activity | Women's participation in groundnut cultivation (%) (n=35) | Activity | Women's participation in rice cultivation (%) (n=55) |
|---|---|---|---|
| Seed sowing | 45 | Transplanting | 65 |
| Irrigation | 20 | Irrigation | 10 |
| Weeding | 65 | Weeding | 65 |
| Fertilizer application | 6 | Fertilizer application | 10 |
| Harvesting | 70 | Harvesting | 35 |
| Drying | 70 | Threshing & Winnowing | 37 |
| Shelling | 85 | Parboiling | 100 |
| Storing | 90 | Drying | 100 |
| | | Storing | 85 |

## 2.20 All India Coordinated Research Project on Home Science

The All India Coordinated Research Project (AICRP) on Home Science is in operation in 10 centres/State Agricultural Universities through AAU, Assam; CCSHAU, Haryana; PAU, Punjab; MPUA&T, Rajasthan; ANGRAU, Hyderabad; GBPUA&T, Uttarakhand; MKV, Maharastra; UAS, Dharwad; UAS, Bengaluru and CSKHPKV, Himachal Pradesh. The main thrust of the project is on empowerment of women in agriculture for their improved nutrition and livelihood security and drudgery reduction for quality living. The salient achievements of the project during the year 2013-14 have been summarized below:

### 2.20.1 Food & Nutrition Security in selected farming system

For characterization of nutritional diversity in selected farming systems, 810 (90 from each centre) rural families were selected with equal representation of the three socio-economic categories as low, medium and high. Data were analysed as background information, food availability, health and nutrition related practices and food and nutrition security at household level in terms of food consumption pattern dietary adequacy and nutritional status of the vulnerable group. Availability of foods assessed for three seasons - summer, rainy and winter season indicated that all the food groups are available in all the seasons. However, availability of various types of fruits and vegetables was found to be more in winter season as compared to summers. It was observed that food habits of all the selected families in Jorhat, Hyderabad (100%), Bangalore (95%), Pantnagar (96.6%) and Palampur (86.67%) were non-vegetarian while in Udaipur all the families were vegetarian. All the respondents followed 2 or 3 meal pattern per day except 15.56% families in Hyderabad, who had a 4-meal pattern.


Fig. 85. Meal pattern of the respondents

Infant feeding practices varied in terms of type of food introduced as prelacteal feed, colostrum & breast milk, weaning and supplementary food. In Parbhani, Palampur, Ludhiana, Hisar, Udaipur and Pantnagar, honey was the most common prelacteal feed given by

the families studied. No prelacteal feed was used in Jorhat and Hyderabad. Colostrum was given by 36.66% families in Pantnagar while breast feeding was practiced by all the families in Hyderabad (100%). Cereal and pulse based recipes and fruits were used as weaning and supplementary foods in the families.

Household preparations were found to be used as weaning and supplementary foods at all the centres. But about 50 to 70% families introduced weaning and supplementary foods at various centres except at Palampur where all the families followed this practice. Age of introducing prelacteal feed ranged from just after birth to one day, for colostrums 30 min after birth to one day followed by breast milk while weaning foods were introduced at the age of from 5 months to one year and supplementary foods from 7 months to one year.

Gender discrimination was not observed in feeding practices of feeding prelacteals, colostrum, weaning foods, supplementary foods and normal family meal.

Data on health and hygienic practices of new borns indicated complete immunization by respondents from Palampur, Hyderabad and Bangalore. In Jorhat all the children were partially immunized. Immunization practices were better among high and medium socio economic group as compared to low socio economic group.

Data were also collected on food consumption pattern and dietary intake of each family member, to assess nutrition adequacy at household level. Nutritional status of adult female and vulnerable groups in the selected families was assessed using anthropometric measurements and clinical examination. Data analyses on these aspects are in progress.

**2.20.1.1 Food based strategies to combat nutritional problems among farm families**

Each centre standardized five to six iron rich recipes. In all 52 standardised recipes, the main ingredients are - wheat flour, millet flour, bengal gram flour, soyabean flour, rice flour, ghee, sugar, rice flakes, groundnut, fresh coconut, dry fenugreek leaves, cauliflower leaves powder, curry leaves, rajkeera seed, seesamum powder, jaggery, skimmed milk powder, coco powder, niger seed, lemon juice and dried mango powder. The iron content of these recipes ranges between 4.5 mg to 41.7 mg per 100g of the finished product. The iron sources used to enrich recipes were mainly rice flakes, lotus stem, garden cress seeds, amaranth seeds, millets, gram flours etc. Recipes standardized were ranked from 6.5 to 8.5 on 9 point scale indicating moderate to high acceptability for the products.

To improve dietary adequacy, 30 trainings were imparted for 1042 rural women, adolescent girls, women entrepreneurs, scientists of KVK's and agricultural officers. The topics covered were balanced diet, importance of fruits and vegetables, nutritious recipes, conserve nutrients while processing foods, nutritious snacks, value added products of locally available foods, use of underutilized foods, etc.


Fig. 66. Iron rich recipes

Fig. 67, 68 & 69. Trainings for improving nutritional status of families

### 2.20.2 Drudgery assessment and mitigation

To characterize drudgery of women, following ten production systems were identified. Data have been collected from different production systems and is being processed. Details of these have been given in table :

**Table 21. Production systems selected to characterize drudgery of farmwomen**

| Production System | Centre |
|---|---|
| Cotton | ANGRAU, Hyderabad; VNMKV, Parbhani; PAU, Ludhiana |
| Strawberry | CCSHAU, Hisar |
| Soyabean | VNMKV, Parbhani |
| Chilly | UAS, Dharwad |
| Groundnut | UAS, Dharwad |
| Paddy | AAU, Jorhat |
| Dairy | MPUAT, Udaipur & GBPUAT, Pantnagar |
| Flower | PAU, Ludhiana |
| Tea leaves | AAU, Jorhat |
| Potato | CSKHPKV, Palampur |

A total of 10 technologies were ergonomically developed and refined/ tested under the project during the year 2013-14. The details are given below:

**Table 22. Technology developed by different centres**

| S. No. | Name of the technology refined/ developed | Developed/ refined | Centre |
|---|---|---|---|
| 1. | Ladle for draining parboiled rice | Refined | AAU, Jorhat |
| 2. | Harvest bag (basket model) | Refined | ANGRAU, Hyderabad |
| 3. | Harvest bag (bin model) | Refined | ANGRAU, Hyderabad |
| 4. | Seed placement tube | Developed | ANGRAU, Hyderabad |
| 5. | Medium hoe | Refined | CSKHPKU, Palampur |
| 6. | Potato digger | Refined | CSKHPKU, Palampur |
| 7. | Potato picker | Refined | CSKHPKU, Palampur |
| 8. | Weaving chair | Developed | GBPUA & T Pantnagar |
| 9. | Foam seat for assisting squatting position | Developed | MPUAT, Udaipur |
| 10. | Flour presser | Developed | VNMKV, Parbhani |

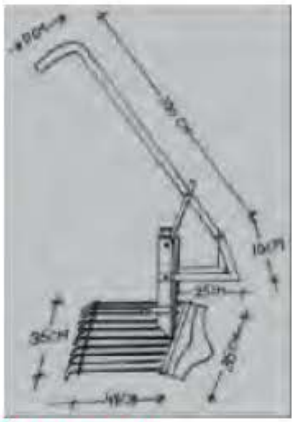


Fig. 70. Sketch of potato digger

Fig. 71. Foam seat for assisting squatting position

### 2.20.2.1 Ladle for parboiling of rice

The technology was ergonomically designed and developed for drudgery reduction of farm women Involved In parboiling activity of rice. The technology was tested for field validation.

Fig. 72.Parboiling of rice

### 2.20.2.2 Harvest bag

Manual cotton picking is not only a tedious and laborious work but also costlier. Results on the evaluation of three types of harvest bags compared to hand picking revealed that the use of harvest basket Increased the pace of work by 238.6 sq.m / hour, productivity by 1.75 kg and saved time by completing an acre of land almost 2.3 hrs earlier, which was a noticeable increase. Technology intervention for hand picking of flowers, okra harvesting and cotton are given below:

**Table 23. Technology developed for harvesting of Jasmine flower, Okra & Cotton**

| Variable X technologies | Jasmine flower harvesting | | | | | Okra harvesting | | | | | Cotton harvesting | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hand picking | Harvest bag 2 (Front loading YMMRV model) | Seed bag (ANGRAU model) | Hand picking x harvest bag 2 | Hand picking x seed bag | Hand picking | Harvest bag -1 with mittens | Seed bag with knitted gloves | Hand picking x Harvest Bag 1 with mittens | Hand picking x seed bag with knitted gloves | Hand picking | Harvest bag 1 (back loading CESHAM model) | Harvest basket (ANGRAU model) | Harvest bag2 (front loading YMMRV model) | Hand picking x Harvest Bag 1 | Hand picking x Harvest basket | Hand picking x Harvest Bag 2 |
| Pace of work (sq.m/hr) | 150.6 | 295.3 | 284.2 | 144.7 | 133.6 | 860 | 722.5 | 1556 | -137.5 | 696 | 539.5 | 632.2 | 778.1 | 685.8 | 92.7 | 238.6 | 146.30 |
| Productivity (kg/ hr) | 16 | 20 | 18.5 | 4 | 2.5 | 15 | 17 | 20.7 | 2 | 5.7 | 4.5 | 5.8 | 6.25 | 5.6 | 1.3 | 1.75 | 1.1 |
| Time taken (hr/acre) | 4.5 | 2.8 | 3.1 | 1.7 | 1.4 | 4.7 | 5.6 | 2.6 | -0.9 | 2.1 | 7.5 | 6.4 | 5.2 | 5.9 | -1.1 | -2.3 | -1.6 |
| Discomfort (5) comfort (1) rating | 3 | 2 | 2 | 1 | 1 | | | | | | 4 | 3 | 2 | 2 | -1 | -2 | -2 |
| Grip discomfort comfort rating | | | | | 3 | 4 | 1 | -1 discom-fort increased | 2 discom-fort decreased | | | | | | | | |

### 2.20.2.3 Seed placement tube for cotton dibbling

The technology was developed for cotton dibbling. The aim of the experiment was to assess the conventional method of sowing and compare with the developed technology. The performance variables & postural analysis and Repetitive Strain Index scores of the technology is given below:

**Table 24. Performance variables**

| Variable | Hand dibbling | Seed placement tube | Change |
|---|---|---|---|
| Time taken per acre/ hour | 2.45 | 2.05 | 24 min |
| Area covered (sq.m)/ hour | 1798 | 1974 | 176 sq.m |
| **Postural analysis** | | | |
| OWAS score | 3 | 1 | Significant |
| RULA score | 6 | 2 | Significant |
| Degree of trunk flexion | >60° | 20° | 40° |
| Frequency (no. of postural bends per acre) | 177 | No bends | |
| Postural holding time (min) | 2.41 | 3.6 | |
| Postural shift time (min) | 2.1 | - | |

**Table 25. Repetitive Strain Index Scores for upper limb in conventional dibbling and the seed placement tube**

| Strain Index Parameters | Dibbling | | Sowing using seed placement tube | |
|---|---|---|---|---|
| | Right | Left | Right | Left |
| Intensity of exertion | 3 | 1 | 1 | 1 |
| Duration of exertion | 1.0 | 0.5 | 0.5 | 0.5 |
| Efforts per minute | 3.0 | 0.5 | 3.0 | 3.0 |
| Hand / wrist posture | 1.5 | 1.0 | 1.0 | 1.0 |
| Speed of work | 1.0 | 1.0 | 1.0 | 1.0 |
| Duration of task per day | 0.50 | 0.50 | 0.75 | 0.75 |
| Final Score | 6.75 | 0.12 | 1.1 | 1.1 |
| | Some risk (right hand) | | Safe | |

Fig. 73. Seed placement tube

### 2.20.2.4 Weeding and Interculturing of strawberry production

Average working heart rate for weeding and interculturing was 89.7 bpm & 87.1 bpm and overall discomfort score was 6.8 & 6.9 respectively. Grip fatigue for weeding was 11.1% and 13.1% for left and right hand respectively and was 10.9% and 4.9% during interculturing for left and right hand, respectively. Maximum musculo-skeletal discomfort was for upper leg, thighs, lower back, lower arm, wrist and hands in both the activities. In weeding activity, angle of deviation was 10° and 13° for cervical and lumber region and for interculturing, it was 7° and 10° respectively.

Fig. 74. Weeding in strawberry cultivation

### 2.20.2.5 Weaving chair

Weaving is one of the most tedious professions requiring long hours of static work leading to risk for musculoskeletal disorders (MSDS). All the

respondents worked in the enterprise for 7-8 hours/day with a rest pause of 1 hour at lunch time. Participation of women respondents and young girls was found to be maximum (90%) in this enterprise as compared to male respondents (10%). Physiological parameters of the respondents were studied ergonomically for existing methods used for performing the weaving.

**Table 26. Physiological parameters**

| Physiological parameters | Weaving method |
|---|---|
| Average working heart rate (beats/min.) | 120.04 |
| Average peak heart rate (beats/min.) | 127.2 |
| Average energy expenditure (kj./min.) | 10.42 |
| Peak energy expenditure (kj./min.) | 11.50 |
| Average TCCW (beats) | 1238.22 |
| Average PCW (beats) | 123.82 |
| Average rating of perceived exertion | 4.1 |

Postural analysis was also recorded and the deviation of center of gravity from normal standing posture to sitting posture adopted by weavers during weaving was 8.75% for men and 27.22% for women. The percentage of reduction of the grip strength of handloom strength was found as 14.79 for the right hand and 7.38 for the left hand.

Scaling up of seventeen (17) technologies was done for introduction among SHGs namely; three types of harvest bags, capron, seed-cum-fertilizer bag, seed placement tube, milking stand and stool, head load manager, revolving milking stool and stand, tailoring table, gopal khore, brinjal and okra mittens, trishul weeder, cotton picking apron, potato picker, potato digger and medium hoe. Forty one (41) training and exhibitions were conducted in the operational villages and 12,435 farm women, men, youth and school children and scientists were made aware of drudgery reducing technologies and resource management practices.

### 2.20.3 Mitigating occupational health hazards

#### 2.20.3.1 Functional clothing to combat occupation hazards of farm workers

The present study was planned to identify the occupational health hazards and existing dress patterns of farm workers engaged in agriculture, agriculture allied and textile sector. The study was conducted by all the centres in their state and respective operational villages. Every centre selected 4 to 7 activities of their region and minimum 30 respondents were selected randomly for each activity for identification of their occupational health hazards. Occupational health problems of workers engaged in various activities are given below :

**Table 27. Problems encountered by farm workers while performing various farm activities**

| Problems encountered during field activities | Paddy (Rice) (%) | Okra (Lady finger) (%) | Ber (%) | Sugarcane (%) |
|---|---|---|---|---|
| **Transplantation** | | | | |
| Back ache due to bending | 32 (53.33) | - | - | - |
| Fungal infection in foot | 62 (86.7) | - | - | - |
| Fungal infection in hands | 34 (56.7) | - | - | - |
| Discomfort/ itching due to wetting of clothes at lower body parts | 53 (88.3) | - | - | - |
| Transportation of seedlings /saplings | 5 (8.3) | - | - | - |
| **Harvesting/picking** | | | | |
| Cut in hand/arms | - | 27 (90) | 37 (92.5) | 30 (100) |
| Cut in other body parts | - | 27 (90) | 17 (42.5) | 12 (40) |

| | | | | |
|---|---|---|---|---|
| Itching/irritation in hands | 20 (33.3) | 27 (90) | 19 (47.5) | - |
| Skin rashes | | 5 (16.7) | - | 13 (43.3) |
| **Threshing** | | | | |
| Soiling of body parts | 35 (58.3) | - | - | - |
| Itching/irritation in hands and other body parts | 17 (28.3) | - | - | - |
| Eye irritation/itching | 35 (58.3) | - | - | - |
| Throat irritation | 27 (45) | - | - | - |
| Running nose/Sneezing | 31 (51.6) | - | - | - |
| Breathlessness | 7 (11.6) | - | - | - |
| Allergic bronchitis | 8 (13.3) | - | - | - |

(Note : Figures in parenthesis indicate percentage)

Discomfort/ itching of lower body parts due to wetting of clothes (86.3%) was the most common problem observed during rice transplantation, followed by fungal infection in foot (86.7%). During threshing, major occupational problems were soiling of body parts and eye irritation/itching (58.3% each), followed by running nose/sneezing (51.6%). Occupational problems of okra pickers were cuts in hands (90%), cuts in other body parts (90%), itching/irritation in hands (90%) and skin rashes (16.7%). Problems of *ber* pickers were cuts in hands (92.5%), cuts in other body parts (42.5%) and itching/irritation in hands (47.5%). Based on the problems reported, protective clothing was designed to mitigate these and improve efficiency.

### 2.20.3.2 Clothing care practices

The study was conducted by all the centers in their respective operational villages and the city. Each center selected 60 families (30 urban and 30 rural) to collect the data regarding use of plant sources for washing of different types of clothes *viz.*, use of washing, whitening and stiffening agents.

In rural households, washing agents and washing practices used for various types of clothes. For washing agents, detergent powder was used by maximum number of families (72.2%) for washing of cotton clothes followed by washing soap (65.2%). A similar trend was observed for washing of cotton blends and synthetic clothes. However, for coloured cotton clothes, use of washing soap was more than that of detergent powder i.e., 89.6% and 63.7%, respectively. To wash silks, maximum families used detergent powder (42.6%) followed by washing soap (17.4%), neutral soap (17.03%), dry-cleaning (12.9%) and *reetha* nuts (7.4%). For washing of wool and wool blended knit wears, about 40% respondents used detergent powder or washing soaps while 20% used neutral soaps.

For washing of white cotton clothes, it was observed that 52.6% respondents washed these in cold water while the percentage was 56.2% for coloured clothes. Wool and wool blended winter knit wears were soaked in cold soap solution by 62.6% respondents whereas only 6.3% respondents soaked these in hot soap solution. For blueing of clothes, Ujala was being used by 40.7% respondents. For brightening of blended clothes, ranipal was used by a very few respondents (8.5%) and ujala was used by 17.4 percent respondents. For stiffening of cotton clothes, the respondents from Hyderabad centre were using all types of starches i.e. rice, sago, maida and arrow root. Respondents from Ludhiana and Jorhat were also using rice starch. Instant stiffening agent was only being used by Ludhiana centre.

With regards to the use of washing agents for laundering of clothes, majority of the respondents (81.1%) used detergent powder for washing of white cottons, followed by washing soap (41.1%). About 1/4$^{th}$ of the respondents (24.4%) were even dry-cleaning white cotton. With regards to coloured cotton clothes, washing soap was used by majority of the respondents (65.5%) followed by detergent powder

(48.9%). Dry-cleaning was done by 34.4% respondents and 12.2% respondents used as neutral soap. Arrowroot was the commonly used stiffening

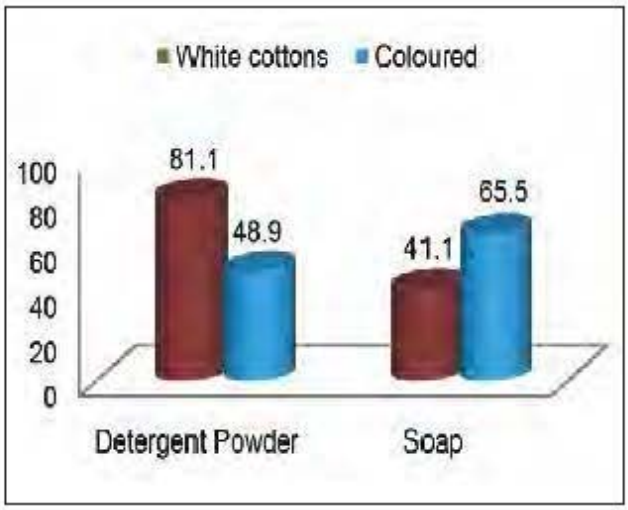



Fig. 75. Use of washing agents for laundering of clothes

agent for cotton as reported by majority of the respondents followed by instant stiffening agent (Revive), sago and refined flower.

**2.20.3.3 Identification of natural plant sources for textile printing**

All the centres reported that the respondents used rapid, pigment, sulphur, vat and direct dyes for textile printing, tie and dye as well as batik. Natural dyes were used for the purpose only in Udaipur. For printing, besides well known guar gum, other natural thickening agents were also being used in Rajasthan like gum acacia or tamarind seeds gum. thickening agents removed by soaking in water and rinsing were: gum acacia (39.2%), guar gum (16.7%) tamarind seed gum (3.33%), rice starch (8.33%) and synthetic thickeners (33.3%). Respondents of Assam centre (20%) were also using the same technique for removal of synthetic thickener. All the respondents (100%) of Ludhiana removed thickening agents through steaming.

**2.20.3.4 Optimization of extraction technique of non-conventional fibres from plant sources and analysis of their properties**

To evolve appropriate technologies for extraction and processing of unconventional fibres for production of woven and non woven fabric, Palampur centre developed a composite fabric from *Grewia optiva*. The fibre was retted using water retting for fiber extraction and approximately 25% of fibre was obtained in almost 20 days during June-July. Scouring of selected fibres was done by using solution of sodium hydroxide and detergent powder at boiling temperature and on the basis of visual analysis, best time for scouring of fibre was found 30 minutes. The best method for bleaching the fibres was 5% hydrogen per oxide which made this more straight and cleaner. Slight variation in elongation at break of bleached and unbleached fibres was observed but in case of fibre tenacity great loss was observed. Different value added *Grewia optiva* woven products *viz.* bags, blinds and table runners were developed.

**2.20.3.5 Value addition of Hemp and Bichchoo Grass**

Value addition of *Cannabis sativa* (hemp) and processing of *Girardinia diversifolia* (*bichchoo* grass) fibre was carried out. Fibers were opened by separating the fibres manually and combing was done by hand and carding by machine. Hemp fibres are coarser, stiffer and have low cohesion and were thus, manually spun on *Bageshwari charkha*. Prepared hand spun yarn was dyed with hot brand reactive dye and used as weft yarns being coarser and uneven these were combined with the cotton warp for production of union fabrics. The valuable inherent properties of hemp fibres were found suitable for the production of decorative woven fabrics. The properties of union hemp fabric and *Bichoo grass* after retting with different methods are given in Table 28.

Fig. 76. Carding of fibres by machine

**Table 28. Physical properties of hemp union fabric**

| Properties | Values |
|---|---|
| Fabric count (ends x picks per inch ) | 24 x 15 |
| Fabric weight (g/m$^2$) | 343.30 |
| Fabric thickness (mm) | 1.23 |
| Tensile strength (kg/cm$^2$) | Warp 35.48<br>Weft 66.94 |
| Elongation at break (%) | Warp 2.24<br>Weft 1.18 |
| Tearing strength (kg) | Warp 5.26<br>Weft 5.53 |
| Flexural rigidity (mg-cm) | Warp 12.18<br>Weft 225.16 |
| Drape coefficient (F) value | 0.51 |
| Crease recovery (degree angle) | Warp 98.4<br>Weft 96 |
| Abrasion resistance (at different no. of cycles) | 1000- 0.0069<br>2000- 0.0124<br>3000- 0.0207<br>4000- 0.0235<br>5000- 0.0305 |
| Pilling resistance (rating) | 1 |
| Wettability (rating) | 0 |
| Dimensional Stability (shrinkage %) | Warp 4.80<br>Weft 1.01 |
| Ultra Protection Factor | 16.76 UPF rating |

### 2.20.3.6 Effect of enzymatic treatment on Deccani wool

Based on tensile strength, Andhra Pradesh centre selected one variety i.e. *Deccani* black (*jodipi*) for the study as its fibers had more strength than other fibres. The fibres were treated with two selected enzymes, papain (Enzyme-I) and pepsin (Enzyme-II) with three different concentrations. On the basis of SEM analysis, one percent concentration was selected for the study. Properties of enzymatically treated fibres are given below:

**Table 29. Properties of enzyme treated fibres**

| Samples | Linear density (Tex) | Moisture content (%) | Moisture regain (%) | Breaking load (gms) | Tenacity (gms/ Tex) | Tensile strain (%) | Extension at break (mm) | Relative extension (%) | Secant modulus (g/Tex) | Nominal rupture energy (g/Tex) |
|---|---|---|---|---|---|---|---|---|---|---|
| Control | 27.0 | 16.0 | 19.0 | 48.33 | 1.79 | 46.92 | 4.69 | - | 0.039 | 41.09 |
| 1% Papain | 21.5 | 14.0 | 16.2 | 30.43 | 1.41 | 33.68 | 3.37 | 73.4 | 0.042 | 23.82 |
| 2% Papain | 21.0 | 13.0 | 14.9 | 28.31 | 1.34 | 38.23 | 3.82 | 83.2 | 0.035 | 26.76 |
| 3% Papain | 18.1 | 12.0 | 13.5 | 20.77 | 1.14 | 62.06 | 6.21 | 135.3 | 0.018 | 35.62 |
| 1% Pepsin | 22.3 | 15.0 | 17.8 | 32.76 | 1.46 | 49.53 | 4.95 | 107.8 | 0.029 | 38.38 |
| 2% Pepsin | 21.7 | 13.0 | 14.9 | 28.38 | 1.30 | 23.15 | 2.31 | 50.3 | 0.056 | 15.11 |
| 3% Pepsin | 19.6 | 12.0 | 13.6 | 24.38 | 1.24 | 57.03 | 5.70 | 124.2 | 0.022 | 35.47 |

Natural sources were selected for the washing of cotton fabric from local areas of Uttarakhand. Five samples of cotton fabric of size 4 x 4 inches and weight 2.8g were prepared for washing by applying soil and artificial sweat on surface of the fabric using standard method for assessment of cleansing efficiency of the selected plant sources. The washed samples were assessed by measuring whiteness index. The whiteness index of white control cotton fabric and treated samples are given below:

**Table 30. Whitening index of the samples washed with different natural sources**

| Samples → / Standard ↓ | Whiteness index of washed samples | | | | |
|---|---|---|---|---|---|
| | 1 (Sisal) | 2 (Wild carrot grass) | 3 (Mustard) | 4 (Finger millet) | 5 (*Rehu*) Mud |
| Control cotton fabric (W.I. 93.931) | 93.755 | 93.392 | 93.215 | 93.16 | 93.502 |

Parbhani centre developed method for extraction of starch from mango kernels to be used as a substitute for cereal starches as stiffening agents. Kernels were steeped in tap water for twenty four hours, washed with water and then ground with addition of 1% Potassium Meta-bisulphate. The paste was mixed with water with MLR 1:20, strained through double fold muslin cloth. The crude starch was then treated with 0.1 N Sodium Hydroxide solutions and washed with distilled water. The washed residue was then treated with 0.1 N Hydrochloric acids to get white starch. Its stiffening properties are being tested.

Udaipur centre selected plant sources for textile application namely tamarind seed for printing, water chestnut for sizing and jatropha seed oil for soap making.

### 2.20.4 Empowerment of rural youth and management of their socio-emotional problems

Rural youth represents a numerically dominant, potentially resourceful segment of Indian population but majority has a low level of education, lacks opportunities for guidance and counseling as well as for engaging in various development oriented activities. Two projects have been planned in Child Development component of AICRP on Home Science to address these challenges. One project is related to empowerment of academically backward rural youth while the other focuses on the management of their socio-emotional problems.

For the project on empowerment of rural youth, a total of 940 school going adolescents in the age group of 11 to 17 yrs (VI$^{th}$-X$^{th}$ standard) who are academically weak, have been selected. The academically week youth have been identified on the basis of their academic performance (last 10-15% students) and after taking feedback from their teachers. The sample comprises of 402 girls and 503 boys.

For the second project on sensitizing rural youths and their mothers for management of their socio-emotional problems, a total of 960 youth - school drop outs and those who have discontinued education after school, have been selected. Their ages range between 18-24 years. The sample, comprising of 532 girls and 428 boys has been selected in various aspects using checklists, questionnaires and psychological tests. Such scales are either to be developed or in certain cases existing scales are to be modified. Behaviour Rating Scale is to be used on academically backward sample selected for the study. The scale has 135 statements covering 10 different areas of behaviour - thought disorder (TD), physical aggression (PA), non-compliance (NC), anxiety (AN), distractibility (DS), depression (DP), hyperactivity (HY), withdrawal (WD), self-esteem (SE), verbal aggression (VA), somatic concern (SC) and sex (SX). Scoring is on four point scale. The scale is to be pilot tested and modifications will be made accordingly.

All the centres are presently working on the scales to measure the socio-emotional problems of adolescents, family environment and the coping skills of parents and adolescents while dealing with various problems.

Sixty three training programmes were conducted by all the ten centres on life skill education and skill development in agriculture and allied areas. A total of 1991 rural adolescent girls and boys who discontinued studies along with rural mothers, pre-school children, anganwadi workers and KVK scientists have benefitted.

Fig. 77-78. Skill upgradation and educational programme for rural youth

### 2.20.5 Empowerment of Women

### 2.20.5.1 Techno-socio economic dimensions of empowerment of women in rice farming

The rice farming eco systems of the states were identified from secondary sources for techno-socio economic dimensions of farm families in rice farming

systems. The data collection tool was finalized after consulting rice scientists and statistician. Data will be collected from 4500 small / marginal rice farming families giving due representation to all the rice farming eco-system in all the nine states. The project aims to suggest successful models to empower women in various rice farming systems as are prevalent in the nine coordinating states.

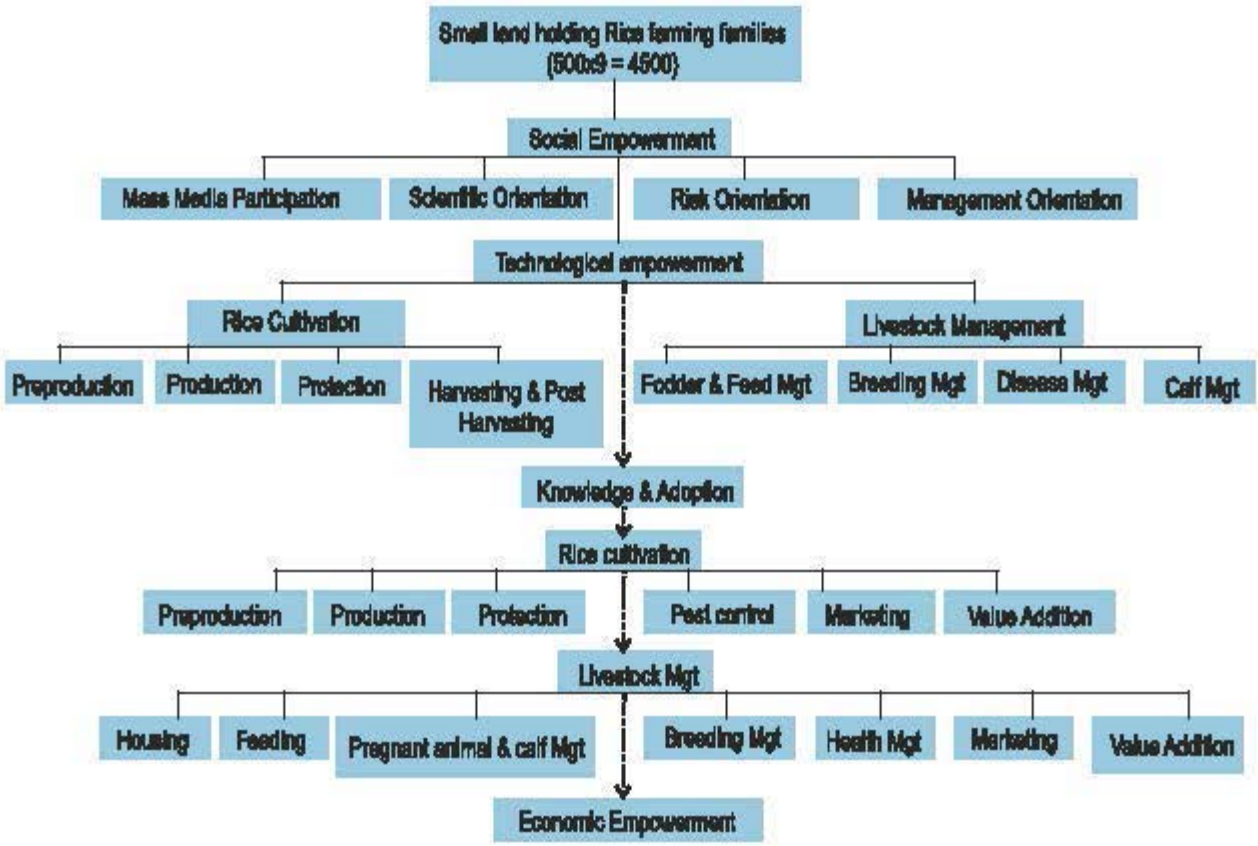



Fig. 79. Data collection tool and sampling plan

It is evident that the area under rice cultivation is the highest in Himachal Pradesh (77.1 lakh ha) followed by Andhra Pradesh (40.96 lakh ha), Punjab (28.18 lakh ha) and Assam (25.37 lakh ha). Haryana, Karnataka and Maharashtra have 12 -16 lakh ha under rice cultivation while Uttrakhand and Rajasthan have only 2.8 lakh ha and 1.34 lakh ha (Fig. 80a). The production in Andhra Pradesh and Himachal Pradesh is almost the same (about 129 lakh tones), followed by 105 lakh tones in Punjab. The least yield was in Uttrakhand and Rajasthan (Fig. 80b). It is noteworthy that the production was highest in Punjab (3741 kg/ha), followed by Andhra Pradesh (3146 kg/ha), Haryana (3044 kg/ha), Karnataka (2793 kg/ha) and Uttrakhand (2121 kg/ha). Although in Assam, area and production are high, yield is lesser i.e., 1780kg/ha. Even Maharashtra and Rajasthan have better productivity when compared to Himachal Pradesh which has the highest area, but the yield is the least 1673 kg/ha (Fig. 80c). Production details of rice cultivation in different states are given below:

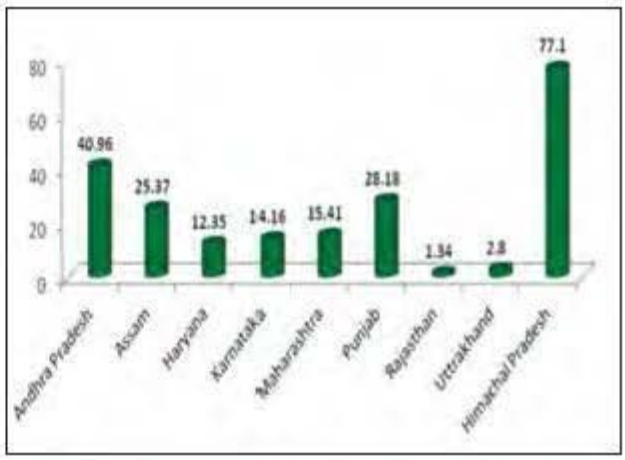



Fig. 80a. Area under cultivation of rice (lakh hectares)

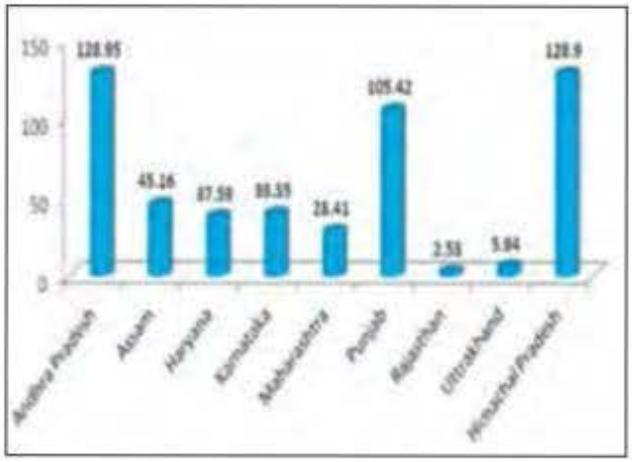



Fig.80b. Production of rice cultivation (in lakh tonne)

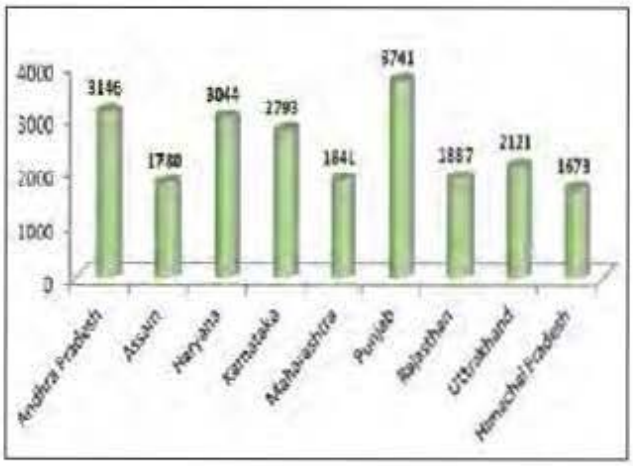



Fig.80c. Yield (kg/ha)

**Table 31. Status of SHG's numbers in different States**

| States | Total SHGs in the state | Total SHGs in the selected district | SHGs selected for the study |
|---|---|---|---|
| Assam | 1338 | - | 17 |
| Andhra Pradesh | 1659056 | 4262 | 43 |
| Uttarakhand | 18383 | 1370 | 33 |
| Haryana | 10213 | 7250 | 52 |
| Himachal Pradesh | 11305 | 1865 | 45 |
| Maharashtra | 204777 | 2230 | - |
| Punjab | - | 1139 | 59 |
| Karnataka | 221303 | 7761 | 159 |

### 2.20.5.2 Dynamics and performance of SHGs

To study the dynamics and performance of women's Self Help Groups across the country, tool for data collection has been finalized. Proportionate data was collected from 408 SHGs and 4145 SHG members covering all the nine states. The status of SHGs in nine cooperating states reveals that the highest number of SHGs (about 16.60 lakhs) is in Andhra Pradesh followed by Karnataka (2.2 lakhs) and Maharastra (2 lakhs). The least number of SHGs (1338) was seen in Assam. The SHGs registered in 2008-2009 have been selected for the study with the premise that as if SHGs have sustained for at least five years, these would have made differences in the lives of the women. Maximum SHGs were selected from Karnataka (159) and the least from Assam (17). Of the SHGs registered in 2008-09, the maximum disintegration of groups was in Haryana (71.15%), followed by Uttarakhand (36.30%). This was attributed mainly to poor group dynamics. Dormant groups are those who are into money saving, lending and borrowing. These are more prevalent in Punjab (69.49%), Himachal Pradesh (62.19%) and Karnataka (44.02) while Andhra Pradesh and Assam have dormant groups. Active groups are those who have taken up entrepreneurial activities either individually or in group. Cent per cent groups in Andhra Pradesh and Assam are active followed by Uttarakhand (57.58%) and Karnataka (52.84%).

### 2.20.5.3 Average size of SHG members

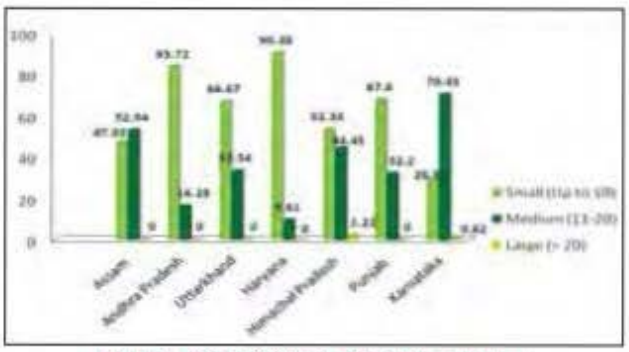



Fig. 81. Average size of SHG members

The maximum number of SHGs are formed by government agencies (75-100%). The average size of the group is 11-20 members in the states of Karnataka (70.43%) and Assam (52.94)%), while in other states, the groups are smaller i.e. up to 10 members. Only two per cent groups one each in Himachal Pradesh and Karnataka have more than 20 members.

One of the major functions of SHGs is that each member should save money on a regular basis however small the amount may be. Smaller amounts of Rs. 10-20 are saved on weekly basis where as higher amounts (21-100) are saved on monthly basis. In Karnataka, saving is only Rs. 10-20 on a weekly basis because the groups are mainly of landless labours. Of the total SHG members studied, only 28.65% are into entrepreneurial activities while a larger percent (71. 35%) are only into micro financing. Agriculture related entrepreneurial activities top list out of all the entrepreneurial activities in Andhra Pradesh (84.83%), Uttarakand (80.78%) and Himachal Pradesh (75.28%). The activities undertaken by SHGs include dairy, poultry and goat & sheep raring. Trading is another activity where many women are involved in Haryana (92.66%), Karnataka (39.50%) and Punjab (30.00%). These include grocery shop, petty shops, saree selling, fruit & vegetables selling and bakery. In Assam weaving is a successful enterprise where as in Karnataka food items like papad & roti making, vermicelli making, flour mill and chilly pounding units have been successful. The group money in the case of Karnataka has been mainly invested to buy machines for the enterprise. The highest group income generation for vermicelli making is between Rs. 40,000-50,000/year in Karnataka, and poultry earned between 30,000-40,000/year. In Assam, the income generation from most of the activities was between 10,000-20,000/year. Average annual income/ per year from individual activity was the highest (Rs.55,909/-) in Haryana, followed by Punjab (Rs. 38,778/-) and Himachal Pradesh (Rs. 23,831/-).

# 3. TRIBAL SUB PLAN (TSP) PROGRAMMES

Post *Phailin*, the Directorate adopted two clusters of cyclone affected tribal villages in Mayurbhanj and Gajapati districts, for implementation of Tribal Sub Plan (TSP) Scheme. These two districts have the tribal population of more than 50% and were among the worst-hit by the cyclone *Phailin* and subsequent cloudburst induced flood. This had resulted in heavy mortality of the livestock and damage to the livelihood.

Fig.62. Interface with tribal families in Gajapati district

Scientists-Farm Women interfaces were organized in these clusters with the objectives of assessing the perceived needs, gaps, and to plan the interventions under TSP scheme. The first interface was organized in three tribal villages *viz.*, Tarajodi, Ambeduvi Talasahi and Teladah Badapanipan Khuntapal under Shamakhunta block of Mayurbhanj on 22nd October, 2013. The second interface was organized in three tribal villages *viz.*, K.M Bhalia Sahi and Sabarpalli under R. Udaygiri block, and Saralapadar under Nuagada block in Gajapati on 15th November, 2013. Based on the need assessment during the interfaces, the interventions in the forms of, animal health camps, skill upgradation on scientific grain storage, demonstration of maize de-husker-cum-sheller, awareness on drudgery reducing women-friendly farm tools and nutritional assessment studies were carried out. The DRWA team consisting of Dr. Anil Kumar, Dr. J. Charles Jeeva, Ms. Gayatri Moharana, Dr. Kushagra Joshi, Mr. B.C. Behera and Mr. Pragati Kishore Rout coordinated the programmes.

## 3.1. Women in Agriculture Day celebrations in a *Phailin* affected village

The Directorate celebrated 'Women in Agriculture Day' by organizing Animal Health Camp at village Tarajodi. Though farming is the primary occupation in the village, animal husbandry plays a major role in supporting livelihood, especially that of the farm women. On an average, each family had 20 goats and 15-25 poultry birds, in addition to draught and milch animals. The cyclone 'Phailin', and the subsequent floods, resulted in heavy mortality of livestock and threat of contagious diseases. Realizing the significance of livestock in the livelihood of tribal families, and the poor access to animal health care, this camp was organized in association with the Animal Resources Department, Govt. of Odisha, Mayurbhanj, to provide veterinary services at the doorstep. About 500 cattle, buffalo as well as small animals such as goats and poultry birds were treated in the camp. Apart from vaccination, mass treatment regarding debility, anorexia, diarrhea, delayed maturity, sprain, cough, fever, wounds, bacillary white diarrhea etc. was given to the animals. The beneficiaries were also given tips on routine animal health care.

The camp was followed by celebration of 'Women in Agricultural Day-2013', which was inaugurated by Dr. Neelam Grewal, Director, DRWA. In her inaugural address, the Director highlighted the role of DRWA in gender mainstreaming and its livelihood support to tribal women. Dr. Nityananda Das, Chief District Veterinary Officer, Mayurbhanj District, Mr. Jagannath Patra, Programme Coordinator, KVK- Mayurbhanj-I

Fig. 63. Dr. Neelam Grewal, Director, DRWA with the participants

and Dr. Anil Kumar, Principal Scientist, DRWA addressed the participants.

### 3.2. Awareness programme on scientific and hygienic storage of food grains to prevent post harvest losses

An awareness programme on scientific and hygienic storage of food grains to prevent losses during storage was organized on 12th December, 2013 at village Tarajodi. About 50 tribal farm women attended the programme. Based on the need assessment of the families carried out after *Phailin*, metallic grain storage

Fig. 84. Distribution of metallic food grain storage bins to 'Phailin' affected tribal

bins were also distributed on this occasion to 50 tribal women to promote effective pest management and scientific storage for taking care of the food and nutrition security of the families.

### 3.3. Awareness cum skill upgradation programme on drudgery reducing implements for farm women

An awareness cum skill upgradation programme on 'drudgery reducing implements for farm women' was conducted on 5th - 6th March, 2014 in village Tarajodi.

Fig. 85. Scientists carrying out nutritional assessment study of tribal families

The programme included awareness creation, knowledge and skill upgradation through demonstration of gender-friendly minor farm tools. This was followed by distribution of hampers of minor farm tools such as, improved sickles, hand cultivator, khurpi, tubular maize sheller and ring cutter to 90 tribal farm women who participated in the programme. The programme was followed by 'Nutritional Assessment studies' covering farm women and children. About 90 tribal farm families participated in the programme. All the participants actively took part in the programme.

## 4. TECHNOLOGY WEEK FOR WOMEN IN AGRICULTURE

The Directorate celebrated 'Technology Week for Women in Agriculture' from 22nd-27th January, 2014. The celebrations consisted of three off-campus and two on-campus programmes.

### 4.1. Off-campus programmes

- The 'Technology Week' celebrations started with an off-campus programme on 22nd January, 2014 in a remote tribal village *viz.*, K.M. Bhalia Shahi in R. Udayagiri block of Gajapati District. As a part of the programme, an 'Animal Health Camp' was organized in which 230 large animals such as bullocks and cows; 249 small animals (goats and sheep) as well as 302 poultry birds were given mass treatment. The programme also included knowledge and skill upgradation through demonstration of gender-friendly maize dehusker cum sheller, developed by DRWA using ergonomic and mechanical considerations. Awareness was created on 'Drudgery

Fig. 86. Demonstration of gender-friendly maize dehusker cum sheller

Reducing Implements for Farm Women'. This was followed by distribution of hampers of women-friendly, drudgery reducing minor farm tools such as vegetable cutters designed by DRWA, hand cultivator, khurpi, tubular maize sheller and ring cutter to all the tribal families. A 'Knowledge Debate' on the topic 'Women's Role in Ensuring Household Nutritional Security' was also conducted. A number of tribal women participated in this, and three winners were selected. About 70 tribal farm families benefitted from the programme. All the participants showed enthusiasm in the activities undertaken and were appreciative of the efforts of the DRWA team consisting of Dr. Anil Kumar, Dr. J. Charles Jeeva, Ms. Gayatri Moharana, Dr. Kushagra Joshi and Mr. Pragati Kishore Rout.

Fig. 87. Animal health camp

- The second off-campus programme consisted of a 'Scientists-Farmers Interaction' and training on protected cultivation of high value crops, organised at village Sakhigopal in Puri district on 23rd January, 2014. In this programme, the Scientists highlighted the importance of technological interventions like improved varieties, seed treatment, seedlings raising techniques of vegetables in protected structure, erection of low cost protected structure, grading and marketing of fruits and vegetables. Critical inputs like seeds of improved varieties of bitter gourd, okra, pumpkin, cucumber, ridge gourd and fertilizer were distributed to the farmers. Further, a 'Knowledge Debate' among farmwomen was also conducted to select three best farmwomen. More than 60 farmers, including farmwomen, participated in this event. Dr. A.K. Shukla, Dr. Naresh Babu and Dr. (Mrs) Abha Singh, Scientists of DRWA coordinated the programme. The programme was assisted by Mr. Manoranjan Prusty and Mrs. Tapaswini Sahoo, Technical Assistants of the Directorate.

- The third off-campus programme was conducted on 24th January, 2014 in a tribal village Guptapada in Jatni block of Khurda district. The programme was conducted in association with Central Poultry Development Organization, Bhubaneswar. A 'training on rearing of backyard poultry' was organized in which farm women/ farm families were given tips on the benefits of rearing backyard poultry as well as the precautions to be followed for getting maximum benefit. The process of immunization of chicks was demonstrated and skill imparted to farm women and master trainers. The master trainers then vaccinated on the spot 250 poultry chicks. The programme was followed by 'Scientists Farm Women Interface' where a number of technical queries were attended. A 'Knowledge Debate' among farm women, on the topic 'Involvement of Farm Women in Agriculture and Allied Areas' was also conducted. About 60 tribal farm families participated in this programme. The DRWA team consisting of Dr. Sabita Mishra, Dr. Anil Kumar, Dr. Ananta Sarkar, Mr. B.C. Behera and Mr. Subrat Kumar Das coordinated the programme.

### 4.2. On-campus programmes

In continuation of the 'Technology Week for Women in Agriculture', two days on-campus programmes were organized. On 25th January, 110 farm women from Guptapada, Haridamoda, Sulia and Gorlapokhori villages in Odisha undertook an exposure visit to the Directorate. Women saw technological models on integrated farming systems, and also visited the fields and laboratories of horticulture, livestock, fisheries, farm machinery and home science, that showcased various models of livelihood and nutrition security. They also participated in the Interactive Session with the Scientists of this Directorate, and enriched their knowledge and clarified their technical queries.

On the Concluding Day, 27th January, 2014, about 400 farm women from different parts of Odisha came for an Exposure Visit to DRWA Campus. The farm women visited the fields and labs of the Directorate as well as got an opportunity to see the exhibition stalls put up by Central Rice Research Institute (CRRI), Central Avian Research Institute (CARI), Central Horticultural Experiment Station (CHES), Central Tuber Crops Research Institute (CTCRI), Directorate of Water Management (DWM), Central Institute of Freshwater Aquaculture (CIFA) and a public sector

undertaking. They also attended an interface with the experts from different fields of agriculture, in which various technical queries raised by them were addressed.

Prof. Manoranjan Kar, Hon'ble Vice-Chancellor of Orissa University of Agriculture and Technology (OUAT), was the Chief Guest at the Valedictory Session of the 'Technology Week'. In his valedictory address, the Chief Guest expressed hope that the 'Technology Week' celebrations of the Directorate would create a significant impact on the enrichment of technological knowledge of farm women, which will result in their livelihood enhancement in the long run. Earlier Dr. Neelam Grewal, Director, DRWA delivered welcome address and gave a detailed report about the activities carried out during the week. Prizes were distributed to the winners of knowledge debates conducted during the three off-campus programmes. Nearly 1200 farm women/ farmers participated in the off-campus and on-campus programmes of 'Technology Week' celebrations, and showed enthusiasm in the activities undertaken and were appreciative of the efforts of the DRWA.


Fig. 88. Dr. Neelam Grewal, Director, DRWA delivering the Welcome Address

Fig. 89. Address by the Chief Guest, Prof. Manoranjan Kar, Vice-Chancellor, OUAT

Fig. 90. Section of the participants looking at women friendly equipment

# 5. NEW DYNAMIC WEBSITE OF DRWA

The website of the Directorate (www.drwa.org.in) has been totally revamped with the addition of dynamic and user interactive features. It not only has a new look and feel, but numerous features like Latest Event Details, Farmers' Corner, Upcoming Events, Image Gallery, Latest News, Event Archives etc. have been added to enhance the user experience. It also provides information on all the research activities and achievements of DRWA. Recent information will remain on the 'Home Page' and will be moved to 'Archive' after a period of one month. The information on training programmes, recruitments of staff, tender notices and other circulars of the Directorate are periodically uploaded in the Directorate's Website.

The Website also has the following additional features:

a) Population Clock : It is a dynamic tool that predicts the population of India at this moment of time

b) Flag Counter: It will country wise display the number of visitors

c) Social media integration

This new website was launched by Prof. Manoranjan Kar, Hon'ble Vice-Chancellor of Orissa University of Agriculture and Technology (OUAT) on 27th January, 2014, during the Concluding Day of 'Technology Week for Women in Agriculture'.

Old Website


New Website

# 6. IMPORTANT MEETINGS

## 6.1 14th Meeting of Research Advisory Committee, held during 05th-06th April, 2013

The 14th Research Advisory Committee (RAC) meeting was held on 05th -06th April, 2013 under the Chairmanship of Dr. K. Narayana Gowda, Vice-Chancellor, University of Agricultural Sciences, Bengaluru in the Directorate of Research on Women in Agriculture, Bhubaneswar. The following RAC members were present in the meeting.

| | | |
|---|---|---|
| Dr. K.Narayana Gowda | - | Chairman |
| Dr. V. Venkatasubramanian | - | Member |
| Dr. V.S. Korikanthimath | - | Member |
| Dr. Malavika Dadlani | - | Member |
| Dr. V.K.Tewari | - | Member |
| Dr. M.P.S. Arya | - | Member |
| Dr. S.K. Srivastava | - | Member-Secretary |

At the outset, Dr. M.P.S. Arya, Director (Acting), DRWA welcomed the Chairman and members of RAC, as well as the Scientific staff of DRWA and explained briefly the research achievements and other developments of the Institute in his introductory remarks. He also highlighted the objectives of DRWA, budget utilization, staff position, capacity building programmes, infrastructure, as well as the proposed theme areas of research for the XII Plan period.

Dr. K. Narayana Gowda, Chairman expressed his happiness over the efforts made by the Institute in organising various activities. In his opening remarks, he emphasized that women are going to be the major farmers of the future. Hence, the needs of small and marginal women farmers need to be identified and addressed. Since the youth is moving away from farming, Attracting and Retaining Rural Youth to Agriculture (ARYA) is need of the hour to address food security of the country. The cost of production needs to be brought down as well as increase the profit margins. He suggested that farming system approach is one of the important areas which requires lot of attention. UAS, Bangalore has started integrated farming models which can be an opportunity for DRWA scientists to learn about those models. He appreciated Dr. Krishna Srinath, the former Director of DRWA for her efforts in bringing national / global perspective to DRWA by undertaking Network Projects and organising National Consultation on Women in Agriculture and Global Conference on Women in Agriculture at NASC, New Delhi. The Chairman suggested that the former Directors should be included as one of the members of RAC and requested ADG (AE) to communicate this special message to the Competent Authority of the Council.

The Chairman suggested that DRWA should play major role in identifying women friendly technologies which can be refined and validated. After the opening remarks by the Chairman, action taken report on the proceedings of the 13th RAC meeting was presented by the Member Secretary which was discussed and approved.

Research achievements of the Directorate were presented by Dr. M.P.S. Arya, Director (Acting), DRWA. He explained that the AICRP on Home Science is being carried out in five disciplines with eleven projects. Salient achievements of eight completed projects, including six network projects and six ongoing projects, were presented. Identified theme areas for XII Plan period were also discussed. RAC observed that the commitment of the scientists of DRWA has been praiseworthy. It was suggested that one member from the previous RAC should be included in the new RAC to strengthen and maintain the transition from one RAC to another. The meeting came to an end with the vote of thanks.

Fig. 91. RAC meeting in progress

### 6.2 13th Meeting of Institute Research Council of DRWA, held during 09th -10th April, 2013

The 13th meeting of Institute Research Council (IRC) of the Directorate of Research on Women in Agriculture, Bhubaneswar (ICAR) was held on 09th -10th April, 2013 to discuss the future course of action and progress of research projects. At the outset, Dr. S.K. Srivastava, Member-Secretary welcomed Dr. M.P.S. Arya, Chairman, IRC and Director (Acting), DRWA, Dr. V.P. Chahal, Council Nominee and all the members of the Institute Research Council. Thereafter, presentations and discussions on the research projects were made under different sections. A total of 13 new projects, seven ongoing projects, six completed Network projects and one completed Institute project were discussed. Dr. V.P. Chahal, in his observation mentioned that scientists have given good thought for the preparation of the new projects. He suggested that the duration of the network projects should be within the plan period for proper utilization and management of Institute budget.

The Chairman, in his concluding remarks, expressed satisfaction for the active participation of members and fruitful discussion in the IRC meeting. He appreciated the efforts of the scientists in carrying out the research work and framing the new research projects inspite of some constraints. He conveyed his gratitude to the DDG (AE) for deputing the Council Nominee for IRC meeting and thanked Dr. V.P. Chahal, Council nominee, for his valuable suggestions in the meeting.

### 6.3. 16th Meeting of Institute Management Committee held on 28th February, 2014

The 16th meeting of Institute Management Committee (IMC) was held on 28th February, 2014 in the Directorate of Research on Women in Agriculture, Bhubaneswar under the chairmanship of Dr. Neelam Grewal, Director, DRWA. Shri R.B. Gopalan, IAS, Director of Agriculture & Food Production, Govt. of Odisha, Dr. S.S. Nanda, Dean (Extension Education), Odisha University of Agriculture & Technology, Dr. (Mrs) Akella Vani, Principal Scientist, Indian Institute of Horticultural Research, Dr. (Mrs) Sandhya Shenoy, Principal Scientist, National Academy of Agricultural Research Management, Dr. (Mrs) K. Usha, Principal Scientist, Indian Agricultural Research Institute and Shri. S.R. Khuntia, Chief Finance and Accounts Officer, Central Rice Research Institute,attended the meeting. Shri. G.S. Rao, Administrative Officer, DRWA and Member-Secretary of the IMC coordinated the meeting. The IMC appreciated the overall progress of the Directorate and provided directions for the future programmes and activities of the Directorate.

Fig. 92. IRC Meeting in progress

Fig. 93. IMC Meeting in progress

# राजभाषा कार्यान्वयन
# 7. OFFICIAL LANGUAGE IMPLEMENTATION, 2013-14

1. राजभाषा अधिनियम की धारा 3(3) का अनुपालन पूर्णतया सुनिश्चित करने हेतु प्रयासों को बढ़ाया गया है।

2. राजभाषा नियमों के अनुसार प्रत्येक तिमाही में राजभाषा कार्यान्वयन समिति की बैठकें एवं हिंदी कार्यशाला नियमित रुप से आयोजित की गईं। जिसका विवरण निम्न प्रकार है।

| क्र.स | तिमाही | राजभाषा कार्यान्वयन समिति की बैठक आयोजन की तथी | तिमाही हिंदी कार्यशाला का आयोजन की तिथी | कार्यशाला का विषय |
|---|---|---|---|---|
| 1 | अप्रैल से जून 2013 | 14-06-2013 | 22-06-2013 | कामकाजी हिंदी की सरलता व हिन्दी शब्दावली |
| 2 | जुलाई से सिम्बर 2013 | 02-08-2013 | 28-09-2013 | देवनागरी लिपि, वर्तनी एवं प्रयोग |
| 3 | अक्टूबर से दिसंबर 2013 | 30-12-2013 | 31-12-2013 | राजभाषा नीति, कार्यान्वयन निरीक्षक |
| 4 | जनवरी से मार्च 2014 | 19-03-2014 | 22-03-2014 | सरकारी कामकाज में हिंदी के प्रयोग में अशुद्धियाँ उनके निवारण के उपाय |

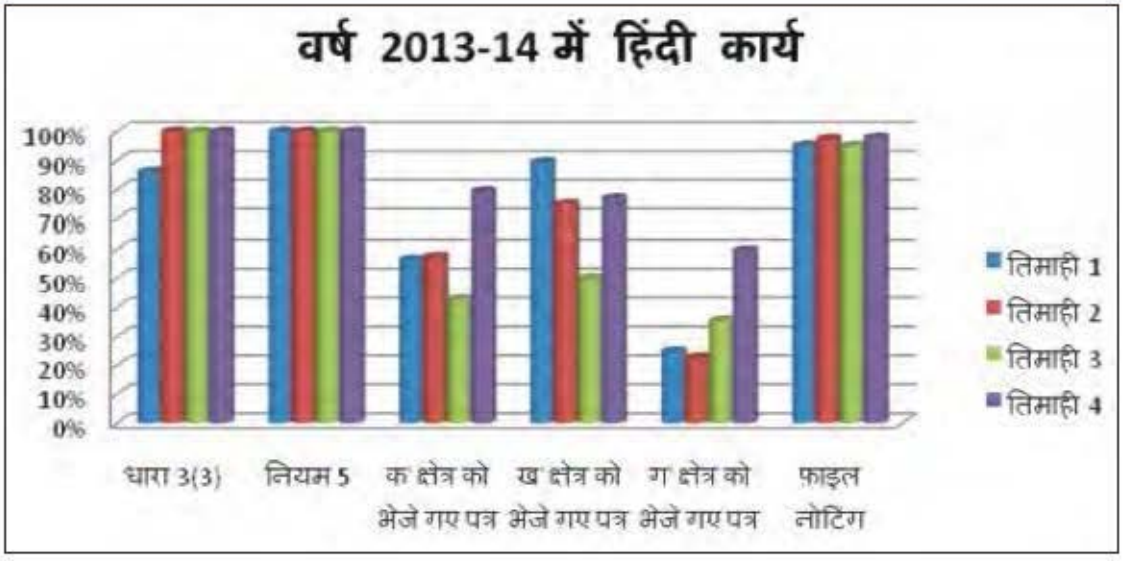



Fig. 94. वर्ष 2013-14 में हिंदी कार्य

3. मुख्यालय नामांकित, श्री आर डी शर्मा (राजभाषा) सहायक निदेशक, राष्ट्रीय पटसन एवं संवर्गी रेशा प्रौद्योगिकी अनुसंधान संस्थान कोलकाता द्वारा दिनान्क, 20/07/2013 को राजभाषा संबंधी प्रगति का जायजा लेने हेतु निरीक्षण किया गया।

4. दिनांक 18/08/2013 से राजभाषा सम्बंधित निर्देशों का समुचित अनुपालन सुनिश्चित करने हेतु एवं राजभाषा कार्यान्वयन संबंधी विवरण का अधिक एवं कारगर प्रसारण हेतु इस निदेशालय के राजभाषा प्रोकोष्ट द्वारा एक फेसबुक पृष्ट (facebook.com/DRWARajbhasha) आरम्भ किया गया।

5. कार्यालय में हिंदी दिवस 14 सितम्बर 2013 को एवं हिन्दी चेतना पखवाड़ा 16-30 सितम्बर 2013 के दौरान मनाया

गया। जिसमे विभिन्न कार्यक्रम एवं प्रतियोगिताएं आयोजित किए गए। इस दौरान कुल नौ प्रतियोगिताएं जैसे स्लोगन / आदर्श-वाक्य प्रतियोगिता; हिन्दी में निबंध प्रतियोगिता; हिन्दी वेग गति पाठन; हिन्दी शब्दावली प्रतियोगित; हिन्दी आलेखन एवं टिप्पण प्रतियोगिता; हिन्दी टंकण प्रतियोगिता; स्व रचित हिन्दी कविता पाठ; हिन्दी में वाद - विवाद प्रतियोगिता का आयोजन हुआ; इन कार्यक्रमों में सभी अधिकारी, कर्मचारी एवं प्रोजेक्ट कर्मचारी अत्यंत उत्साह पूर्वक भाग लिए। हिन्दी चेतना पखवाड़ा 2013 का पुरस्कार वितरण समारोह दिनांक 04.10.2013को आयोजित किया गया है।

6. श्रीमती गीता साहा, तकनिकी अधिकारी को नगर राजभाषा कार्यान्वयन समिति द्वारा दिनांक 12.08.2013 को आयोजित हिन्दी निबन्ध लेखन प्रतियोगिता में प्रथम पुरस्कार पाने के अवसर पर प्रमाण पत्र, शील्ड एवं स्वर्ण पताक से मुख्य आयकर आयुक्त, भुवनेश्वर के द्वारा दिनांक 30.10.2013 को अपराह्न 04.00 बजे मुख्य आयकर आयुक्त कार्यालय, भुवनेश्वर में पुरस्कृत किया गया।

7. राजभाषा संबंधी रोस्टर के अनुसार रोष एक कनिष्ट आशुलिपिक को हिंदी शिक्षण योजना, राजभाषा विभाग, गृह मंत्रालय, भारत सरकार का कंप्यूटर /हिन्दी आशुलिपि का एक-वर्ष की प्रशिक्षण

Fig. 95. हिन्दी में निबंध प्रतियोगिता

Fig. 96. श्रीमती गीता साहा को हिन्दी निबन्ध लेखन प्रतियोगिता में प्रथम पुरस्कार पाने के अवसर

Fig. 97. हिन्दी चेतना पखवाड़ा

# 8. AWARDS AND RECOGNITIONS

## 8.1 ISO 9001-2008 certification for DRWA

In consonance with the mandatory RFD success indicators, the Directorate has implemented ISO 9001-2008 standards. It has been duly audited by the certifying body and the ISO 9001-2008 certification (No.Q9119404) was issued on 19th June, 2013. The certificate was released by Dr. K.D. Kokate, Dy. Director General (AE), ICAR in the presence of Dr. Neelam Grewal, Director & Dr. M.P.S. Arya, Pr. Scientist (Agronomy) at AE Division, ICAR, New Delhi.


Fig.98. ISO certificate released by Dr. K.D. Kokate, Dy. Director General (AE), ICAR

## 8.2 Farm Women Award

Smt. Anusaya Beura, a Village level Para Extension Worker of Padasahi in Dadha Panchayat of Bhubaneswar block trained by DRWA, has been conferred the prestigious *Krishi Prerna Samman, (Eastern Region)* - Mahindra Samridhi India Agri Award 2014 in a glittering ceremony held in New Delhi on 24th February, 2014. Smt. Beura was initially trained as a facilitator for DRWA but later on ventured into mushroom farming, floriculture, eco friendly pest management and formed SHG in her village with the guidance and patronage of DRWA.

## 8.3 Awards/ Recognitions for the Scientists of DRWA

**Dr. Neelam Grewal, Director**

- The Director led the Joint Review Team of the Ministry of the Human Resource Management, Government of India, for implementation of 'Mid Day Meal Scheme' in the states of Bihar and Odisha.
- Delivered Keynote Address during the Biennial Conference of Home Science Association of India, held at M. S. University, Baroda from 18th - 20th December, 2013.
- Chairperson of ICAR Committee on 'Minimum Requirement in Higher Agricultural Education', Education Division, ICAR.
- Member, ICAR-SRF (PGS) Examination Committee, Education Division, ICAR.
- Member of UGC-SAP Departmental Scientific Review of 'Department of Clothing & Textile' MSU, Baroda.
- Chairperson of DSIR project on 'Income Generating Activities in Fish Aquaculture in Puri district' sponsored by DST.

**Dr. Abha Singh**

- Best Oral Paper Presentation Award to the paper "Water availability for irrigation and domestic use in tribal livelihoods at higher elevation in some parts of Odisha state" by Abha Singh and B.N.Sadangi in the International Conference on Water quality and management for climate resilient agriculture held from 28th -31st May, 2013 at Jalgaon, Maharastra.

**Dr. H. K. Dash**

- Invited as an expert to evaluate the project proposals on Mahila Kisan Sashaktikaran Pariyojona (MKSP) on non-timber forest produces by Odisha Livelihood Mission, Govt. of Odisha.

**Dr. J. Charles Jeeva**

- Best Paper Award (Poster): J. Charles Jeeva, Joisana Jeevan, S. Soma and P.J. Antony Sijo (2013) Policy Interventions for Sustainable Empowerment of Women in Coastal Ecosystem:

A Participatory Assessment, Poster Presentation in the "International symposium on Greening Fisheries: Towards green technologies in fisheries", held at Kochi, Kerala, India during 21st - 23rd May, 2013. The paper has been presented the Best Paper Award (Poster) under the Technical Session on *Action Blue- Societal Initiatives for a better Tomorrow in Fisheries.*

- Editor of the Journal 'Fishery Technology', Society of Fisheries Technologists (India), Cochin.
- Reviewer of the Journals, 'Asian Fisheries Science Special Issue on Gender in Aquaculture and Fisheries', 'Fishery Technology' and 'Indian Journal of Fisheries.'

**Dr. Naresh Babu**

- Chaired a Technical Session in Training cum-Workshop at Directorate of Extension Education, OUAT, Bhubaneswar for making joint efforts by the SMS (Home Science & Horticulture) in KVK Bhubaneswar on 3rd -4th May, 2013 at Bhubaneswar.
- External expert for recruitment of field helper under DUS project entitled "Development DUS testing criteria and varietal gene bank establishment for the tropical tuber crops: "cassava and sweet potato" on 2nd August, 2013 at Regional Centre of CTCRI, Bhubaneswar.
- ICAR representative in 7th Scientific Advisory Committee meeting of Krishi Vigyan Kendra, Mayurbhanj-I held on 17th September, 2013.
- Member of the Departmental Promotion Committee Meeting for Clearance of Probation Administrative Personnel of DRWA held on 27th of February, 2014 at DRWA, Bhubaneswar.
- Co- Chaired the Technical Session- II in the State Level Seminar on cashew development in Odisha on 6th-7th March, 2014 at Bhubaneswar.
- Member of the Assessment Committee Meeting for Promotion of technical personnel of DRWA held on 6th March, 2014 at DRWA, Bhubaneswar.
- External expert for recruitment of Senior Research Fellow and Field Assistant under European Union Funded Project entitled "Adapting clonally propagated crops to climatic and commercial changes" on 14th March, 2014 at Regional Centre of CTCRI, Bhubaneswar.

**Dr. Sabita Mishra**

- Awarded ISEE Fellow Award by Indian Society of Extension Education, New Delhi during the National Seminar conducted during April 26th-27th April, 2013.
- Member, Editorial Board for the Indian Journal of Extension Education. IARI, New Delhi.
- Member, Editorial Board for the Journal of Extension Education, OUAT, Bhubaneswar.
- Member, Editorial Board for the Krushak Bandhu Annapurna, Nayapalli, Bhubaneswar.
- Referee of the Publication Centre, UAS, Dharwad, for Karnatak Journal of Agricultural Sciences.
- Member-Monitoring, Evaluation, Learning and Documentation Committee by Watershed Development Mission, Government of Odisha.
- *Member, Departmental Promotion Committee by* DRWA, Bhubaneswar for Probation Clearance Committee of Administrative Personnel on 27th February, 2014.
- *Member, Assessment Committee* by CRRI, Cuttack for Merit Promotion/Grant of Advance Increment of technical staff on 13th December, 2014.
- Member, Complaints Committee by CHES, Bhubaneswar and attended meeting on 7th September, 2013.

**Dr. A.K. Shukla**

- Fellowship Award on the occasion of International Conference on 'Impact of technological tools on food security under Global Warming Scenario (ITTFS-2012)' at Meerut (UP) by HI-Tech Horticultural Society, Meerut.
- Member of the Technical Committee for development of 'Centre of Excellence in Floriculture' at Kandhamal, Odisha by Director Horticulture, Govt of Odisha.

**Dr. S.K. Srivastava**

- Awarded 'Bharat Jyoti' By India International Friendship Society, New Delhi.
- Chief Guest on World Environment Day function on 5th June, 2013 at Central Horticulture Experiment Station (ICAR), Bhubaneswar.
- Co-Chairman for second Project Review Committee meeting on 2nd December, 2013 at Puri for the project entitled Composting coir pith for sustainable livelihood and ecorestoration in Satyebadi Block for Puri district in Coastal Orissa, approved by Department of Scientific and Industrial Research (DSIR) Ministry of Science and Technology, Govt of India.

### 8.4 Awards and Recognitions (AICRP on Home Science)

- The AICRP Centre, UAS, Bangalore secured First Prize for the poster on "Enrichment of small millet with green leaves and murrel fish powder" in Global Consultation on Millets Promotion for Health and Nutrition Security at Hyderabad, 18th - 20th December, 2013.
- Dr. Gayatri Tiwari has been nominated by District Collector, Udaipur as a member in district level committee constituted for prevention of sexual harassment at work place.
- Dr. Suman Singh, Prof. & Head, FRM Deptt. was conferred with 'Senior Scientist Award' at 30th Biennial Conference of Home Science Association of India on 100 years of Home Science-Retrospect and Prospect, 19th-21th December, 2013 organized at M. S. University of Baroda.
- Dr. Suman Singh was a Key Speaker at the 30th Biennial Conference of Home Science Association of India at M.S. University, Baroda, on the topic - Sustainable Development and Environment Education: Issues and Challenges.
- Dr. Hemu Rathore attended and presented a paper on 'Indoor Air Quality in Urban and Rural Household' at 30th Biennial Conference of Home Science Association of India, 19th-21st December, 2013 organized at M. S. University of Baroda.
- Dr. Hemu Rathore received University Appreciation Award for outstanding services on 26th January, 2014 from Prof. O.P.Gill, Hon'ble Vice Chancellor, MPUAT, Udaipur.

### 8.5 Radio/TV Talks

1. Dr. Sabita Mishra, Senior Scientist delivered a radio talk on "Krushijibi Mahilanka Pain Krushi Udyoga" on 14th January, 2014 at AIR, Cuttack.
2. Dr. Sabita Mishra, Senior Scientist delivered a TV talk on "Krishi Jantrikaran" on 11th March, 2014 at DDK, Bhubaneswar.
3. Dr. Sabita Mishra, Senior Scientist delivered a TV talk on "Gramina Mahilanka Arthanaitika Bikas" on 12th October, 2013 at DDK, Bhubaneswar.

### 8.6 News items published

1. Celebration of Technology Week, *Krushak Bandhu*, Monthly Agriculture Magazine, February 2014, p.44.
2. Organization of training on vaccination of poultry birds, *Krushak Bandhu*, Monthly Agriculture Magazine, March 2014, p.33.

## 9. PUBLICATIONS

### Research Papers (DRWA)


1. Babu N, Srivastava S K and Agrawal S. 2013. Traditional storage practices of spices and condiments in Odisha. *Indian Journal of Traditional Knowledge*. 12(3): 518-523.
2. Dash H K and Srinath K. 2013. Promoting agricultural education among Rural women: a critical intervention for sustaining farm and home, *Current Science*. 105 (12): 1664-1665.
3. Dash H K, Mishra S, Singh A and Sarkar A. 2013. Engendering agricultural research: needs and challenges. *Current Science*. 105 (11): 1488-1489.
4. Hassan F, Prathap S K, Jeeva J. C, Mathew S and Babu M. R. 2013. Economic feasibility analysis of fisherwomen based microenterprises. *Indian J. Fisheries*. 60 (1):125-130.
5. Joshi K, Singh R and Jaswal S. 2013. Intergenerational Differences in Perceived Conflict among Families of Working and Non-working Women. *Studies on Home and Community Sciences*. 7:55-60.
6. Kishore K, Pattnayak S and Shukla A K .2013. Optimization of method to alleviate in vitro shoot tip necrosis in *Trichosanthes dioica* Roxb. *Indian Journal Biotechnology* (Accepted).
7. Koley T K, Singh S, Khemaria P, Sarkar A, Kaur C, Chaurasia S N S and Naik P S. 2013. Evaluation of bioactive properties of Indian carrot (*Daucus carota* L): A chemometric approach. *Food Research International*. (In Press)
8. Kumar A and Tanuja S. 2014. Agro-climatic zone wise distribution of cattle and buffalo in Odisha. *GCBR Bioresearch*.1(1): 1-5
9. Mahawer L N, Balwa H L and Shukla A K .2012. Field performance of Tuberose (*Pollanthes tuberosa L.*) cultivars for growth, floral and economics characters under sub-humid southern plains and Aravalli hills of Rajasthan. *Indian Journal of Horticulture. 70 (3)*: 411-416.
10. Mishra P and Mishra S. 2013. Prospect of Flower Vendors: A Case Study at Bhubaneswar. *Asian Journal of Home Science*. 8 (2): 780 784.
11. Mishra D, Rao R V S, Rao K H, Sarkar A and Anwer, M.M. 2013. Leadership Effectiveness of Scientists in Indian Council of Agricultural Research. *The IUP Journal of Organizational Behavior*. XII (1): 24-40.

12. Mishra S and Dash H K. 2013.Gender Gap in access to Extension Services: A Case Study. *International Journal of Extension Education.*9: 51 55.

13. Moharana G, Vinay D and Singh D. 2013. Assessment of work load and occupational health hazards of hospitality industry workers. *Pantnagar Journal of Research*. XI (2): 295-298.

14. Mondal B, Bhattacharya I, Sarkar A and Khatua D C. 2013. Evaluation of local brinjal *(Solanum melongena* L.) germplasm for bacterial wilt resistant. *International Journal of Agricultural and Statistical Sciences*. 9(2): 709-715.

15. Nayak J, Singh S P and Moharana G. 2013. Rural Women's Risk at Household, Farm and Animal Rearing Work. *Journal of Extension Education*. XVII (1): 132-138.

16. Ponnusamy K, Nayak J, Sarkar A, Arya M P S, and Prusty M. 2013. Comparative performance and gender appraisal of random and line planting in paddy (*Oryza sativa*) cultivation. *Indian Journal of Agricultural Sciences*. 83 (10): 10991101.

17. Prasad M V, Sarkar A, Mary Rani K L and Jameema J. 2013. Farmers' adoption pattern in high yielding oil palm plantation - A survey. *Journal of Plantation Crops*. 41(1): 105-108.

18. Sadangi B N, Sahoo L P and Dash M K .2014. A study on adoption and constraints in cultivation and maintenance of local varieties of greengram (*Vigna radiata*) by farmers using indigenous methods. *Journal of Research*. 29 (1& 2): 13-16.

19. Sahoo L P, Sasmal A C and Dadlani M. 2014. Comparision between morphological and biochemical markers for testing genetic purity in the female parent of hybrid APSH 11 of sunflower (*Helianthus annuus* L.). *Journal of Research*. 29 (1&2): 19-22.

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21. Singh A and Sadangi B N. 2012. Intergenerational changes in the traditional livelihood pattern of the tribal households in Odisha. *Journal of Extension Education*. XVII (2): 41-49.

22. Tanuja S, Mohanty P K, Kumar Anil, Moharana A and Kumar S N.2014. Shelf life study of acid added silage produced from fresh water fish dressing waste with and without addition of antioxidants. *International Journal of Agriculture and Food Science Technology*. 5(2): 91-96.

23. Tanuja S, Viji P, Zynudheen A A, George Ninan and Joshy C G. 2014. Composition, Textural Quality and Gel Strength of Surimi Prepared from Striped Catfish (*Pangasianodon hypophthalmus*, Souvage, 1878*). Fishery Technology. 51: 106-111.*

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25. Viji P, Tanuja S, George N, Zynudheen A A and Lalitha K V .2014. Quality characteristics and shelf life of Sutchi cat fish (*Pangasianodon hypophthalmus*) steaks during refrigerated storage. *International Journal of Agriculture and Food Science Technology*. 5(2): 105-116.

**Popular Articles**

1. Behera B C, Mishra S, Nayak J. and Das S. 2014. Krushira Mahila Abhimukhi Ghatanabalee and DRWA (Gender Issues in Agriculture and DRWA). Souvenir, Eastern Zone Agriculture Fair 2013-14. CRRI, Cuttack, pp.113-116.

2. Behera B C, Mishra S, Singh A and Das S. 2014. Pijuli Gachhara Upadeyata (Importance of Guava Plant). Souvenir, Eastern Zone Agriculture Fair 2013-14. CRRI, Cuttack, pp.120-123.

3. Grewal N and Mishra S. 2014. Women in Indian Agriculture: Kerala Karshakan Malayalam Magazine, March, 2014

4. Kishore K, Shukla A K, Babu N, Samiksha and Sarangi D N. 2013. Dynamics changing of mango pollinators. ICAR NEWS. 19(3): 22.

5. Mishra S.2013. Anabana Sagara Upakarita (Benefits of Local Green Leaves). *Krishak Bandu Annapurna* (In Odia). XXI(IV): 21-23.

6. Mishra S.2013 Life of Women Agricultural Labourers in Odisha. *Souvenir,* Krushi Fair-2013. pp.29-31.

7. Mishra S. 2013. Mahilamanankara Artha Uparjanare Krushi Udyogeekaran (Agro-

Enterprise for Farm women). *Krishak Bandu Annapurna* (In Odia). XXI(V): 25-26.

8. Mishra S, Mishra P and Singh A .2014. Krushi Mahila Mananka Pain Samprasarana Seba : Eka Drustipat (A Look on Extension Service for Farm women), *Krishak Bandu Annapurna* (In Odia). XXII (1): 37-38.
9. Mishra P and Mishra S. 2014. Ajira Jubapidhi Abam Krushi (Today's Youth and Agriculture). *Krishak Bandu Annapurna* (In Odia). XXII (2) : 37.
10. Mishra P, Mishra S and Singh A. (2014). Extension services for farm women (In Odia). *Krushak Bandhu Annapurna*. pp.37-38
11. Mishra S, *Sahoo L, Singh A, Behera B C and* Das S. 2014. Mahilanka Khadya Nirapattare Saga Phasiara Mahattwa (Importance of Leafy Vegetables in Food Security of Farm Women), Souvenir, Eastern Zone Agriculture Fair 2013-14, CRRI, Cuttack, pp.124-127.
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17. Nayak J and Mishra S.2014. Phala O Paniparibe Sarkhanya Ra Abashyakata. Souvenir, Eastern Zone Agriculture Fair 2013-14. CRRI, Cuttack. pp:117-119.
18. Nayak J and Rout P K .2014. Ghasa Bachha Yantra. *Krushakbandhu Annapurna* (In Odia). XXII(1):25.
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20. Rout P K, Nayak J.and Moharana G .2014. Dhadire Bihana Buniba O Ehara Upakarita. *Krushakbandhu Annapurna*. (In Odia). XXII (3):15-16.
21. Rout P K, Nayak J and Moharana G .2013. Makka Manji Chhadeiba ra Yantri Karan. *Krushakbandhu Annapurna* (In Odia). XXI (11):30.
22. Sahoo L. P, Mishra S, Dash H K and *Singh A.* 2014. Gramina Abam Saharanchalara Mahila Mananke Pain Uperjanara Eka Nuten Madhyam : Rangeen Patra Chhancha Prastuti (Colour Leave Frame Preparation : A New Medium for Income of Rural and Urban Women), *Krushak Bandhu Annapurna* (In Odia). XXII (2):38-39.
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25. Singh S P, Nayak J and Singh A .2013. Srama Laghab Nimante Krishi Jantrapati and Saranjam Ra Sadhan. *Krushakbandhu Annapurna* (In Odia). XXI(V):27-28.

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1. Babu N, Srivastava S K, Arya M PS, Shukla A K, Srinath K and Sarangi D N. 2013. *Gender Friendly Organic Farming Technologies for Vegetables*, pp 1-26. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
2. Babu N, Srivastava S K, Attri B L, Shukla A K and Prusty M. 2013. *Short Duration Fruit Crops for Income Enhancement of Farm Family*, pp 1-28. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
3. Mishra S, *Dash H K and Singh A .2014. Empowerment of Women Working in Agriculture Sector*, pp.1-87. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
4. Mohanty P K, Barik R K, Kumari C, Mohanty S K, Nayak J, Moharana G and Rout P K .2013. *Mahilanka Shrama Laghaba Pain Upakarana O*

*Jantra*, pp1-26. Odisha Livelihood Mission, Bhubaneswar, Odisha.

5. Nanda R, Kumar A and Tanuja S. 2013. *Gramina Mahilamaneka Jibikaraunnati Pain Spiruline Chasa*, pp1-8. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
6. Nanda R, Anil K and Tanuja S. 2014. *Machha Khadyara Prastuti Praneli Abam Machhe Khadyare Pustisara Posaktatturo O Saktira Utchhe Bhabe Spirulinera Byabahara*, pp1-4. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
7. Nanda R., Anil K. and Tanuja S. 2014. *Fish Feed Formulation and the Potential of Spiruline as a Protein and Energy Supplement in Fish Feed.* pp 1-4. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
8. Nayak J, Singh S P and Moharana G. 2013. *Occupational Health Hazard of Farm Women*, pp1-32. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
9. Nayak J, Singh A and Moharana G.2013. *Promotional Issues of Women in Agriculture for Farm Mechanization and Further Steps to Reduce their Drudgery with Increased Output*, pp.1-153. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
10. Ponnusamy K, Nayak J, Mishra S, Dash H K, Moharana G, Arya M P S, Kumar A, Shukla A K and Prusty M .2014. *A Model for Gender Mainstreaming in Agriculture for Village* Development, pp1-44. Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
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**Book Chapters**

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2. Arya M P S, Srivastava S K and Singh S P. 2013. Gender issues in crop production and suitable technologies to reduce drudgery. *Compendium of Model Training Programme on Promotional Issues of Women in Agriculture for Farm Mechanization and further Steps to Reduce their Drudgery with Increased Output*, pp 133-139. Nayak J, Singh A and Moharana G (Eds). Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
3. Babu N and Shukla A K. 2013. Opportunities offered by horticulture for empowering farmwomen. *Compendium of Model Training Course on Promotional Issues of Women in Agriculture for Farm Mechanization and Further Steps to Reduce their Drudgery with Increased Output*, pp 104-110. Nayak J, Singh A and Moharana G (Eds). Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.
4. Babu N and Shukla A K.2013. Different Horticulture Based Models and their Benefits for Women and Family. *Compendium of National Training Programme on Empowerment of women working in agriculture sector*, pp38- 42. Mishra S, Dash H K and Singh A (Eds.) Directorate of Research on Women in Agriculture, Bhubaneswar. Odisha.
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122. Nayak J, Singh A and Moharana G (Eds). Directorate of Research on Women in Agriculture, Bhubaneswar, Odisha.

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9. Mishra S.2014. Gender Sensitive Extension. *Compendium on National Training programme on Empowerment of Women Working in Agriculture Sector*, pp.16-20. Mishra S, Dash H K and Singh A (Eds.) Directorate of Research on Women in Agriculture, Bhubaneswar. Odisha.
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# 10. TRAININGS / WORKSHOPS / SEMINARS/ EXHIBITIONS / INTERFACES CONDUCTED

In their endeavour to build the capacity of the different stakeholders, the scientists of DRWA conducted three model training courses/trainers training and 35 project related trainings/ interfaces

## Model Training Course

A Model Training Course entitled 'Promotional issues of women in agriculture for farm mechanization and further steps to reduce their drudgery with increased output', sponsored by Department of Agriculture and Cooperation, Directorate of Extension, New Delhi,

Fig.99. Participants of Model Training

Govt of India, was conducted from 6th to 13th November, 2013. A total of 22 participants from 8 states attended the programme.

All the participants were provided knowledge and skills related to anthropometric parameters & strength issues in design/ assessment of farm tools and equipment for women, physiological workload, aerobic capacity, ergonomics, drudgery and its assessment technique and women friendly tools and equipment. Topics such as the role of Bureau of Indian Standards in farm mechanization, nutritional security of farm families, health hazard of farm women at workplaces, gender sensitive extension techniques & gender focus in entrepreneurial development, women friendly IPM techniques, gender issues in agriculture, horticulture and livestock activities, and Government programme for women in agriculture were also dealt with. The training course was coordinated by Dr. Jyoti Nayak, Dr. Abha Singh and Ms. Gayatri Moharana.

## Training of Trainers (ToT) on 'Financial assistance to women self help groups for drudgery reduction'

Training of Trainers (ToT) on 'Financial assistance to women self help groups for drudgery reduction' was organized in collaboration with Odisha Livelihood Mission, Govt. of Odisha during 22nd -25th November, 2013 at DRWA. Forty five trainers were trained during the programme in two groups in two-days schedule. The trainers represented the sectors like Govt. officials, NGO members, farmers etc. Sh. D. V. Swami, IAS, Director, Odisha Livelihood Mission, Govt. of Odisha visited the Directorate and addressed the trainees during the training programme. Practical demonstrations were conducted on different drudgery reducing implements accompanied by screening of video films on the subject.

## National Training Programme on 'Empowerment of women working in agriculture sector'

A National Training Programme on "Empowerment of women working in agriculture sector" was conducted under ATMA Scheme of Uttar Pradesh from 28th January-1st February, 2014 at DRWA. Eighteen participants from various fields including Extension Functionaries, NGO workers and Progressive Farm women attended the programme. Dr. Sabita Mishra, Senior Scientist (AE) coordinated the programme.

Fig.100. Participants of National Training on "Empowerment of Women Working in Agriculture Sector"

## Trainings/ Workshops/ Interfaces Conducted under Different Projects

| Name of the Project | Programmes | Date | Place | Beneficiaries |
|---|---|---|---|---|
| Multi Agency Participatory Extension Model for Livelihood Improvement of Rural Women through Backyard Poultry | Stakeholders meet | 3rd September, 2013 | DRWA Bhubaneswar | 46 |
| | Care and maintenance of mother units | 24th January, 2014 | Guptapada Khurda | 25 |
| | Care of day old chicks | 11th February, 2014 | Haridamada Angarpada Padasahi | 104 |
| | Skill improvement on vaccination of poultry birds | 19th February, 2014 | Haridamada Angarpada Padasahi | 108 |
| | Sensitization Workshop on 'Solar Poultry Incubator and ICT Integration for Empowerment of Rural Women' | 20th February, 2014 | DRWA, Bhubaneswar | 46 |
| Technology Application and Gender Mainstreaming in Agriculture for Developing a Model Village | Capacity development of rural adolescent and young mothers for use of ICT | 6th-7th September, 2013 | DRWA, Bhubaneswar | 07 |
| | Training programme for knowledge disseminators on 'Mushroom as women friendly agro-enterprise'. | 23rd September, 2013 | Giringaput, Khurda | 25 |
| | Training on fodder production and rejuvenation of cashew orchard | 30th September, 2013 | Giringaput, Khurda | 36 |
| | Farmers-Scientists interface | 24th March, 2014 | Giringaput, Khurda | 55 |
| Assessment of Integrated farming Model for Improved Food Security and Livelihood in Rural Households | Farmers-Scientists interface | 17th August, 2013 | Jhadeswarpur, Cuttack | 50 |
| | Farmers-Scientists interface | 12th March, 2014 | Jhadeswarpur, Cuttack | 75 |
| Ergonomic Evaluation of Selected Manually Operated Farm Equipment in Mango & Cashewnut | Farmers-Scientists interface | 26th March, 2014 | Kalmati, Dhenkanal | 85 |
| Identification of Gender Issues in IPM and Suitable Intervention with Women Perspective | Stakeholders' meet | 12th-13th September, 2013 | DRWA, Bhubaneswar | 27 |



| Name of the Project | Programmes | Date | Place | Beneficiaries |
|---|---|---|---|---|
| | Farmers-Scientists Interface | 21st December, 2013 | Otarakera, Puri | 72 |
| | Training programme for Krishi Rakshak and farm women on IPM | 21st March, 2014 | Otarakera, Puri | 53 |
| Development of Resource Efficient Horticulture Model for Livelihood Improvement of Rural Women | Farmers-Scientists Interface | 23rd January, 2014 | Sakhigopal, Puri | 60 |
| Enhancing Productivity of Fruit Based Cropping Models for Income Generation of Farmwomen | Farmers-Scientists Interface | 22nd August, 2013 | Padmapur, Keonjhar | 30 |
| Technological Interventions for Drudgery Reduction with Increased Work Efficiency through Women Friendly Farm Tools/ Equipment/ Technologies in the State of Odisha (RKVY) | Focused Group Discussion | 21st March, 2014 | Arada, Cuttack | 25 |
| Technological Empowerment of Farmwomen in Production of Quality Seeds and Planting Materials of Vegetables | Orientation training to farm women in micro-propagation | 4th - 6th February, 2014 | DRWA, Bhubaneswar | 10 |
| Reducing the Gender Gap in Nutritional Status of Family Members in Rice Based Farming System | Training-cum-demonstration on Value addition and Processing | 19th - 21st February, 2014 | DRWA, Bhubaneswar | 15 |

## Trainings/ Workshops/ Seminars/Exhibitions/Interfaces Conducted

| S. No. | Title of the Programme | Venue | Date | Name of the Coordinators |
|---|---|---|---|---|
| 1. | One month Orientation training programme for Dr.(Ms) Kushagra Joshi, Scientist (Home Sc./ FRM) | DRWA, Bhubaneswar | 12th April-11th May, 2013 | Dr. Suman Agarwal |
| 2. | Three months attachment training programme for Dr. (Ms) Nisha Verma, Scientist, Home Sc./ FRM, Project Directorate for Farming System Research (PDFSR), Modipuram | DRWA, Bhubaneswar | 14th April -14th July, 2013 | Dr. Suman Agarwal |
| 3. | Exhibition on the occasion of 87th Foundation Day | CRRI, Cuttack | 23rd April, 2013 | Dr. Sabita Mishra<br>Dr. Abha Singh |
| 4. | World Environment Day | DRWA, Bhubaneswar | 5th June, 2013 | Dr. Sabita Mishra<br>Dr. Jyoti Nayak |
| 5. | Brainstorming Meeting on 'Improving Visibility of Home Science Education in India' | NASC Complex, New Delhi | 13th August, 2013 | Dr. Neelam Grewal<br>Ms. Gayatri Moharana |
| 6. | Scientists-Farmers Interaction | Padmapur, Keonjhar | 22nd August, 2013 | Dr. A. K.Shukla<br>Dr. Naresh Babu<br>Mr. Manoranjan Prusty<br>Mrs. Tapaswini Sahoo |
| 7. | Stake holders meet on 'Multi Agency Participatory Extension Model (MAPEM) for Livelihood Improvement of Rural Women through Backyard Poultry' | DRWA, Bhubaneswar | 3rd September, 2013 | Dr. Sabita Mishra<br>Dr. Anil Kumar<br>Dr. Ananta Sarkar |
| 8. | Capacity development of rural adolescent and young mothers for use of ICT | DRWA, Bhubaneswar | 6th-7th September, 2013 | Dr. Suman Agarwal<br>Mrs. Geeta Saha |
| 9. | Training programme for Youth Core Group members on Care of Mother Units for Day Old Chicks Rearing | Harkamada, Khurdha | 11th September, 2013 | Dr. Sabita Mishra<br>Dr. Anil Kumar<br>Dr. Ananta Sarkar |
| 10. | Stakeholders' Meet for Programme coordinators and Plant Protection Officers/ Agriculture Officers from ten agro-climatic zones of Odisha | DRWA, Bhubaneswar | 12th -13th September, 2013 | Dr. S. K. Srivastava<br>Dr. Naresh Babu<br>Dr. Sabita Mishra |
| 11. | Unit Meeting of all the scientist of AICRP on Home Science | DRWA, Bhubaneswar | 18th-20th September, 2013 | All Scientists of AICRP on Home Science |
| 12. | Training programme for knowledge disseminators on 'Mushroom as women friendly agro-enterprise' | Giringaput, Khurdha | 23rd September, 2013 | Dr. Sabita Mishra |
| 13. | A training programme on "Fodder production and rejuvenation of cashew orchard" | Giringaput, Khorda | 30th September, 2013 | Dr. A. K Shukla<br>Dr. Anil Kumar |
| 14. | Scientist-Farmwomen Interfaces under TSP | Tarajodi, Ambaduvi Talasahi &Taladah Badapanipan Khuntapal under Shamakhunta block in Mayurbhanj district, Odisha | 22nd October, 2013 | Dr. J. Charles Jeeva<br>Ms. Gayatri Moharana |

| S. No. | Title of the Programme | Venue | Date | Name of the Coordinators |
|---|---|---|---|---|
| 15. | Exhibition on the occasion of 8th KVK National Conference | UAS, Bangalore | 23rd-25th October, 2013 | Dr. Sabita Mishra<br>Dr. Jyoti Nayak<br>Er. Pragati K. Rout<br>Er. Subrat K. Das |
| 16. | MTC on 'Promotional Issues of Women in Agriculture for Farm Mechanization and Further Steps to Reduce their Drudgery with Increased Output' | DRWA, Bhubaneswar | 6th -13th November, 2013 | Dr. Jyoti Nayak<br>Dr. Abha Sigh<br>Ms. Gayatri Moharana |
| 17. | Training programme on Spirulina Culture | Nagpada, Kendrapada | 11th November, 2013 | Dr. Anil Kumar<br>Mrs. Rajashree Nanda |
| 18. | Scientist-Farmwomen Interfaces under TSP | K.M Bhata Sahi and Sabarpalli in R. Udayagiri block and Saralapadar under Nuagada block in Gajapati, Odisha | 15th November, 2013 | Dr. J. Charles Jeeva<br>Ms. Gayatri Moharana<br>Dr. Kushagra Joshi |
| 19. | ToT Odisha Livelihood Mission on new scheme 'Financial assistance to women self help groups for drudgery reduction' in collaboration with OLM | DRWA, Bhubaneswar | 22nd-26th November, 2013 | Dr. Jyoti Nayak<br>Ms.Gayati Moharana<br>Er. Pragti Kishore Rout |
| 20. | Exhibition on the occasion of ICAR Institute-SAU-State Department Interface Odisha | CRRI, Cuttack | 26th -27th November, 2013 | Dr. Sabita Mishra<br>Dr. H. K. Dash<br>Ms. Gayatri Moharana<br>Mr. B. C. Behera<br>Mr. Manoranjan Prusty |
| 21. | Exhibition in Eastern Region Agricultural Technology Showcasing Meet-2013 | ICAR Research Complex for Eastern Region, Patna, Bihar | 6th -7th December, 2013 | Dr. H. K. Dash<br>Dr. Kushagra Joshi<br>Mr. Atul Chetan Hemrom<br>Mrs. Tapaswini Sahoo |
| 22. | Animal Health Camp under TSP | Tarajodi, Shamakhunta block in Mayurbhanj district, Odisha | 10th December, 2013 | Dr. Anil Kumar<br>Dr. J. Charles Jeeva<br>Ms. Gayatri Moharana<br>Dr. Kushagra Joshi<br>Mr. B.C. Behera |
| 23. | Lecture on 'Protection of Plant Varieties for IPR' | DRWA | 11th December, 2013 | Dr. Anil Kumar |
| 24. | Awareness programme on scientific and hygienic storage of food grains under TSP | Tarajodi, Shamakhunta block in Mayurbhanj district, Odisha | 12th December, 2013 | Dr. J. Charles Jeeva<br>Mr. B.C. Behera |
| 25. | Exhibition on the occasion of 'National Seminar on Environment & Energy-Challenges & Opportunities' | Hotel May fair Convention, Bhubaneswar | 14th December, 2013 | Dr. Naresh Babu<br>Dr. Ananta Sarkar |
| 26. | Scientists-Farmers Interface | Otarakera village of Puri District in Odisha | 21st December, 2013 | Dr. S.K.Srivastava<br>Dr. Naresh Babu<br>Dr. Sabita Mishra |

| S. No. | Title of the Programme | Venue | Date | Name of the Coordinators |
|---|---|---|---|---|
| 27. | Training on rearing of backyard poultry birds with demonstration of immunization | Guptapada, Khordha, Odisha | 24th December, 2013 | Dr. Anil Kumar |
| 28. | Off-campus Technology Week Celebration (Under TSP)-Animal health camp, demonstration of DRWA maize dehusker cum sheller, knowledge debate, awareness creation programme on drudgery reducing implements for farm women | K.M. Bhalia Shahi in R. Udayagiri block of Gajapati District, Odisha | 22nd January, 2014 | Dr. Anil Kumar<br>Dr. J. Charles Jeeva<br>Ms. Gayatri Moharana<br>Dr. Kushagra Joshi<br>Er. Pragti Kishore Rout |
| 29. | Off-campus Farmers-Scientists interaction and training on 'Protected cultivation of high value crops' | Sakhigopal, Puri Odisha | 23rd January, 2014 | Dr. A. K. Shukla<br>Dr. Naresh Babu<br>Dr. Abha Singh |
| 30. | Off-campus training programme on 'Rearing of Backyard Poultry' and demonstration of 'Immunization of Poultry Chicks' | Guptapada, Jatni Block, Khurda | 24th January, 2014 | Dr. Sabita Mishra<br>Dr. Anil Kumar<br>Dr. Ananta Sarkar |
| 31. | On campus programme during 'Technology Week for Women in Agriculture' | DRWA, Bhubaneswar | 25th and 27th January, 2014 | All the staff of DRWA |
| 32. | National Training Programme on Empowerment of Women Working in Agriculture Sector for SIMA, UP | DRWA, Bhubaneswar | 28th January 1st February, 2014 | Dr. Sabita Mishra<br>Dr. H. K. Dash<br>Dr. Abha Singh |
| 33. | Sensitization workshop on Solar Poultry Incubator Awareness and ICT Integration for empowerment of women | DRWA, Bhubaneswar | 20th February, 2014 | Dr. Anil Kumar<br>Dr. Sabita Mishra<br>Dr. Jyoti Nayak<br>Dr. Abha Singh |
| 34. | Training-cum-demonstration on Value addition and Processing | DRWA, Bhubaneswar | 19th-21st February, 2014 | Dr. Abha Singh<br>Mrs. Tanuja, S.<br>Dr. Kushagra Joshi |
| 35. | Exhibition- Rashtriya Krishi Vigyan Mela | Indira Gandhi Krishi Viswavidyalaya, Raipur | 22nd-25th, February, 2014 | Dr. Naresh Babu<br>Dr. J. Charles Jeeva<br>Mr. Manoranjan Prusty<br>Dr. Sujit Kumar Nayak |
| 36. | Exhibition on the occasion of Eastern Region Agriculture Fair | CRRI, Cuttack | 26th -28th, February, 2014 | Dr. Sabita Mishra<br>Dr. Abha Singh |
| 37. | Skill Upgradation Programme on 'Drudgery Reducing Implements for Farm Women' under TSP | Tarajodi, Shamakhunta block in Mayurbhanj district, Odisha | 5th-6th March, 2014 | Dr. J. Charles Jeeva<br>Ms. Gayatri Moharana<br>Dr. Kushagra Joshi<br>Mr. B.C. Behera |
| 38. | Training programme for Krishi Rakshak and Farm women on IPM | Otarakara village of Puri district in Odisha | 21st March, 2014 | Dr. S.K.Srivastava<br>Dr. Naresh Babu<br>Dr. Sabita Mishra |
| 39. | Training cum Awareness programme on Protection of Plant Varieties and Farmers' Right | DRWA, Bhubaneswar | 28th March, 2014 | Dr. Sabita Mishra<br>Dr. Jyoti Nayak<br>Dr. Abha Singh |

# 11. PARTICIPATION IN WORKSHOPS / CONFERENCES / MEETINGS / TRAININGS

## 11.1 DRWA

| S. No. | Title of the Programme | Venue | Date | Name of the Participants |
|---|---|---|---|---|
| 1 | National Seminar on Frontier Agriculture | NDUAT, Faizabad | 20th-21st April, 2013 | Dr. A.K. Shukla |
| 2 | 87th Foundation Day of CRRI, Cuttack | CRRI, Cuttack | 23rd April, 2013 | Dr. Sabita Mishra<br>Dr. Abha Singh |
| 3 | Brain Storming Session on 'Improving Research in Agricultural Extension: Issues and Way Forward' | Tamil Nadu Agricultural University, Coimbatore | 26th April, 2013 | Dr. J. Charles Jeeva |
| 4 | National Seminar on Social Dimensions of Extension Education in Holistic Development of Rural Livelihood | CBGA PG College, Lucknow, UP | 26th-27th April, 2013 | Dr. Sabita Mishra |
| 5 | Training cum- Workshop for making joint efforts by the SMS (Home Science & Horticulture) in KVK | Directorate of Extension Education, OUAT, Bhubaneswar | 3rd-4th May, 2013 | Dr. A. K. Shukla<br>Dr. Naresh babu<br>Dr. Jyoti Nayak<br>Ms. Gayatri Moharana |
| 6 | International Conference on Impact of Technological Tools on Food Security under Global Warming Scenario (ITTFS-2012) | Meerut (UP) | 11th-12th May, 2013 | Dr. A. K. Shukla |
| 7 | Professional Attachment Training | PDFSR, Modipuram | 21st May-20th August, 2013 | Dr. Kushagra Joshi |
| 8 | International Symposium on 'Greening Fisheries' | Central Institute of Fisheries Technology, Cochin | 21st -23rd May, 2013 | Dr. J. Charles Jeeva |
| 9 | International Conference on Water Quality and Management for Climate Resilient Agriculture | Jalgoan, Maharastra | 28th-31st May, 2013 | Dr. Naresh Babu<br>Dr. Abha Singh |
| 10 | XX Zonal Workshop for KVKs | Deen Dayal Research Institute, Chhitrakoot | 20th-24th June, 2013 | Dr. Sabita Mishra<br>Dr. Jyoti Nayak |
| 11 | Agribusiness Camp organized by the Zonal Technology Management Business Planning and Development Unit, NIRJAFT, Kolkata in association with Agribusiness Incubation (ABI) Programme, ICRISAT, Hyderabad | Gangtok, Sikkim | 24th June, 2013 | Dr. Anil Kumar<br>Dr. Naresh Babu |
| 12 | Stakeholders meeting on 'Women Related Farm Mechanization Issues' | NASC Complex, New Delhi | 25th June, 2013 | Dr. Suman Agarwal |
| 13 | Agri-Tech Investors Meet | NASC, New Delhi | 18th July, 2013 | Dr. Anil Kumar |
| 14 | National Seminar cum Workshop on Quality Initiatives in Research and Extension organized by IQAC | CH.S.D.ST.Thresa's College for Women, Eluru, AP | 19th-20th July, 2013 | Dr. H.K. Dash |
| 15 | Brainstorming Meeting on 'Improving Visibility of Home Science Education in India' | NASC Complex, New Delhi | 13 th August, 2013 | Ms. Gayatri Moharana |

| S. No. | Title of the Programme | Venue | Date | Name of the Participants |
|---|---|---|---|---|
| 16 | Management Development Programme on Leadership Development (Pre RMP Cadre) | NAARM, Hyderabad | 28th August - 7th September, 2013 | Dr. S. K. Srivastava<br>Dr. A. K Shukla |
| 17 | Nodal Officers Installation-cum-Training Workshop for NAIP Consortium Strengthening Statistical Computing for NARS | DWM, Bhubaneswar | 5th-6th September, 2013 | Dr. Ananta Sarkar |
| 18 | Workshop cum Technical Session with Scientific Community on new Molecule Cyazypyr | OUAT, Bhubaneswar | 17th September, 2013 | Dr. S. K.Srivastava |
| 19 | Annual Workshop of ZTMU | NIRJAFT, Kolkata | 26th September, 2013 | Dr. Anil Kumar |
| 20 | Viral diseases of pulse crops and their management | OUAT, Bhubaneswar | 07th October 2013 | Dr. S. K.Srivastava |
| 21 | National meeting of Stakeholders | IIHR, Bengaluru | 26th October, 2013 | Dr. A. K. Shukla |
| 22 | 'KVK-Institute Interface on Cyclone-Flood Situation in Odisha' organized by Zonal Project Directorate (Zone VII) | Directorate of Extension Education, OUAT, Bhubaneswar | 21st October, 2013 | Dr. Neelam Grewal<br>Dr. J. Charles Jeeva<br>Ms. Gayatri Moharana |
| 23 | 8th KVK National Conference on Sustainable Intensification of Smallholder Farms | UAS, Bangalore | 23rd-25th October, 2013 | Dr. Neelam Grewal<br>Dr. Sabita Mishra<br>Dr. Jyoti Nayak |
| 24 | Scientists-Bankers-Farmers Interface | Business Planning and Development Unit of CIFA, Bhubaneswar | 2nd November, 2013 | Dr. J. Charles Jeeva |
| 25 | Workshop on Livelihood Issues Affecting Women in Odisha | Odisha Livelihood Mission | 5th November, 2013 | Dr. Sabita Mishra<br>Ms. Gayatri Moharana |
| 26 | Consultation meeting of the food START project on root and tuber crops for food security in Odisha | CTCRI Regional Station, Bhubaneswar | 6th -7th November, 2013 | Dr. A. K. Shukla |
| 27 | 13th Workshop of the IOBC Global working group on Mass rearing and quality assurance, Emerging opportunities for the Mass production and Quality assurance of Invertebrate | Bangalore, Karnataka | 6th-8th November, 2013 | Dr. S. K.Srivastava |
| 28 | Management Development Programme on Leadership Development (Pre RMP Cadre) | NAARM, Hyderabad | 26 th November to 7th December, 2013 | Dr. Anil Kumar<br>Dr. Naresh Babu |
| 29 | ICAR institutes-SAU-State Department Interface meet (exhibition and participation) | CRRI, Cuttack | 26th-27th November, 2013 | Dr. Sabita Mishra<br>Dr. H.K.Dash<br>Ms. Gayatri Moharana<br>Mr. Manoranjan Prusty<br>Mr. B.C.Behera |
| 30 | International conference on HWWE-2013 "Ergonomics for Rural Development" | Vidyasagar University, Midnapore, West Bengal | 4th-6th December, 2013 | Dr. Jyoti Nayak<br>Dr. Abha Singh<br>Ms.Gayatri Moharana |
| 31 | International Conference on Extension Educational Strategies for Sustainable Agricultural Development- A Global Perspective | GKVK, Bangalore | 5th-8 th December, 2013 | Dr. Sabita Mishra |

| S. No. | Title of the Programme | Venue | Date | Name of the Participants |
|---|---|---|---|---|
| 32 | Eastern Region Agricultural Technology Showcasing Meet-2013 | ICAR Research Complex for Eastern Region, Patna, Bihar | 6th-7th December, 2013 | Dr. H. K. Dash<br>Dr. Kushagra Joshi<br>Mr. Atul Chetan Hemrom<br>Mrs.Tapaswini Sahoo |
| 33 | IPR sensitization programme on "Protection of plant varieties for IPR" | DRWA, Bhubaneswar | 11th December, 2013 | All the Staff of DRWA |
| 34 | Exhibition on the occasion of National Seminar on Environment & Energy-Challenges & Opportunities | Hotel Mayfair Convention, Bhubaneswar | 14th December, 2013 | Dr. Naresh Babu<br>Dr. Ananta Sarkar |
| 35 | National seminar on Environment and Energy: Challenges and Opportunities organized by State Pollution Control Board, Government of Odisha and IQEMS | State Pollution Control Board, Bhubaneswar | 14th December, 2013 | Dr. Naresh Babu |
| 36 | State level conference of women co- operative leaders | CYSD Premises Bhubaneswar | 15th December, 2013 | Dr. Naresh Babu |
| 37 | Rural Advisory Committee meeting | Door Darshan Kendra, Bhubaneswar | 19th December, 2013 | Dr. Sabita Mishra |
| 38 | Technology Platform on Farming System for Nutrition (FSN) initiative | Swosti Premium, Bhubaneswar | 22nd December, 2013 | Dr. A. K. Shukla<br>Dr. Kushagra Joshi |
| 39 | Stakeholders meeting on farming system for nutrition initiative organized by M S Swaminathan Research Foundation | OUAT, Bhubaneswar | 23rd December, 2013 | Dr. A. K. Shukla<br>Dr. Kushagra Joshi |
| 40 | Workshop on Hi-tech vegetable and flower cultivation in Odisha and made oral presentation on protected cultivation of ornamental plants | Directorate of Horticulture, Govt. of Odisha, Bhubaneswar | 5th-6th January, 2014 | Dr. A. K. Shukla<br>Dr. Naresh Babu |
| 41 | National symposium on Emerging trends in eco-friendly insect pest management | Tamil Nadu Agricultural University, Coimbatore | 22nd-24th January, 2014 | Dr. S. K.Srivastava |
| 42 | Mid Term review Meeting of ICAR of Action Taken of Regional Committee Meeting - II | Barrackpur, Kolkata | 24th January, 2014 | Dr. Suman Agarwal |
| 43 | Authentic Leadership Development (ALD) | Harvard Business School, Executive Education Programme, Boston, USA | 2nd-7th February, 2014 | Dr. Neelam Grewal |
| 44 | Krishi Vasant - National Agriculture Fair cum Exhibition | CICR, Nagpur | 9th-13th February, 2014 | Dr. Ananta Sarkar |
| 45 | AZRA Silver Jubilee International Conference on Probing Bio Sciences for Food security & Environmental security | CRRI, Cuttack | 16th-18th February, 2014 | Dr. S. K. Srivastava |
| 46 | Sensitization workshop on Solar Poultry Incubators | DRWA, Bhubaneswar | 20th February, 2014 | All the staff of DRWA |
| 47 | National Krishi Vigyan Mela | College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur | 22nd-25th February, 2014 | Dr. Naresh Babu<br>Dr. J. C. Jeeva<br>Mr. Manoranjan Prusty<br>Dr. Sujit Kumar Nayak |

| S. No. | Title of the Programme | Venue | Date | Name of the Participants |
|---|---|---|---|---|
| 48 | Leadership Development for the benefit of the newly recruited Directors, ADGs and other RMPs of ICAR | NAARM, Hyderabad | 22nd-28th February, 2014 | Dr. Neelam Grewal |
| 49 | Workshop on Internet Protocol Version 6 (IPv6) in DARE/ICAR | NASC Complex, New Delhi | 27th February, 2014 | Dr. Ananta Sarkar |
| 50 | Eastern Region Agriculture Fair | CRRI, Cuttack | 26th-28th February, 2014 | Dr. Sabita Mishra<br>Dr. Abha Singh<br>Mr. B. C. Behera |
| 51 | Ensuring Nutritional Security: Challenges and Opportunities | CRRI, Cuttack | 26th-28th February, 2014 | Dr. Suman Agarwal |
| 52 | Workshop on protected cultivation in Odisha and made oral presentation on cultivation of the tomato and capsicum under protected condition | Directorate of Horticulture, Govt. of Odisha at Hotel The New Marrion, Bhubaneswar | 1st-2nd March, 2014 | Dr. A. K. Shukla |
| 53 | Rural Programme Subject Committee meeting of All India Radio, Cuttack | Directorate of Extension Education, OUAT, Bhubaneswar | 4th March, 2014 | Dr. Sabita Mishra |
| 54 | State level seminar on cashew development in Odisha "Odisha the challenges ahead in cashew sector" and made oral presentation on role of women entrepreneur in field of cashew plantation, processing and value addition | Nayapalli, Bhubaneswar | 6th-7th March, 2014 | Dr. Naresh Babu |
| 55 | ICAR Sponsored Orientation Training Programme for Subject Matter Specialists (SMS) of Home Science of KVKs, Odisha | OUAT, Bhubaneswar | 18th-19th March, 2014 | Dr. Suman Agarwal |
| 56 | Stakeholder's workshop on "Climate change impact on Fisheries and aquaculture in Odisha- Adaptations and mitigations for resilience" | Bhubaneswar, Odisha | 22nd March, 2014 | Mrs. Tanuja, S. |
| 57 | Public awareness campaign on women farmers on Odisha organized by Oxfam | IDCOL auditorium, Bhubaneswar | 27th March, 2014 | Dr. H.K. Dash |
| 58 | International congress on "Agriculture, Food Engineering and Environmental Sciences- Sustainable Approaches-AFEESSA-2014" | JNU, New Delhi | 29th-30th March, 2014 | Mrs. Tanuja, S. |
| 59 | Training cum awareness programme on 'Protection of plant varieties and farmers' rights' | DRWA, Bhubaneswar | 29th March, 2014 | All the staff of DRWA |

## 11.2 Conferences/ Workshops/ Trainings/ Meetings attended (AICRP on Home Science)

| S. No. | Title | Venue | Date | Name of the Participants |
|---|---|---|---|---|
| 1. | Training on Extension Methodology | GBPUAT, Pantnagar in collaboration with Extension Education Institute, Nilokheri, Haryana | 15th-19th April, 2013 | Dr. N. Agrawal |
| 2. | Brain Storming Sessions (BSS) to Strengthen the Research in Agricultural Extension in India. | University of Agricultural Sciences, Bangalore | 26th April, 2013 | Dr. S. Nagnur |
| 3. | Methodological Issues in Extension Researches | IARI, New Delhi | 26th April, 2013 | Dr. S. Rani |
| 4. | American Canadian Conference for Academic Disciplines | Ryerson University, Toronto,Canada | 20th-29th May, 2013 | Dr. G. Tiwari |
| 5. | Workshop on Counselling Skills | Department of Psychology, MLSU Academy of Wellbeing,Udaipur | 11th July, 2013 | Dr. G. Tiwari |
| 6. | Vidhyapeeth Apiya Dari Tantradnyan Shetawarf Vishesh Abhiyan | ATIC, Information on technologies developed under AICRP-FRM was given to 30 farmers of village Hyatnagr, Lingi and Vasmat | 16th August, 2013 | Dr. J. Zend |
| 7. | International Conference: Transforming Lives, Milestones and Challenges | Dept. of Home Science, St Bede's College, Simla | 23rd- 24th August, 2013 | Dr. R. Pathania |
| 8. | Addressing the Emerging Concerns of Indian Agriculture | Indian Society of Oil Seeds Research, Hyderabad | 24th August, 2013 | Dr. S. Kamala |
| 9. | e-Home Science Courseware Consortium Project | College of Home Science, Hyderabad | 27th- 28th August, 2013 | Dr. S. Kamala |
| 10. | Task force meeting and presented the progress report of adhoc project on Role of women in providing economic & nutritional security through non-timber forest products | Department of Biotechnology, New Delhi | 12th-13th September, 2013 | Dr. S. Hasalkar |
| 11. | Unit Meeting of AICRP on Home Science | DRWA, Bhubaneswar | 18th-20th September, 2013 | All the Scientists of AICRP |
| 12. | Exhibition organized at Conference 'Tech For Seva' | Vijnan Bharti, Seva Sahayog, GIST, and Yojak held at Cummins Engineering College, Karve Nagar, Pune | 28th-29th September, 2013 | Dr. A. Mrunalini |
| 13. | National Conference on Human Development | MS University of Baroda | 17th-19th October, 2013 | Dr. R. Pathania |
| 14. | KVK Conference | University of Agricultural Sciences, Bangalore | 23rd- 25th October, 2013 | Dr. S. Nagnur |
| 15. | Sixth National Women's Science Congress, Rashtriya Mahila Vijnana Sammelana | LVD College, Raichur | 7th-8th November, 2013 | Dr. S. Hunshal<br>Dr. L. Pujar |

| S. No. | Title | Venue | Date | Name of the Participants |
|---|---|---|---|---|
| 16. | International Seminar on Education Well being and National Integration | B.N Sansthan, Udaipur in collaboration with Indo German Society, Jaipur and Academy of Wellbeing, Udaipur. | 12th-13th November, 2013 | Dr. I. Ahlawat<br>Dr. G. Tiwari |
| 17. | Revision of Curriculum for greater career opportunities for Home Science Graduates | College of Home Science, ANGRAU, Hyderabad | 5th-6th December, 2013 | Dr. S. Kamala |
| 18. | Work shop on Revision of curriculum opportunities for Home Science graduates | College of Home Science, Saifabad, Hyderabad | 5th-6th December, 2013 | Dr. N. Banu |
| 19. | International Conference on Extension Educational Strategies for Sustainable Agricultural Development- A Global Perspective | University of Agricultural Sciences, Bangalore | 5th-8th December, 2014 | Dr. S. Nagnur |
| 20. | Third International Science Congress | Karunya University, Coimbatore | 6th-9th December, 2013 | Dr. P. Singh |
| 21. | 27th National Conference on Agriculture Marketing | Dept. of Agril. Economics, College of Agriculture, UAS, Dharwad | 18th-19th December, 2013 | Dr. S. Hasalkar |
| 22. | Winter School "Recent Advances in Apparel Manufacturing and Designing" | Dept. of Textile and Apparel Designing at College of Rural Home Science, UAS, Dharwad (Sponsored by ICAR, New Delhi) | 26th December, 2013<br>to<br>15th January, 2014 | Dr. G. Chitagubbi |
| 23. | Workshop on Ergonomic Workplace Analysis conducted by Recoup | Dept of FRM, RHSc College, UAS, Dharwad | 16th-18th January, 2014 | Dr. S. Hasalkar<br>Dr. G. Chitagubbi |
| 24. | International Seminar on Menstrual Management in Contemporary Context | JATAN Sansthan, Udaipur | 22nd January, 2014 | Dr. I. Ahlawat and<br>Dr. G. Tiwari |
| 25. | 32nd Annual National Conference of Indian Society of Professional Social Work | Dept. Social Work, Karnataka State Women's University, Bijapur | 20th-22nd January, 2014 | Dr. S. Hunshal<br>Dr. L. Pujar |
| 26. | Subcommittee meeting for finalization of documentation of AICRP-FRM research work. | ANGRAU, Hyderabad | 23rd January, 2014 | Dr. A. Mrunalini,<br>Dr. Suma Hasalkar |
| 27. | National workshop on "Gender main streaming: problems and prospects" (Chair Person) | Udaipur School of Social Work, Rajasthan Vidyapeeth, Udaipur | 27th-28th January, 2014 | Dr. G. Tiwari |
| 28. | National Seminar on Agripreneurship and Feasible Interventions for Small Women Group | National Institute of Rural Development, Hyderabad | 30th January, 2014 | Dr. Sarah Kamala |
| 29. | Training program on Nomogram development techniques and variable scale development and unit meeting | ANGRAU, Hyderabad | 6th-7th February, 2014 | Dr. A. Mrunalini<br>Dr. S. Hasalkar<br>Dr. G. Chitagubbi |
| 30. | Workshop on Right to Information | Karnataka State Law University, Hubli in association with Higher Education Council, Govt of Karnataka | 14th February, 2014 | Dr. G. Chitagubbi |
| 31. | Workshop on Preventive measure to eliminate the crimes of honour killing | College of Home Science, CCSHAU, Hisar | 25th -26th February, 2014 | Dr. K. Duhan |

## 11.3 Meetings Attended by the Director, DRWA, Bhubaneswar (1st July, 2013 - 31st March, 2014)

| Dates | Place of Visit | Highlights of Visit |
|---|---|---|
| 16th July, 2013 | New Delhi | Attended 85th Foundation Day and Award Ceremony of ICAR and Directors' Conference at NASC, New Delhi |
| 17th July, 2013 | New Delhi | Attended meeting with Director NCAP regarding Institute Performance Indicators.<br>Attended meeting with Director PDFSR at NCAP, New Delhi regarding participation of DRWA in farming system research |
| 18th July, 2013 | New Delhi | Attended Divisional Meeting at KAB-I, Pusa, New Delhi regarding review of Institute Performance Indicators, Annual and Half yearly Reports |
| 31st July, 2013 | New Delhi | Made a presentation to the High Powered Committee on Status of Women in India |
| 22nd August, 2013 | Patna | Attended the Joint Review Mission (JRM) of MHRD on Mid Day Meal Programme |
| 29th August, 2013 | New Delhi | Attended Meeting in ICAR regarding AICRP |
| 4th September, 2013 | New Delhi | Attended the review of the existing ICAR-SRF (PGS) competitive examination in KAB II |
| 16th September, 2013 | New Delhi | Attended the review meeting of ICAR-SRF (PGS) examination in KAB II |
| 24th-25th September, 2013 | Balasore | Reviewed the nutrition assessment work at Balasore |
| 2nd October, 2013 | Kolkata | Attended a workshop on Development of Action Plan for Livelihood Options in Bali (Sunderban) |
| 18th October, 2013 | New Delhi | Attended the final meeting of Revisiting/Reviewing the existing ICAR-SRF (PGS) Competitive Examination Scheme |
| 23rd-25th October, 2013 | Bangalore | Attended the 8th the National KVK Conference |
| 31st October, 2013 | New Delhi | Attended the 40th Foundation Day Function of the ASRB |
| 11th November, 2013 | New Delhi | Made a presentation at UNICEF workshop on "WASH" |
| 23rd November, 2013 | Ludhiana | Chaired the meeting of the Committee constituted by ICAR on "Minimum Standards of Higher Agricultural Education (MSHAE) in Home Science" |
| 25th November, 2013 | New Delhi | Attended meeting for finalization of technical programme of AICRP on Home Science, HEE component, at NASC Complex |
| 7th December, 2013 | New Delhi | Delivered a talk on "Strengthening women's participation in agriculture with gender friendly technologies" in Elma Agrimech India 2013 |
| 8th December, 2013 | Bangalore | Chaired the Technical Session on "Women in Agriculture Day" celebrations of IIHR, Bangalore |

| Dates | Place of Visit | Highlights of Visit |
|---|---|---|
| 20th December, 2013 | Vadodara | Delivered the Key Note Address during the Biennial Conference of Home Science Association of India at M.S University, Baroda |
| 24th December, 2013 | New Delhi | Attended CAS meeting at ASRB |
| 16th-20th January, 2014 | Baramati | Attended the VCs and Directors Conference |
| 2nd-7th February, 2014 | Boston, USA | Attended International Training Under HRD Program of NAIP "Authentic Leadership Development (ALD)" at Harvard Business School, Executive Education Program, USA |
| 22nd - 26th February, 2014 | Hyderabad | Attended the "Executive Development Programme on Leadership" at NAARM, Hyderabad |
| 10th March, 2014 | New Delhi | Attended the 'Jharkhand Agriculture Development Vision- Meeting' chaired by Hon DG, ICAR at NASC Complex, New Delhi. |
| 11th March, 2014 | Vadodara | Attended the Advisory Committee meeting of UGC-DRS Programme in Clothing and Textiles at MS University, Baroda |
| 13th March, 2014 | Madurai | Participated as the Chief Guest of the National Workshop on 'Emerging Technologies on Processing of Millets for Better Utilization' at Home Science College and Research Institute, TNAU, Madurai |
| 26th-27th March, 2014 | New Delhi | Attended and chaired a session in a International Consultation on 'Addressing Gender, Agriculture and Assets in Agricultural Development Projects' organised by IFPRI |

# 12. DISTINGUISHED VISITORS

| S. No. | Date | Distinguished Visitors |
|---|---|---|
| 1. | 27th September, 2013 | **Dr. V. Sadamate**<br>Former Advisor, Planning Commission, Government of India |
| 2. | 20th November, 2013 | **Dr. Ramesh Kumar**<br>Director, Directorate of Floriculture, ICAR |
| 3. | 24th November, 2013 | **Shri D.V. Swamy, IAS**<br>Director, Odisha Livelihood Mission, Govt. of Odisha |
| 4. | 30th November, 2013 | **Dr. Y. R. Chanana**<br>Consultant, National Horticulture Board, Gurgaon |
| 5. | 12th December, 2013 | **Dr. V. N. Sharda**<br>Member, ASRB, New Delhi |
| 6. | 27th January, 2014 | **Dr. Manoranjan Kar**<br>Vice-Chancellor, OUAT, Bhubaneswar |
| 7. | 28th February, 2014 | **Shri R.S. Gopalan, IAS**<br>Director of Agriculture & Food Production, Govt. of Odisha |

## 13. RESEARCH PROJECTS

| S. No. | Name of the Projects | Duration | Name of the PI & Co-PIs |
|---|---|---|---|
| 1. | Reducing the gender gap in nutritional status of family members in rice based farming system | 2010-December, 2013 | Dr. Abha Singh<br>Dr. M.P.S. Arya<br>Mrs. L. P. Sahoo |
| 2. | Micro propagation of pointed gourd and pine apple for empowerment of women | 2011-2014 | Dr. A. K. Shukla<br>Dr. Naresh Babu<br>Mrs. L. P. Sahoo<br>Dr. Kundan Kishore |
| 3. | Technology application and gender mainstreaming in agriculture for developing a model village | 2011-2014 | Dr. Sabita Mishra<br>Dr. K. Ponnuswamy<br>Dr. M.P.S. Arya<br>Dr. Suman Agarwal<br>Dr. A. K. Shukla<br>Dr. Anil Kumar<br>Dr. H. K. Dash<br>Dr. Jyoti Nayak<br>Ms. Gayatri Moharana |
| 4. | Refinement of storage pest management techniques in selected cereals, pulses, condiments and spices with gender perspective | 2008-2014 | Dr. S. K. Srivastava<br>Dr. Suman Agarwal<br>Dr. Naresh Babu |
| 5. | Assessment of women's role in traditional livestock dependant societies: Kangayam grasslands | 2012-2014 | Dr. Anil Kumar<br>Mrs. Tanuja, S.<br>Dr. J. Charles Jeeva |
| 6. | Technological empowerment of farmwomen in production of quality seeds and planting materials of vegetables | 2008 -2014 | Mrs. L. P. Sahoo |
| 7. | Studies on physiological and biochemical changes in stored sunflower (*Helianthus annuus*. L.) seeds as influenced by storage conditions under coastal agro climate | 2009-2014 | Mrs. L. P. Sahoo |
| 8. | Identification of gender issues in IPM and suitable intervention with women perspective | 2013-2016 | Dr. S. K. Srivastava<br>Dr. Naresh Babu<br>Dr. Sabita Mishra |
| 9. | Enhancing productivity of fruit based cropping model for income generation of farm women | 2013-2016 | Dr. Naresh Babu<br>Dr. A. K. Shukla<br>Dr. S. K. Srivastava |
| 10. | Development of resource efficient horticulture model for livelihood improvement of rural women | 2013-2018 | Dr. A. K. Shukla<br>Dr. Anil Kumar<br>Dr. Naresh Babu<br>Dr. S. K. Srivastava<br>Dr. Abha Singh<br>Dr. Kushagra Joshi |

| S. No. | Name of the Projects | Duration | Name of the PI & Co-PIs |
|---|---|---|---|
| 11. | Livelihood improvement of rural women through non-conventional feed and food | 2013-2016 | Dr. Anil Kumar<br>Dr. M. P. S. Arya<br>Dr. A. K. Shukla<br>Dr Jyoti Nayak<br>Dr. Kundan Kishore<br>Mrs. Tanuja, S. |
| 12. | Assessment of integrated farming model for improved food security and livelihood in rural households | 2013-2017 | Dr. Jyoti Nayak<br>Dr. M. P. S. Arya<br>Dr. Abha Singh |
| 13. | Multi agency participatory extension model for economic enhancement and effective management of poultry by rural women | 2013-2016 | Dr. Sabita Mishra<br>Dr. Anil Kumar<br>Dr. Ananta Sarkar |
| 14. | Study on gender related indices in agriculture | 2013-2016 | Dr. Ananta Sarkar<br>Dr. H. K. Desh |
| 15. | Ergonomic evaluation of selected manually operated farm equipment in mango and cashew nut | 2013-2016 | Ms. Gayatri Moharana<br>Dr. Naresh Babu<br>Dr. S. P. Singh |
| 16. | Aqua and poultry feed from fish and shell fish wastes for entrepreneurship development of rural women | 2013-2016 | Mrs. Tanuja, S.<br>Dr. Anil Kumar |
| 17. | Gender work participation scenario in agriculture | 2013-2016 | Dr. H. K. Desh<br>Dr. Ananta Sarkar |
| 18. | Technological interventions for drudgery reduction with increased work efficiency through women friendly farm tools/equipment/ technologies in the state of Odisha (RKVY Project) | 2013-2016 | Dr. Jyoti Nayak<br>Dr. S. P. Singh<br>Dr. Sabita Mishra<br>Dr. Abha Singh<br>Ms. Gayatri Moharana |
| 19. | Assessment of sustainable livelihood interventions and entrepreneurial skills among coastal women self help groups using participatory methodologies. (ICSSR funded) | 2013-2015 | Dr. J. Charles Jeeva |
| 20. | All India Coordinated Research Project on Home Science | 2012-2017 | Dr. Suman Agarwal (SIC) |

# 14. PERSONNEL

## STAFF LIST OF DRWA, BHUBANESWAR

| S. No. | Name | Designation |
|---|---|---|
| **Director** | | |
| 1 | Dr. (Mrs.) Neelam Grewal | Director |
| **Scientific** | | |
| 2 | Dr. (Ms.) Suman Agarwal | Principal Scientist |
| 3 | Dr. Santosh Kumar Srivastava | Principal Scientist |
| 4 | Dr. Anil Kumar Shukla | Principal Scientist |
| 5 | Dr. Anil Kumar | Principal Scientist |
| 6 | Dr. Naresh Babu | Principal Scientist |
| 7 | Dr. (Mrs.) Sabita Mishra | Senior Scientist |
| 8 | Dr. Hemanta Kumar Dash | Senior Scientist |
| 9 | Dr. J. Charles Jeeva | Senior Scientist |
| 10 | Dr. (Mrs.) Jyoti Nayak | Senior Scientist |
| 11 | Dr. Ananta Sarkar | Senior Scientist |
| 12 | Smt. Laxmi Priya Sahoo | Scientist |
| 13 | Dr. (Mrs.) Abha Singh | Scientist |
| 14 | Smt. Tanuja, S. | Scientist |
| 15 | Ms. Gayatri Moharana | Scientist |
| 16 | Dr. (Ms.) Kushagra Joshi | Scientist |
| **Technical** | | |
| 17 | Shri Shaji, A. | Senior Tech. Officer |
| 18 | Smt. Geeta Saha | Technical Officer |
| 19 | Shri Debendra Nath Sarangi | Senior Tech. Assistant |
| 20 | Shri Bhikari Charan Behera | Senior Tech. Assistant |

| S. No. | Name | Designation |
|---|---|---|
| 21 | Shri Manoranjan Prusty | Senior Tech. Assistant |
| 22 | Shri Bishnu Charan Sahu | Technical Assistant |
| 23 | Dr. Sujit Kumar Nayak | Technical Assistant |
| 24 | Smt. Tapaswini Sahoo | Technical Assistant |
| 25 | Shri Sanjay Kumar Behera | Technical Assistant |
| 26 | Er. Pragati Kishore Rout | Technical Assistant |
| 27 | Er. Subrat Kumar Das | Technical Assistant |
| 28 | Shri Atul Chetan Hemrom | Technical Assistant |
| **Administrative including Supporting** | | |
| 29 | Shri G.S. Rao | Administrative Officer |
| 30 | Shri V. Ganesh Kumar | Assistant Administrative Officer |
| 31 | Shri Janardan Biswal | Assistant Finance & Accounts Officer |
| 32 | Smt. Parisima Sen | Personal Assistant |
| 33 | Smt. Bishnupriya Moharana | Assistant |
| 34 | Shri Parikshit Mallik | Stenographer Gr.III |
| 35 | Shri Jyoti Ranjan Das | Lower Division Clerk |
| 36 | Shri Biswanath Biswal | Skilled Support Staff |

## Appointments

| S. No. | Name of the officer/employee | Designation | Date of joining at DRWA |
|---|---|---|---|
| 1 | Dr. Neelam Grewal | Director | 17.07.2013 |
| 2 | Dr. J. Charles Jeeva | Senior Scientist | 17.08.2013 |
| 3 | Dr. Kushagra Joshi | Scientist | 12.04.2013 |
| 4 | Shri Shaji, A. | Senior Technical Officer | 17.05.2013 |
| 5 | Shri Sunil Kumar Singh | Technical Assistant | 08.04.2013 |
| 6 | Smt. Tapaswini Sahoo | Technical Assistant | 25.04.2013 |

| S. No. | Name of the officer/employee | Designation | Date of joining at DRWA |
|---|---|---|---|
| 7 | Shri Sanjay Kumar Behera | Technical Assistant | 27.04.2013 |
| 8 | Er. Pragati Kishore Rout | Technical Assistant | 24.06.2013 |
| 9 | Er. Subrat Kumar Das | Technical Assistant | 24.07.2013 |
| 10 | Shri Atul Chetan Hemrom | Technical Assistant | 28.08.2013 |

## Transfers

| S. No. | Name of the officer/employee | Designation | Date of relieving from DRWA |
|---|---|---|---|
| 1 | Dr. Shiv Pratap Singh | Senior Scientist | 29.05.2013 |
| 2 | Dr. K. Ponnuswamy | Principal Scientist | 30.05.2013 |
| 3 | Dr. Kundan Kishore | Senior Scientist | 20.07.2013 |
| 4 | Dr. Mahendra Pal Singh Arya | Principal Scientist | 30.11.2013 |

## Relieving on resignation

| S. No. | Name of the officer/employee | Designation | Date of relieving from DRWA |
|---|---|---|---|
| 1 | Shri Sunil Kumar Singh | Technical Assistant | 07.10.2013 |