

वार्षिक प्रतिवेदन
Annual Report
2006-2007



National Research Centre for Women in Agriculture
Indian Council of Agricultural Research

Bhubaneswar, Orissa, India



NRCWA

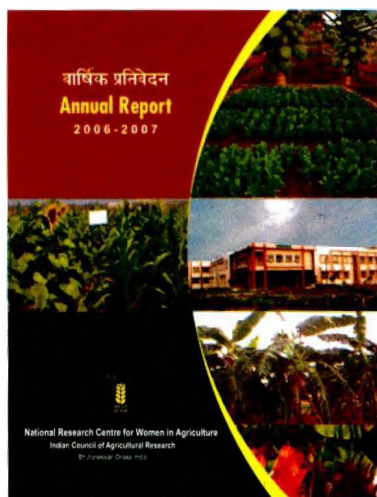
ANNUAL REPORT

2006 - 2007

National Research Centre for women in Agriculture
(Indian Council of Agricultural Research)
Bhubaneswar



**NRCWA
ANNUAL REPORT 2006-2007**



Published by
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Director, NRCWA

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Printed at
Capital Business Service & Consultancy
B-51, Sahid Nagar, Bhubaneswar - 751 007
Ph: 0674-2545484

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Preface

Women played a predominant role in the Indian Agriculture from time immemorial. Even though they are the backbone of agriculture at various stages viz., production, processing and post-harvest storage, their role continue to be overlooked. A number of constraints and problems are associated with the farm women and to overcome these, they are to be empowered both socially and economically. Mainstreaming gender in agricultural policy, research, extension and training by developing skills in gender analysis is the need of the hour. The gender roles and gender issues related to agriculture are required to be addressed alongwith livelihood and nutritional security. Feeding ever-growing population is a big challenge to the scientists, planners and policy makers. The National Research Centre for Women in Agriculture (NRCWA) is mandated to work in this direction. The activities related to farmwomen in various sectors of agriculture have been undertaken and popularized in different locations through research and farmers' training during 2006-07. The Annual Report of NRCWA 2006-07 is an important document which highlights the activities, achievements, infrastructure and human resource development of the Centre.

I express my deep sense of gratitude to Dr Mangala Rai, Secretary, DARE, Government of India and Director General, ICAR, for his guidance and constant support. I sincerely thank Dr P.Das, Deputy Director General (Agricultural Extension) for his kind support, consistent guidance and encouragement to carry out the various activities of the Centre during the period. The activities reported here pertain to the period when Dr (Mrs) Hema Pandey was the Director of the Centre. The NRCWA is proud of the contribution made by her particularly in the infrastructure development.

I am thankful to members of the Editorial Board and all scientific, technical and administrative staff for contributing material compilation and editing of the Annual Report.

December, 2007
Bhubaneswar

Krishna Srinath
Director



Preface

कार्यकारी सारांश

कृषि में महिलाओं पर राष्ट्रीय अनुसंधान केंद्र का अधिदेश उपलब्ध कृषि क्षेत्र में प्रौद्योगिकियों/कार्यक्रमों/नीतियों का महिलाओं के परिपेक्ष में लिंग सम्बन्धित मामले तथा उनकी समुचितता परखने के लिए मौलिक, कूटनैतिक व व्यवहारिक अनुसंधान करना व कृषि महिलाओं के सशक्तिकरण हेतु अनुसंधान और प्रसार में लिंग को मुख्यधारा में प्रोत्साहित करना तथा कृषि महिलाओं की जरूरतों के उत्तरदायित्व हेतु वैज्ञानिकों, योजनाकारों तथा नीति निर्धारकों को सक्षम बनाने के लिए प्रशिक्षण व सलाह देना है। तदनुसार प्रौद्योगिकियों को परखना, लिंग को मुख्यधारा में लाना तथा क्षमता बढ़ाने वाली गतिविधियाँ जैसे व्यापक क्षेत्रों पर अनुसंधान परियोजनाएँ ली गई।

केंद्र के अधिदेश के मुख्य क्षेत्रों को ध्यान में रखते हुए कृषि एवं संबंधित क्षेत्रों में तकनीकियों की परख एवं शोधन प्रसार व संस्थागत बदलाव एवं आर्थिक व राजनैतिक बिन्दुओं पर अध्ययन किया गया। महिला संबंधित मामले जैसे खरपतवार नियन्त्रण के उपाय, स्वास्थ्य को ध्यान में रखते हुए पौध बचाव, कृषि कार्यों में उबारूपन को दूर करनेवाले यंत्र और महिलाओं के लिए मुख्यतः घर संबंधी जरूरतों/मामलों व पाघ फसलों को कटाई उपरान्त रखरखाव इत्यादि परख एवं शोधन किए गए।

धान व मूंगफली की किस्मों को पहचानने के लिए क्षेत्र परख की गई जो खरपतवार से मुकाबला कर सके और इस तरह खरपतवार निकालने के बोझिल काम को कम कर सके। आर्थिक स्तर के मुकाबले के लिए खरपतवार के नियन्त्रण के निर्णयन कार्य को सरल करने के लिए समय एवं मानदण्ड बनाने के लिए खरीफ में धान व मूंगफली की खरपतवार घनत्व की सीमा 125 खरपतवार पौधे/प्रति वर्गमीटर पाई गई। मूंगफली में प्रति पौधे के लिए 160 वर्ग से.मी. क्षेत्रफल तथा पंक्ति व पौधे के बीच 3:1 का अनुपात खरपतवार प्रबलता कम करने एवं उत्पादन स्तर को बढ़ाने के लिए प्रभावशाली पाई गई जो कृषि महिलाओं के काम को काफी हद तक कम करने में सहायक होगी।

कृषि महिलाओं की लिंग सम्बन्धित संवेदनशीलता एवं सशक्तिकरण के लिए भी परियोजनाएँ ली गई। अदरक एवं मूंगफली के अधिकतम उत्पादन, बीज डालने के लिए जमीन तैयार करना, भूमि उपचारण, बीज उपचारण, बीज बोने, पेड़ों के चारों तरफ घास विछावन, बैगन में तना तथा फल छेदक तथा टमाटर में फल छेदक कीट प्रबंधन के लिए परिस्थितकीय अनुकूल प्रौद्योगिकियों को प्रदर्शित किया गया। पुआल व ढींगरी खुम्ब उत्पादन, नीबू व अदरक का शर्बत, मिला-जुला शर्बत, अचार तथा सागू पापड़ व सूजी पापड़ पर भी प्रशिक्षण दिया गया।

बीज का कटाई उपरान्त रखरखाव एक महत्वपूर्ण मामला है जो कृषि में महिलाओं को प्रभावित करता है। मडुआ के बीज की रोपण मूल्य बढ़ाने के लिए स्थानीय उपलब्ध चीजें जैसे यूरिया, साधारण नमक इत्यादि परखे गए तथा साधारण नमक (5%) व यूरिया (1%) से उपचारित बीज इसकी रोपण मूल्य बढ़ाने में सहायक पाए गए।

बैगन के तना एवं फल छेदक कीट के नियन्त्रण के लिए नक्स वॉम, तम्बाकू का पानी, नीम तेल, कपूर व नैफथलीन की गोलियों को लटकाना तथा मदार के पत्तों का मिट्टी में मिलाना इत्यादि विषाक्त रसायनों के मुकाबले में प्रभावशाली वैकल्पिक उपाय पाए गए। पौधशाला को कड़कती धूप से बचाने के लिए झाड़ियों की पत्ते वाली टहनियों के उपयोग का मानकीकरण किया गया।

कम लागत द्वारा निर्मित शून्य ऊर्जा चालित शीत कक्ष में कटाई उपरान्त सब्जियों को रखा गया। केन्द्र में बने कक्ष में किए गए प्रयोगों से पता चला कि ताजी सब्जियों व फलों को 7-10 दिन तक बिना किसी नुकसान व गुणवत्ता हास के रखा जा सकता है।

महिलाओं की जरूरतों को पूरा करने के लिए केले एवं पपीते की किस्मों का विभिन्न प्राचलों के लिए मूल्यांकन किया गया। केले की ग्रांड नैन किस्म में प्रति केले के 265 ग्रा के साथ-साथ सबसे ज्यादा उत्पादन (30.29 कि.ग्रा./पौधा) पाया गया। पपीते की किस्मों के मूल्यांकन में पूसा इवार्फ में सबसे ज्यादा भार एवं उत्पादन (38.59 कि.ग्रा./ पौधा) का पता चला। छिद्रयुक्त (0.2 प्रतिशत) 100 गेज की पोलीथीन थैली थे, में रखे सीओ-2 पर किस्म फलों की निधानी आयु सबसे ज्यादा (8 दिन) पाई गई।

कृषि में महिलाओं पर राष्ट्रीय अनुसंधान केन्द्र के उपकेन्द्र भोपाल में केन्द्रीय धान अनुसंधान संस्थान द्वारा निर्मित द्विपंक्ति धान प्रत्यारोपण यंत्र, केन्द्रीय अभियान्त्रिकी अनुसंधान संस्थान के खरपतवार निकालने के औजार, उड़ीसा कृषि एवं तकनीकी विश्वविद्यालय द्वारा पदचालित धान गहाई यन्त्र तथा केन्द्रीय धान अनुसंधान संस्थान के धान ओसाई यन्त्र का महिलाओं की शारीरिक संरचना के संदर्भ में मूल्यांकन किया गया। उड़ीसा कृषि एवं तकनीकी विश्वविद्यालय द्वारा निर्मित पदचालित धान गहाई यन्त्र से पता चला कि इस पर दिन भर काम करने वालों को बीच में आराम की जरूरत होती है।

उद्यम में शामिल करके उद्यमकर्ता सम्बंधी गतिविधि से कृषक परिवारों का सक्रिय स्वयं सहायता समूहों द्वारा केचुआ खाद उत्पादन और मधुमक्खी पालन द्वारा जीविका सुरक्षा हेतु दक्षता विकास के लिए प्रशिक्षण आयोजित किए गए।

धान के क्षेत्र में यांत्रिकीकरण द्वारा लैंगिक असर से पता चला कि पुरुष सम्बंधी अधिकांश कार्य यांत्रिक है जबकि महिलाओं से सम्बंधित कार्य अछूते हैं। यांत्रिकीकरण गतिविधियों में क्षेत्र कृषि सम्बंधित घटकों पर आधारित भिन्नता पाई गई।

50-60 लीटर क्षमता वाले मिट्टी के बर्तन, जो सामान्यता: महिलाओं द्वारा पारम्परिक तरीके से धान उसनाकरण में इस्तेमाल किए जाते हैं, को ग्रामीण महिलाओं के सशक्तिकरण हेतु रंगीन मच्छली उत्पादन का मानकीकरण किया गया तथा ऐसी 12 रंगीन मच्छली इकाईयाँ पुरी जिले के निमापड़ा खण्ड में एक समूह में विकसित की गई। ग्रामीण युवाओं को भी शीशे के जलजीवशाला बनाने के लिए प्रशिक्षित किया गया।

‘कृषि महिलाओं के लिए प्रसार सेवाओं को सुधारने की तकनीक’ एवं ‘कृषि महिलाओं में उद्यमता विकास’ पर क्रमशः 17-24 अगस्त व 15-22 नवम्बर 2006 को दो आदर्श प्रशिक्षण पाठ्यक्रम आयोजित किए गए। ‘कृषि अनुसंधान एवं प्रसार में लिंग को मुख्यधारा - उभरते विषय एवं निदान पर विन्टर स्कूल आयोजित किया गया।

जैसा कि ग्यारहवीं पंचवर्षीय योजना से अखिल भारतीय गृहविज्ञान समन्वित अनुसंधान परियोजना - का कृषि में महिलाओं पर राष्ट्रीय अनुसंधान केन्द्र में विलय किया गया है, अतः इसका तकनीकी कार्यक्रम विकसित करने के लिए अनुवर्ती कार्यशाला का आयोजन किया गया। साथ ही अनुसंधान सलाहाकार समिति तथा संस्थानिक प्रबंधन समिति की बैठक भी सम्पन्न हुई।

केन्द्र के वैज्ञानिकों ने विभिन्न गोष्ठियों, कार्यशालाओं, सम्मेलनों में भाग लिया तथा शोध पत्र प्रस्तुत किए। इसके अलावा हिन्दी चेतना दिवस मनाया गया तथा दूर-दराज गाँवों में जाकर भी प्रसार कार्यक्रम आयोजित किए गए।

EXECUTIVE SUMMARY

The Mandate of the National Research Centre for Women in Agriculture is to Carrying out basic, strategic and applied research to identify gender issues and test appropriateness of available farm- technologies/programmes/policies with women perspective. To do training and consultancy for promoting gender mainstreaming in research and extension for empowerment of farmwomen and capacity building of scientists, planners and policy makers to respond to the needs of farmwomen. Accordingly the research projects on broad areas of testing of technologies, gender mainstreaming and capacity building activities were taken up.

Projects were undertaken to address thrust areas of testing and refinement of technologies, extension and institutional changes and economics and policies in agriculture and allied fields. The interventions for testing and refinement were selected pertained to women - specific operational issues like measures of weed control, plant protection options with concern for health, agricultural implements for reducing operational drudgery and household needs/issues including post harvest care of food items.

The field-testing was undertaken to identify and evaluate varieties of rice and groundnut that are capable of withstanding weed competition and thus reducing workload of cumbersome operation of weeding. To facilitate the decision-making on timings and measures of weed control the threshold weed density for economic level competition was found out which was 125-weed plants/m² both for rice and groundnut in kharif season. The spacing geometry of 160 cm² per plant area and 3:1 row to plant spacing ratio was found effective in reducing weed intensity and increasing yield level of groundnut that could help in reducing the work load of farm women to a great extent.

Technological assistance was made on yield maximization of ginger and groundnut, preparation of seedbed, soil treatment, seed treatment, sowing of seeds, mulching and eco-friendly technologies for the management of brinjal shoot and fruit borer (*Leucinodes orbonalis*) and tomato fruit borer (*Heliothis armigera*) for on - farm testing and technological empowerment of farm women. Trainings were also imparted on production of straw and oyster mushroom and value addition of lime and ginger into squash, blended squash and pickle and preparation of Sagu Papad and Suji Papad.

The post harvest management of seed is an important activity taken up by the women in agriculture sector. For enhancing planting value of seeds the locally available materials were tested and the seed treated with NaCl (5%) and Urea (1%) found to enhance the planting value of ragi seeds.

The spraying of Nux Vom, tobacco soaked water, and Neem oil; hanging of Camphor and Naphthalene and soil application of Calotropis leaf powder were found effective as alternate measures to the toxic chemicals for the control of brinjal shoot and fruit borer. The use of bushy or leafy twigs was standardized for protecting

nursery from scorching sun.

The studies on post harvest handling of vegetables conducted using low cost Zero Energy Cool Chamber (ZECC) revealed that fresh farm produces like vegetables and fruits kept safe for 7-10 days without any significant loss in quality.

Varieties of banana and papaya were tested and evaluated for table and vegetable purpose. The Grand Naine variety of banana recorded the maximum yield (30.29 kg bunch/ plant) along with higher weight (265 g) per finger. The evaluation of papaya varieties revealed that fruit weight and yield (38.59 kg/ plant) were highest in 'Pusa Dwarf'. The shelf life of fruit was found maximum (8 days) at room temperature in variety Co-2 under 100 gauge polythene bags having vents (0.2%).

The ergonomical evaluation of manually operated CRR1 two row transplanter, single row CIAE-IEP cono-weeder, OUAT ESA pedal operated paddy thresher and CRR1 rice winnower was carried out at NRCWA Sub Centre, Bhopal. The higher work pulse value recorded over OUAT ESA pedal operated paddy thresher indicated that adequate rest pauses need to be given to the worker for day long work.

Skill development trainings were organized on vermi-composting and bee-keeping for livelihood security through entrepreneurial activity among farm families through reviving SHGs that were lying idle for a long time without involvement in any enterprise.

The impact of mechanization of rice sector on gender indicated that most of the male dominated tasks were mechanized, while women related tasks left untouched. The extent of mechanization of activities found varied with farm-specific factors.

The technology consisting of locally available earthen pots of 50-60 ltrs capacity that are commonly used by women in traditional method of rice parboiling was tested and standardized for empowering rural women in ornamental fish production and 12 such ornamental units were developed in a cluster in Nimapara block of Puri district of Orissa. Rural youths were also trained in fabrication and maintenance of glass aquarium.

Model Training Course on Techniques of improving extension services for farm women and entrepreneurship development among farmwomen and a Winter School on Gender mainstreaming in agricultural research and extension- emerging issues and approaches were organized.

The All India Coordinated Research Project on Home Science has been merged with NRCWA from XI Plan period. A Follow-up Workshop AICRP was held for planing and finalising technical programmes. The meeting of Staff Research Council and Research Advisory Committee was also conducted.

The scientists of Head Quarter and Sub Centre participated in various seminars, workshops and conferences including Hindi Chetna Diwas and other extension activities.

1. THE CENTRE



1.1 BRIEF HISTORY

The Working Group on Agricultural Research and Education constituted by the Planning Commission for the formulation of the Eighth Five Year Plan (1992-97) recommended for establishment of a National Research Centre for Women in Agriculture (NRCWA). Accordingly, the Indian Council of Agricultural Research established the NRCWA in the month of April 1996 at Bhubaneswar. The Sub-Centre of NRCWA is located at the Campus of CIAE, Bhopal.

1.2 MANDATE AND OBJECTIVES

The Centre while finalizing the X plan EFC considered the views offered by different reviewing agencies including Planning Commission and in consultation with the Director General, ICAR, revised the mandate and objectives to streamline the research programmes and make it more relevant.

MANDATE

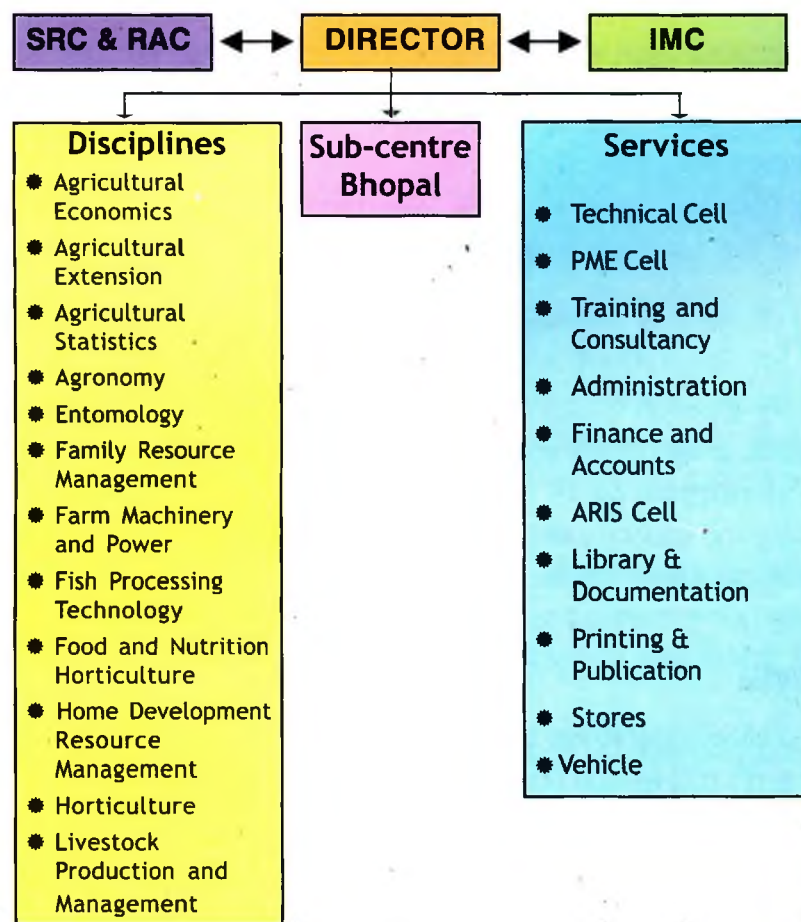
To identify gender issues and test appropriateness of available farm-technologies, programmes and policies with women perspective for promoting gender mainstreaming in research and extension for empowerment of farmwomen and capacity building of scientists, planners and policy makers to respond to the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

OBJECTIVES

- To create a database on gender specific information about men's and women's role in food production and agriculture development for effecting technologies, programmes and policies.
- To test the appropriateness of farm technologies and programmes and policies in terms of gender sensitivity in collaboration with relevant national and international organizations and suggest suitable modifications.

- To develop drudgery reducing options for decreasing the workload and increasing the efficiency of women.
- To develop gender sensitive modules and methodologies for transfer of technology.
- To develop gender sensitive training modules and materials and impart training for capacity building of scientists, researchers, planners and policy makers for gender mainstreaming and practical application of gender related technologies.
- To develop and publish gender sensitive materials, create network linkage through journals and information sharing.

1.3 ORGANOGRAM OF NRCWA



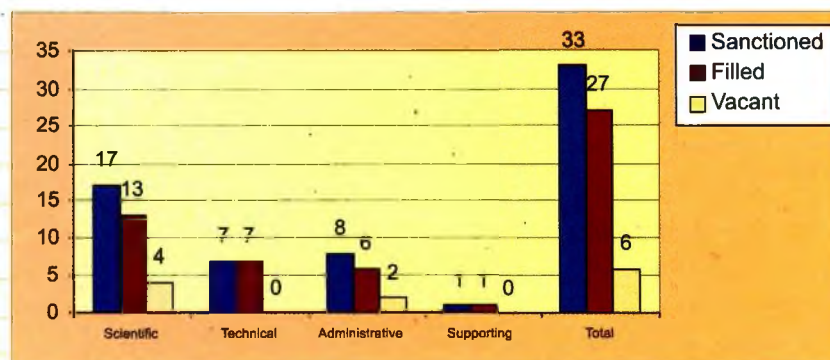
1.4 BUDGET AND EXPENDITURE (MAIN AND SUB-CENTRE)

(In lakh)

Sl. No.	Head of Account	Budget		R.E.		Expenditure	
		Non-plan	Plan	Non-plan	Plan	Non-plan	Plan
A. Recurring							
1.	Establishment charges including LS & PC	64.00	-	78.00	-	75.17	-
2.	OTA	0.05	-	0.05	-	-	-
3.	Traveling allowances	0.10	6.00	0.10	5.00	0.09	3.71
4.	HRD	-	1.43	-	1.00	-	0.75
5.	Contingency	14.85	67.00	3.85	44.00	3.84	38.18
	Total	79.00	74.43	82.00	50.00	79.10	42.64
B. Non-recurring							
1.	Equipments	-	19.42	-	6.30	-	0.42
2.	Works	1.00	-	1.00	-	0.98	-
3.	Vehicle	-	-	-	-	-	-
4.	Library	-	14.00	-	9.70	-	9.70
5.	Furniture/ Livestock	-	-	-	-	-	-
	Total	1.00	33.42	1.00	16.00	0.98	10.12
	Total (A+B)	80.00	107.85	83.00	66.00	80.08	52.76

1.5 MANPOWER (MAIN AND SUB-CENTRE)

Category	Sanctioned	Filled	Vacant
Scientific	17	13	04
Technical	07	07	-
Administrative	08	06	02
Supporting	01	01	-
Total	33	27	6



1.6 SCIENTIFIC STAFF (MAIN AND SUB-CENTRE)

Sl. No.	Discipline	Sanctioned Strength			In position as on 31.3.2007		
		Scientist	Senior Scientist	Principal Scientist	Scientist	Senior Scientist	Principal Scientist
1	DIRECTOR	RMP (1)			RMP (1)		
Scientific							
2	Agricultural Economics	1	-	-	1	-	-
3	Agricultural Extension	-	1	1	-	1	1
4	Agricultural Statistics	-	1	-	-	-	-
5	Agronomy	-	-	1	-	-	1
6	Entomology	-	1	-	-	1	-
7	Family Resource Management	-	1	-	-	-	-
8	Farm Machinery and Power	-	1	-	-	1	-
9	Fish Processing Technology	-	1	-	-	1*	-
10	Food and Nutrition	1	-	-	1	-	-
11	Home Development Resource Management	-	-	1	-	-	1
12	Horticulture	2	1	1	2	1	-
13	Livestock Production and Management	-	-	1	-	-	-
Total		4	7	5	4	5	3

1.7 TECHNICAL STAFF

Designation	Sanctioned post	In position as on 31.3.2007
Technical Assistant (T-3)	6	6
Technical (T-1)	1	1

1.8 ADMINISTRATIVE STAFF INCLUDING SUPPORTING

Designation	Sanctioned post	In position as on 31.3.2007
Asst. Administrative Officer	1	1
Asst. Finance and Accounts Officer	1	-
Personal Assistant	1	1
Senior Clerk	2	2
Stenographer, Gr-III	2	2
Junior Clerk	1	-
S.S.G. 1	1	1
Total	9	7

2. RESEARCH ACCOMPLISHMENTS



During the period under report in all the sixteen projects proposed were implemented. Out of them, four projects were concluded. The details of research achievements are given below:

2.1 TECHNOLOGY TESTING AND REFINEMENT

2.1.1 Studies on eco-friendly integrated weed management

(M.P.S. Arya)

The major objectives of the project were to workout integrated model of weed management so that weed intensity could be reduced and women working in the fields are relieved from heavy workload of weeding. Field trials were conducted on various aspects of crop management on major crops of coastal region of Orissa i.e., rice and groundnut. The experiments conducted under the project have been detailed below :

Screening of rice genotypes for weed suppression

A field experiment was conducted during Rabi 2005-06 and Kharif 2006. Six genotypes (Khandagiri, Udaigiri, Nilgiri, Ghanteswari, ORS 102-4 and OR 1519-2) were tested with reference to their ability to compete with weeds. The experiment was conducted in randomized block design.

The major weed species observed during Rabi season were - *Mitracarpus verticillatus*, *Perotis indica*, *Digitaria ciliaris*, *Dactyloctenium aegyptium* and *Hedyotis corymbosa*. However, *Bulbostylis barbata* (Rottb.) C.B. Clarke, *Cyperus compressus*, *Digitaria sanguinalis*, *Brachiaria mutica*, *Perotis indica*,

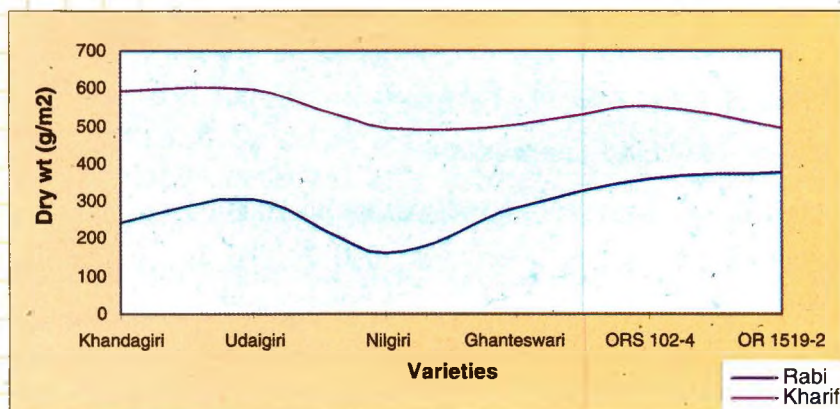


Fig.1. Weed dry weight (g/m²) under rice varieties at 30 days

Digitaria ciliaris, *Dactyloctenium aegyptium*, *Tephrosia purpurea* (Linn.) Pers., *Desmodium triflorum*, *Sida cordata* (Burm. F.) Waalkes, *Spermacoce ramani* and *Mitracarpus verticillatus* were major weeds of Kharif season.

The data on grain yield revealed that rice variety Nilgiri recorded the highest yields both under weed free (15.69 q/ha) and weedy (15.83 q/ha) conditions showing highest yield potential and response to weeding input during Rabi season (Table 1). While in Kharif, variety Khandagiri, recorded highest yield of (14.59 q/ha) under weed free conditions showing highest yield potential and response to weeding input.

Table 1. Grain yield (q/ha) and dry weight of weeds recorded under different varieties of rice

Varieties	Grain yield (q/ha)				Weed dry wt (g/m ²) at 30 days	
	Rabi 2005-06		Kharif 2006		Rabi	Kharif
	Weed free	Weedy	Weed free	Weedy		
Khandagiri	12.36	12.36	14.59	0.04	241.33	590.53
Udaigiri	13.61	10.83	8.11	0.02	305.87	598.53
Nilgiri	15.69	15.83	11.37	0.01	160.27	492.27
Ghanteswari	8.42	5.28	7.68	0.00	281.73	504.27
ORS 102-4	10.56	10.06	7.12	0.03	358.67	554.00
OR 1519-2	8.89	5.14	14.36	0.02	379.07	492.13
CD (P=0.05)	-	2.49	-	1.49	-	-

Data on dry weight of weeds (Fig.1) revealed that variety Nilgiri recorded the lowest weight during both the seasons. The result is an indicative of higher smothering effect of these varieties over weeds.

Thus, in view of yield and weed associated characters variety Nilgiri may be recommended for Rabi sowing and variety Khandagiri for Kharif season sowing both under weed stress and weed free conditions. These varieties may be considered as women friendly because of their specific character of weed tolerance and smothering effect.

Screening of groundnut genotypes for weed suppression

A field experiment was conducted during Rabi and Kharif seasons in 2005-06 and 2006 with the aim of studying six genotypes (Somnath, TAG 24, TG 3, TMV 2, AK 12-24 and Smruti) with reference to their ability to compete with weeds. The experiment was conducted in randomized block design with three replications.

Groundnut variety Somnath recorded the highest yield (31.53q/ha) under weed free conditions (Table 2) showing highest yield potential and response to weeding input during Rabi season. Under weedy conditions, however, variety TMV 2 yielded the highest (23.61 q/ha). During Kharif season variety TMV 2 recorded the highest yields both under weed free (23.61 q/ha) and weedy (11.11 q/ha) conditions showing highest yield potential and response to weeding input.

Table 2. Pod yield (q/ha) and dry weight of weeds recorded under different varieties of groundnut

Varieties	Grain yield (q/ha)				Weed dry wt (g/m ²) at 30 days	
	Rabi 2005-06		Kharif 2006		Rabi	Kharif
	Weed free	Weedy	Weed free	Weedy		
Somnath	31.53	17.08	11.67	7.50	193.20	303.07
TAG 24	25.56	16.67	13.89	5.00	178.00	259.60
TG 3	25.00	18.33	11.11	4.72	174.00	181.73
TMV 2	24.17	23.61	23.61	11.11	113.60	301.47
AK 12-24	20.28	18.06	15.28	9.72	78.53	204.27
Smruti	26.94	21.81	15.28	11.11	157.60	260.93
CD (P=0.05)	-	2.42	-	3.45	-	-

Data on dry weight (Fig. 2) of weeds revealed that variety AK 12-24 recorded the lowest weight (78.53q/m²) in Rabi, while TG 3 (181.73q/m²) recorded lowest dry highest during Kharif 2006. The results of both of these varieties are; thus, indicative of their smothering character to weed infestation that may provide relief to the farmwomen to some extent.

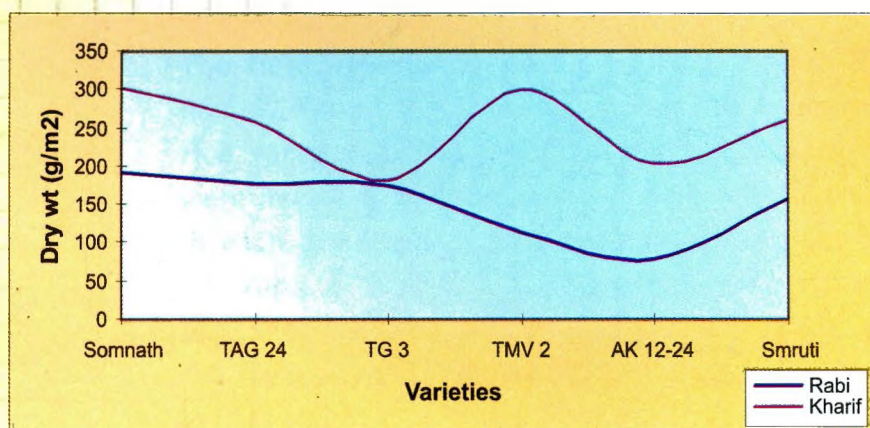


Fig.2. Weed dry wt (g/m²) under groundnut varieties at 30 days

Study on threshold weed density for economic level competition in rice and groundnut

Many of the weed species are found to affect the rice crop under different agro-climatic conditions. The yield of crop, thus, varies according to the nature of weed species and their intensity. The field trials were conducted on rice (variety Khandgiri) and groundnut (variety Smruti) on three-weed species namely : *Mitracarpus verticillatus*, *Perotis indica* and composite weeds with four levels of weed population Zero, 12.5, 25 and 50 plants/m² during Rabi and *Bulbostylis barbata*, *Cyperus compressus* and *Perotis indica* with Zero, 25, 125 and 625 plants/m² during Kharif. Experiments were laid out in randomized block design with four replications. The crop wise results are discussed below :

Rice

The data revealed that *Perotis indica* recorded the lowest yield both during Rabi (9.93q/ha) and Kharif (6.60q/ha) causing highest damage to rice crop (Table 3 & 4). Weed population beyond 50 plants/ m² in Rabi and 125 plants/ m² in Kharif found to be the critical limit for reducing grain yield of rice.

Table 3. Grain yield (q/ha) and weed dry weight (g/m²) at harvest under varying weed densities in Rabi rice (2005-06)

Treatment	Grain yield (q/ha)	Weed dry weight (g/m ²)
Weed species		
<i>Mitracarpus verticillatus</i>	10.11	130.17
<i>Perotis indica</i>	9.93	68.2
Composite	11.11	135.23
CD (P=0.05)	0.94	-
Weed population		
P ₀ (Weed free)	10.20	0.00
P ₁ (12.5/m ²)	13.13	103.27
P ₂ (25/m ²)	10.21	137.60
P ₃ (50/m ²)	7.82	92.73
CD (P=0.05)		
To compare P ₁ , P ₂ & P ₃	0.94	
To compare P ₀ with P ₁ , P ₂ & P ₃	1.33	
To compare interaction between weed species and weed population	3.26	

Table 4. Grain yield (q/ha) and weed dry weight (g/m²) at harvest under varying weed densities in Kharif rice (2006)

Treatment	Grain yield (q/ha)	Weed dry weight (g/m ²)
Weed species		
<i>Bulbostylis barbata</i>	9.58	44.63
<i>Cyperus compressus</i>	7.68	49.93
<i>Perotis indica</i>	6.60	331.73
CD (P=0.05)	0.85	-
Weed population		
Po (Weed free)	9.92	0.00
P1 (25/m ²)	8.85	133.27
P2 (125/m ²)	7.68	130.73
P3 (625/m ²)	7.33	162.30
CD (P=0.05)		
To compare P1, P2& P3	0.85	
To compare P0 with P1, P2& P3	1.21	
To compare interaction between weed species & weed population	NS	

Groundnut

The data recorded on groundnut revealed that composite weed population significantly reduced the pod yield (10.63q/ha) over *Perotis indica* (12.26q/ha) in Rabi season (Table 5). The dry weight of weeds was also highest (169.63g/ha) in the same treatment. During Kharif season however, *Bulbostylis barbata* recorded the lowest yield (8.68) followed by *Perotis indica* and both the weed species found significantly reducing the yield over *Cyperus compressus* (Table 6).

Weed population of 50 and more plants/m² found the threshold limit for weed completion in Rabi season and 125/m² in Kharif season.

Standardization of weedicide spraying schedule for rainfed rice

The field experiment was initiated in Kharif 2005 using two weedicide namely, Butachlor at 2.0kg a.i./ha and Pretelachlor at 1.0kg a.i./ha on rice variety Khandagiri. Rabi 2005-06 onward however, the treatments were modified and one hand weeding was introduced at 30th day of sowing in each of the spray treatment using only one weedicide i.e. butachlor. The results revealed that on pre-emergence spray of butachlor at the day of sowing followed by one hand weeding at 30th day of sowing recorded in the highest yield during both the seasons (Table 7). One spray at 10th day in Rabi and 5th day in Kharif recorded the highest dry weight of weeds in rice.

Table 5. Grain yield (q/ha) and weed dry weight (g/m²) under varying weed densities in Rabi groundnut (2005-06)

Treatment	Grain yield (q/ha)	Weed dry weight (g/m ²)
Weed species		
<i>Mitracarpus verticillatus</i>	11.70	119.77
<i>Perotis indica</i>	12.26	147.17
Composite	10.63	169.63
CD (P=0.05)	1.08	-
Weed population		
Po (Weed free)	12.71	0.00
P1 (12.5/m ²)	12.33	161.93
P2 (25/m ²)	11.77	126.73
P3 (50/m ²)	10.49	147.90
CD (P=0.05)		
To compare P1, P2 & P3	1.08	
To compare P0 with compare P1, P2 & P3	1.53	
To compare interaction between weed species & weed population	NS	

Table 6. Grain yield (q/ha) and weed dry weight (g/m²) under varying weed densities in Kharif groundnut (2006)

Treatment	Grain yield (q/ha)	Weed dry weight (g/m ²)
Weed species		
<i>Bulbostylis barbata</i>	8.68	113.13
<i>Cyperus compressus</i>	11.32	31.93
<i>Perotis indica</i>	9.83	244.40
CD (P=0.05)	1.72	-
Weed population		
Po (Weed free)	12.50	0.00
P1 (25/m ²)	11.01	126.70
P2 (125/m ²)	9.44	125.33
P3 (625/m ²)	9.36	137.43
CD (P=0.05)		
To compare P1, P2 & P3	1.72	
To compare P0 with compare P1, P2 & P3	2.43	
To compare interaction between weed species & weed population	NS	

Table 7. Grain yield (q/ha) and dry weight (q/ha) of weed in spray scheduling rice trial

Treatments	Yield (q/ha)		Weed dry wt. (q/ha) at harvest	
	Rabi 2005-06	Kharif 2006	Rabi	Kharif
Only one spray at very first day of sowing	7.92	13.71	15.20	27.08
One spray at very first day of sowing followed by one hand weeding at 35 th day	11.54	14.42	0.00	22.92
Only one spray at fifth day of sowing	7.25	12.13	13.40	44.79
One spray at fifth day of sowing followed by one hand weeding at 35 th day	9.25	13.33	0.00	17.71
Only one spray at tenth day of sowing	3.75	10.08	18.40	38.54
One spray at tenth day of sowing followed by one hand weeding at 35 th day	7.60	13.21	0.00	15.62
Only one weeding at 35 th day	7.50	11.17	6.60	20.83
Two weeding at 30 th and 45 th DAS	10.81	12.54	0.00	30.21
Weed free	9.94	12.67	00.0	0.00
CD (P=0.05)	1.16	2.01	-	-

Effect of spacing dynamics on the density and growth of weeds in groundnut

In view to study inter and intra row smothering effect of cover crop i.e. groundnut (var. Smruti), a field experiment was conducted using three levels of space per plant (160, 240 and 320cm²) and three levels of row to plant spacing ratios (2:1, 3:1 and 4:1). The layout was made in randomized block design with three replications.

Table 8. Pod yield (q/ha) of groundnut under varying planting geometry

Treatments	Rabi 2005-06	Kharif 2006
Area (cm²)		
160	19.64	14.00
240	18.51	11.39
320	13.94	9.49
CD (P=0.05)	1.27	1.88
Row to plant spacing ratio (R/P)		
2:1	17.82	12.57
3:1	16.82	12.20
4:1	17.46	10.11
CD (P=0.05)	NS	1.88

The data recorded on spacing geometry in groundnut revealed that increasing per plant area from 160 to 240 and 360 cm² reduced the pod yield during both the seasons (Table 8). The effect of row to plant spacing ratio was also significant in Kharif 2006 and pod yield were reduced with widening the row to plant ratio.

Table 9. Pod yield (q/ha) of groundnut in Rabi and Kharif season under interaction effect of area and row to plant spacing ratio

Treatments	Rabi			Kharif		
	(R/P)	(R/P)	(R/P)	(R/P)	(R/P)	(R/P)
	2:1	3:1	4:1	2:1	3:1	4:1
160	15.02	21.93	21.97	13.55	14.91	13.56
240	21.82	16.35	17.37	13.28	12.37	8.53
320	16.62	12.17	13.04	10.88	9.34	8.24
CD (P=0.05)	Rabi 2005-06 - 2.19					
for A x RP Ratio	Kharif 2006 - NS					

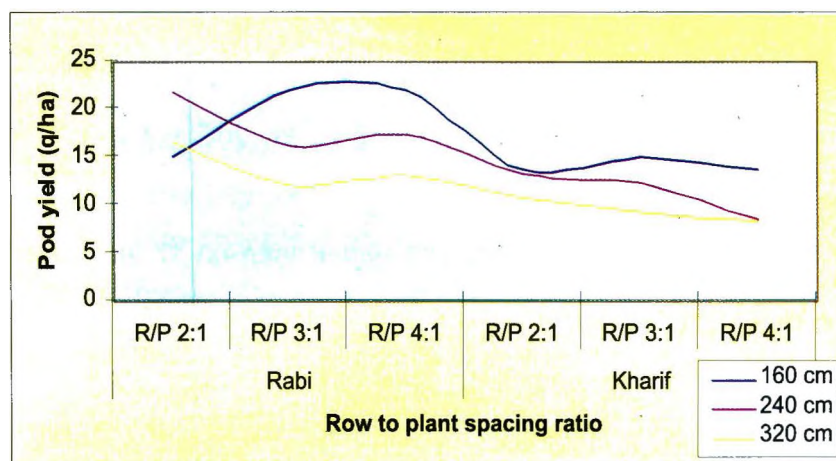


Fig. 3. Groundnut pod yield (q/ha) v/s row to plant spacing ratio

The interaction effect of per plant area and row to plant spacing ratio revealed that highest yield was recorded with a combination of 160 cm² area and 3:1 row to plant spacing ratio during both the seasons (Fig.3).

2.1.2 Technological Empowerment of farmwomen for family sustenance

(M.P.S.Arya, S.K.Srivastava, B.L.Attri,
Sabita Mishra, Naresh Babu, L.P. Sahoo & Abha Singh)

Mendhasal in Bhubaneswar Block of Khurda district was selected as rain-fed village for the technological empowerment of farmwomen. Participatory rural appraisal (PRA) was conducted and the available resources, farming systems, calendar of the crops, time schedule, number and types of women self help groups (WSHG) etc. were identified in the village. A detailed survey was conducted and data were collected from 100 farmwomen on various aspects including status of agriculture and allied farm activities, prospects and choice of entrepreneurial activities. The preliminary analysis of the results revealed that majority of farmwomen (87%) of Mendhasal village were members of SHG, within the group of Rs.10, 000/- to Rs.30, 000/- (52%), having rice farming & labour as major occupation (65%). The farm women were mostly engaged in post harvest technologies of rice cultivation and they faced the problem of insect pest in stored grain, monkey in vegetable growing and elephants in rice farming. The farmwomen preferred to take up enterprises like mushroom cultivation, dairy, floriculture, poultry etc., through SHG and they need both skill training and critical inputs for it.

Demonstrations: The following on-farm demonstrations were conducted on different aspects identified through PRA

Method demonstration on ginger was undertaken during the period under report and sowing was done.

Method demonstration on groundnut was undertaken on 17.06.06. Maa Tarini Swaym Sahayak Sangh, Chhatabar (Vart Smurti), Baba Gopinath Swaym Sahayak Sangh, Mendhasal (Vart AK 12-24) and Bana Durga Swaym Sahayak Sangh, Chhatabar (Vart AK 12-24) took demonstration in participation mode.

Preparation of seedbed, soil treatment, seed treatment, sowing of seeds, mulching, watering etc., propagation and cultivation practices of guava, banana, papaya and brinjal were also taken under method demonstration.

Demonstrations were also taken on eco-friendly technologies for the management of Brinjal shoot and fruit borer (*Leucinodes orbonalis*) and Tomato fruit borer (*Heliothis armigera*). Before demonstration, 39 farmwomen (interested in Brinjal/ Tomato cultivation) were trained for nursery raising of vegetables and different eco-friendly pest management technologies.

Participatory demonstration was also undertaken on eco-friendly pest management modules including fencing of bamboo stick, pheromone trap and pheromone + ash dusting formulated for brinjal and tomato. Pheromone trap with pheromone lure and necessary guidance were given to the farmwomen of Chakkadola Group and Maa Bandurga Group of Mendhasal village.

Exposure visit: The exposure visits were undertaken to provide an opportunity to the farmwomen to interact with the successful entrepreneurs. The research and demonstration units at NRCWA were also shown to imbibe a level of confidence among the farmwomen. The following exposure visits were undertaken during 2006-07.

- Exposure visit of farmwomen of Mendhasal to mushroom farm in Salepur block on 2 August 2006.
- Exposure visit of farmwomen of Mendhasal to CRRRI Engineering Workshop on 2 August 2006.

- Exposure visit of farmwomen of Mendhasal to mushroom farm in Salepur block on 24 November 2006.
- Exposure visit of farmwomen of Mendhasal to NRCWA farm on 25 November 2006.
- Exposure visit of farmwomen of Mendhasal to mushroom production unit of NRCWA on 8 February 2007.

List of trainings conducted under the project

Sl. No.	Programmes	Date	No. of participants (women)
1.	Training-cum-demonstration on straw mushroom production	17 June 2006	22
2.	Importance, production and insect pest management of vegetable nursery and vermicomposting	27 September 2006	39
3.	Training-cum-demonstration on oyster mushroom production	24 November 2006	20
4.	Value addition of lime and ginger into squash, blended squash and pickle	8 February 2007	22
5.	Training on preparation of sagu papad and suji papad	8 February 2007	22



Fig. 4. Training on value addition of lime and ginger into squash, blended squash and pickle



Fig. 5. Training-cum-demonstration on paddy straw mushroom (Dhingri) production

2.1.3 Refinement of invigoration techniques as suitable to farm women for enhancing planting value of finger millet (*Eluesine coracana*) seeds

(L.P.Sahoo)

Seeds of ragi (*Eluesine coracana*) were collected from farmer saved seeds. Seeds were 6 months old having germination percentage 67% which was less than the minimum seed certification standards. The seeds were having normal vigour (Vigour Index 21). The electrical conductivity of the seed lot was 13m mhos/cm/gm of seed. The vigour was determined with the following method. The seeds were subjected to treatment like; i) Hydration, ii) soaking with NaCl (1% and 5% solution) and iii) soaking with Urea (1% and 5% solution)

The seeds were soaked for 3 different durations of 1 hour, 6 hour and 24 hour and with 3 volumes of water/solution i.e. 50% of seed volume, one volume and double the volume of seed. All total 45 treatments were taken in 3 replications. The observations were taken in 3 months interval and average of 1 year observations were taken.

The seeds were soaked in the required solution for the specified duration. Then they were removed from the solution, air dried over a blotter and tested for germination. The seed leachate was collected in specimen tubes and tested for electrical conductivity (EC). The EC of the seed leachate gives an estimate of seed vigour as seeds having good vigour having intact membranes leach less electrolytes giving low EC and less vigour seeds and weakened cell membrane leach more ions giving a higher EC. Invigoration of seeds by soaking in distilled water, salt, growth regulator solutions may have repaired the membrane leakage thus improved germination.

Table 10. Initial vigour of ragi seeds collected from farmers

Replication	Germination %	Vigour index	E.C (m mho/cm)
1	68.0	23.0	14.3
2	66.0	19.2	13.7
3	68.0	22.4	14.7
Average	67.3	21.5	13.9

Table 11. Germination percentage of invigorated seeds soaked in different treatment (volumes and duration)

Treatments	0.5V 1H	1V 1H	2 V 1H	0.5V 6H	1V 6H	2V 6H	0.5V 24H	1V 24H	2V 24H
NaCl (1 %)	69.0 (23.0)	66.0 (22.9)	67.0 (23.0)	70.0 (24.9)	71.0 (25.7)	71.0 (25.7)	63.0 (18.9)	67.0 (20.6)	66.0 (20.8)
NaCl (5 %)	69.0 (23.4)	64.0 (20.6)	68.0 (23.0)	68.0 (23.8)	66.0 (22.4)	59.0 (17.2)	63.0 (17.8)	70.0 (25.7)	60.0 (17.2)
Urea (1%)	70.0 (24.1)	69.0 (22.9)	68.0 (18.6)	66.0 (19.6)	68.0 (23.0)	70.0 (25.2)	69.0 (23.6)	72.0 (26.5)	70.0 (24.9)
Urea (5%)	59.0 (17.3)	62.0 (18.5)	65.0 (18.6)	63.0 (18.3)	66.0 (19.6)	62.0 (18.2)	-	-	-
Distilled water	70.0 (24.6)	68.0 (21.8)	64.0 (17.6)	63.0 (17.1)	66.0 (18.2)	66.0 (18.8)	67.0 (18.6)	68.0 (19.2)	71.0 (26.2)

* Figures in parenthesis indicate the vigour index of blank solution

Table 12. Electrical conductivity of leachate of invigorated seeds in different volumes and duration

Treatment	Blank	1V 1H	2 V 1H	1V 6H	2V 6H	1V 24H	2V 24H
NaCl (1 %)	16.64	16.37 (16.64)	25.1 (16.64)	16.93 (16.64)	17.58 (16.64)	19.04 (16.64)	25.7 (16.64)
NaCl (5 %)	70.2 (70.2)	21 (70.2)	51.1 (70.2)	53.2 (70.2)	72.5 (70.2)	20.8 (70.2)	85.2 (70.2)
Urea (1%)	0.193 (0.193)	1.18 (0.193)	1.07 (0.193)	5.86 (0.193)	1.377 (0.193)	1.646 (0.193)	4.34 (0.193)
Urea (5%)	0.459 (0.459)	73.9 (0.459)	36.4 (0.459)	25.1 (0.459)	16.6 (0.459)	15.8 (0.459)	70.2 (0.459)
Distilled water	0.04 (0.04)	2.51 (0.04)	25 (0.04)	11.2 (0.04)	14.25 (0.04)	16.32 (0.04)	3.11 (0.04)

* Figures in parenthesis indicate the electrical conductivity of blank solution

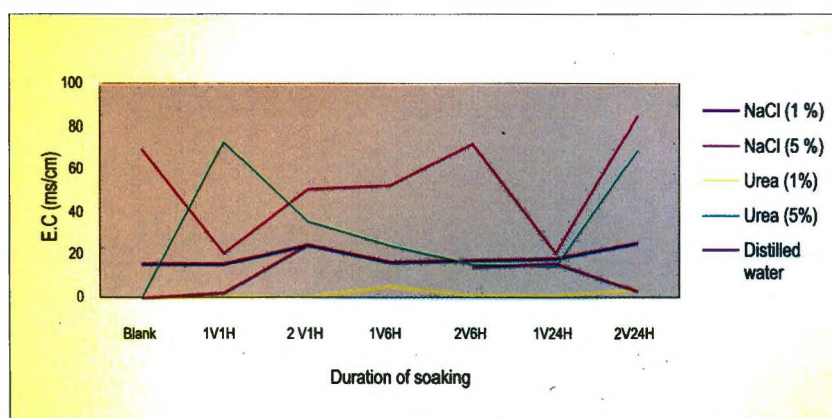


Fig. 6. Electrical conductivity of leachate of invigorated seeds soaked in different volumes and duration

Results of the Table 12 indicated that when seeds were soaked in NaCl (5%) the EC was reduced in all treatments except when soaked in 2 volume and for 24 hours indicating less leakage electrolytes. In all these cases though germination was not increased significantly but the vigour index was improved. In Urea (1%) the EC was little more than blank but in Urea 95%) the leakage is very high and seeds turned black and germination is very low when soaked for 6 hour and 24 hour. The seeds soaked in NaCl showed less increase in EC than distilled water. The results so far indicated that NaCl (5%) is useful followed by Urea (1%) and hydration treatment.

2.1.4 Refinement and development of eco-friendly management technology of brinjal shoot and fruit borer (*Leucinodes Orbonalis* Guence) appropriate for farmwomen

(S.K. Srivastava & Naresh Babu)

Under this project nursery of brinjal was grown and experiment was transplanted on the farm of the Centre. Recommended treatment of eco-friendly pesticides was given on the crop and data were recorded on damage and yield.

Effect of various treatments on the number of damaged plant/ plot

Minimum plant damage was recorded in imidacloprid treated plots followed by nux vom, camphor, calotropis leaf powder, nephthalene, tobacco soaked water and Neem oil.

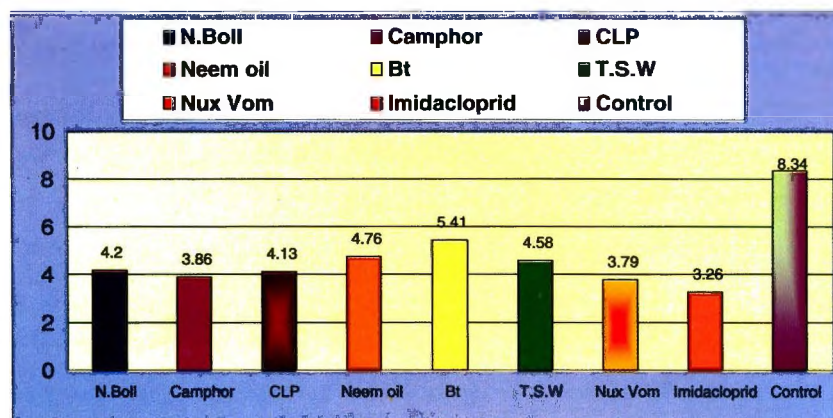


Fig. 7. Number of damaged plant / plot

Effect of various treatments on the percent damaged shoot/plant

Minimum percent shoot damage / plant was recorded in imidacloprid treated plots followed by nux vom, camphor, nephthalene, calotropis leaf powder, tobacco soaked water and Neem oil.

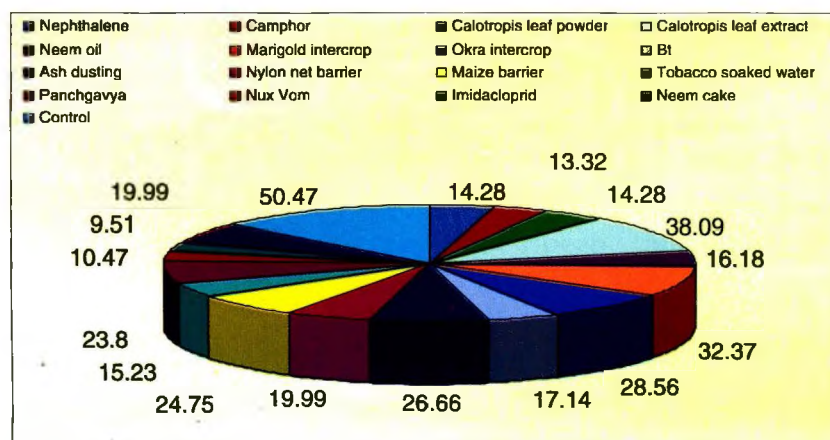


Fig. 8. Percent damaged shoot / plant

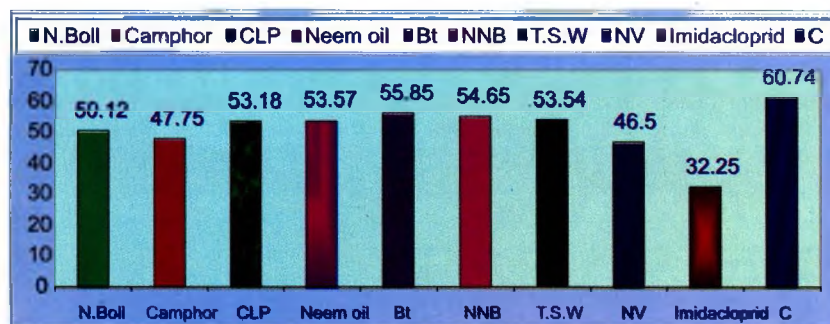


Fig. 9. Percent fruit damage / plot

Effect of various treatments on the percent fruit damage / plot

Minimum percent fruit damage was recorded in Imidacloprid treated plots followed by nux vom, camphor, nephthalene, calotropis leaf powder, tobacco soaked water and Neem oil.

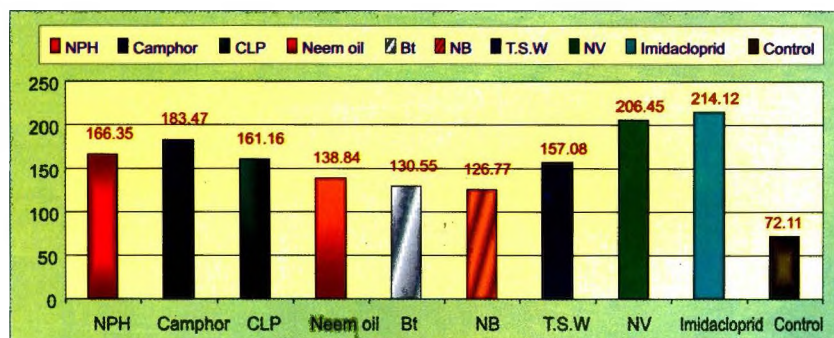


Fig. 10. Yield in Kg/ Plot

Effect of various treatments on marketable yield of brinjal

Maximum yield was recorded in imidacloprid treated plots followed by nux vom, camphor, nephthalene, calotropis leaf powder, tobacco soaked water and Neem oil. On the above basis it can be said that nux vom, camphor, nephthalene, calotropis leaf powder, tobacco soaked water and Neem oil are quit effective out of which camphor, nephthalene, calotropis leaf powder, tobacco soaked water and Neem oil can be easily handled by farm women without any health hazards, for the management of brinjal shoot and fruit borer.

Effect of various treatments on percent fruit damage by Weight in damaged fruit of brinjal

Minimum fruit damage by weight was recorded in Panchagavya treated plot (21.40%) followed by calotropis leaf powder (22.44%), Bt (24.43%), nux vom (24.7%), tobacco soaked water (24.86%) and calotropis leaf extract (24.95%). This observation indicates that in spite of the damage of the fruit maximum portion of fruit by weight is found fit for consumption to the resource poor farmwomen.

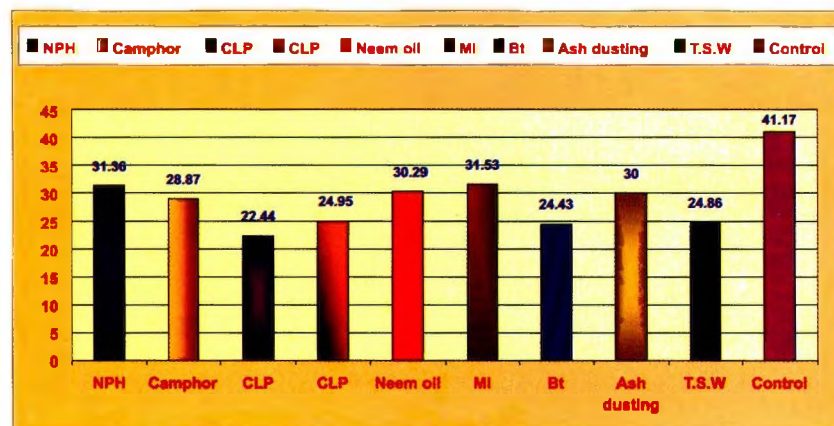


Fig. 11. Percent fruit damage by weight in damaged fruit

Effect of different treatment on the shelf life of brinjal at ambient temperature in basket

Minimum physiological loss of weight was recorded in camphor treated plot followed by Neem oil, Ash dusting and calotropis leaf extract when brinjal was kept in the basket at ambient temperature. Shelf life of brinjal treated with these treatments was found up to 12 days.

Effect of different treatment on the shelf life of brinjal at ambient temperature in poly bags

Poly bag was found effective to increase the shelf life of brinjal by 7 days. Brinjal treated with nephthalene, calotropis leaf powder and nylon net barrier started deterioration early in comparison to other treatments and kept up to 12 days. Rest of the treatments was kept up to 19 days.

For the sensitization of farmwomen on different aspect of eco-friendly pest management technologies of brinjal and to show the effect of various treatments a field visit was organized for them and they all visited the experimental farm of the Centre.

2.1.5 Empowerment of farmwomen in post harvest handling of vegetables

(B.L.Attri & Abha Singh)

Different vegetables and fruits like french bean, tomato, carrot, broccoli, brinjal, orange and mango were subjected to storage study at ambient temperature (room), low temperature (refrigeration) and zero energy cool chamber (ZECC). The vegetables/fruits were packed in polyethylene bags having 1% vents. The average temperature and relative humidity of ambient conditions and ZECC have been given in table 13.

In the storage study of french bean it was observed that the produce can be stored successfully without significant loss in weight and quality upto 8 days in ZECC as compared to ambient and low temperature (Fig. 12).

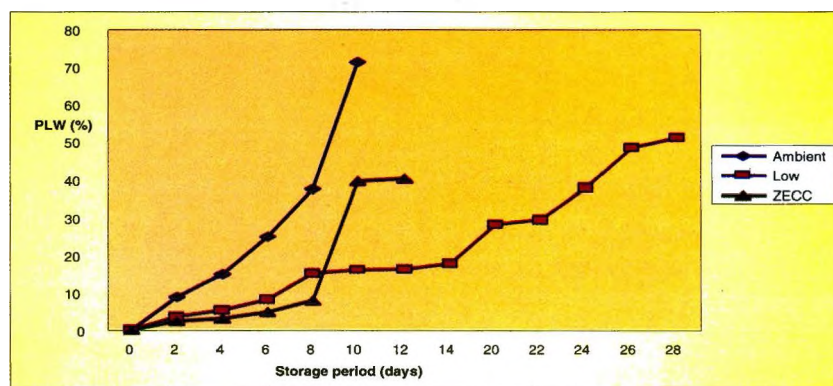


Fig. 12. Physiological loss in weight (PLW) in french bean at ambient temperature, low temperature and zero energy cool chamber

Table 13. Average temperature and relative humidity during 2006-07

Month	Average temperature (°C)		Average relative humidity (%)	
	Ambient (Room)	Zero energy cool chamber	Ambient (Room)	Zero energy cool chamber
February, 2006	30	26	52.50	85.50
March, 2006	32	26	50.20	84.70
April, 2006	33	26	50.00	82.60
May, 2006	34	28	47.80	80.10
June, 2006	32	27	43.75	82.50
July, 2006	30	26	80.10	90.20
August, 2006	30	27	85.60	92.25
September, 2006	31	26	78.70	90.40
October, 2006	32	26	65.40	88.50
November, 2006	29	23	60.30	86.40
December, 2006	24	19	57.25	85.30
January, 2007	22	18	55.10	84.50

The physiological loss in weight (PLW) and quality of the tomato was comparable to that of low temperature up to 6 days in ZECC but after that the spoilage was significantly high (Fig. 13).

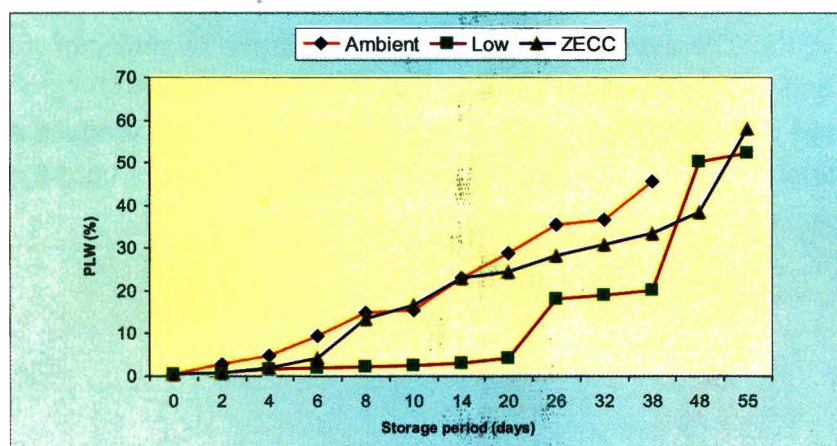


Fig. 13. Physiological loss in weight (PLW) in tomato at ambient temperature, low temperature and zero energy cool chamber

The Nagpur oranges were subjected to storage study. From the Fig. 14 it is clear that the fruit can be stored successfully with comparative loss in weight at low temperature and ZECC up to 60 days.

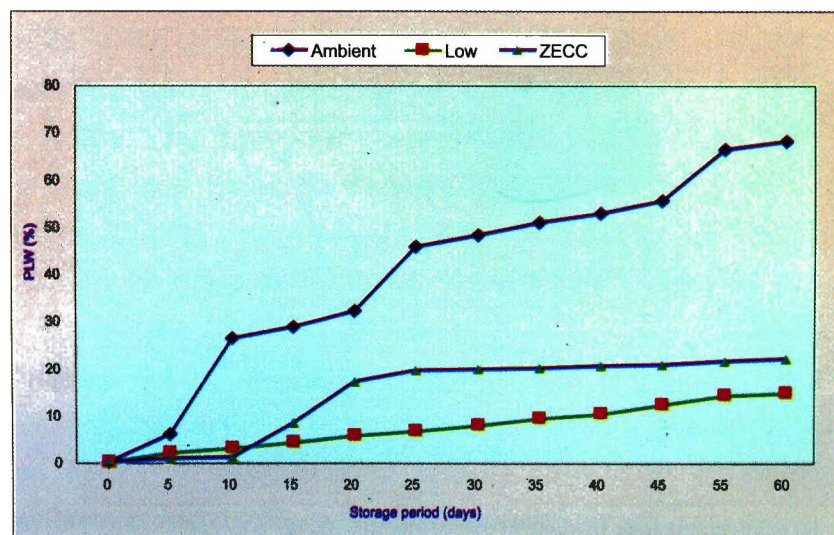


Fig. 14. Physiological loss in weight (PLW) in orange at ambient temperature, low temperature and zero energy cool chamber

In the storage study of fully matured mango (Gulab Khas) it was observed that the PLW was minimum with good quality in ZECC up to 6 days but after that the spoilage increased significantly (Fig. 15).

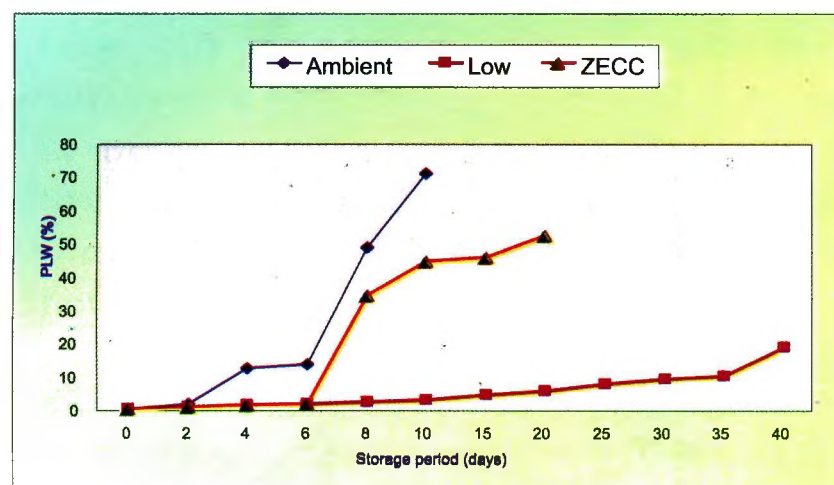


Fig. 15. Physiological loss in weight (PLW) in mango at ambient temperature, low temperature and zero energy cool chamber

The brinjal (Utkal) was also stored successfully for 26 days in ZECC with significantly low PLW and better quality as compared to ambient and low temperature.

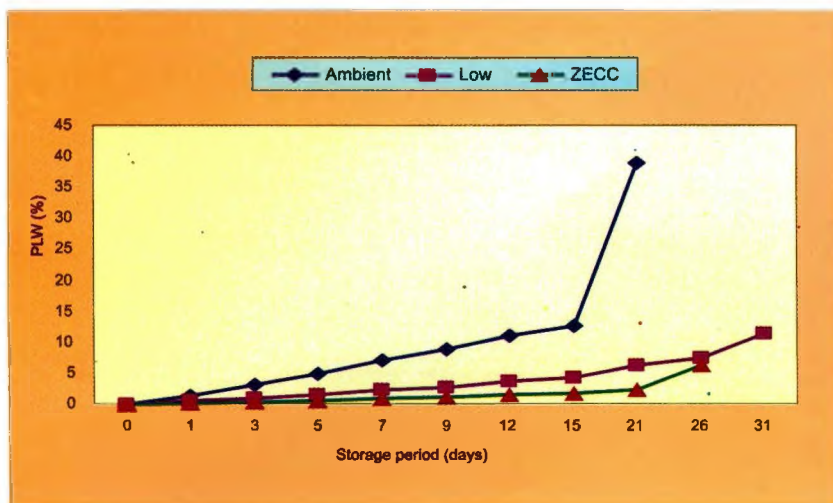


Fig.16. Physiological loss in weight (PLW) in brinjal at ambient temperature, low temperature and zero energy cool chamber



Fig. 17. Brinjal fruits stored in Zero Energy Cool Chamber

Training and demonstration of the low cost technology to the farmwomen

Conducted training on construction and utilization of low cost storage structure (zero energy cool chamber) in villages Panikata (Balipatna), Nahala pada (Pipili), Mendhasal (Bhubaneswar), Pataligaon (Nimapara), Raipur (Barang) and Sarkana (Balianta) in which 138 farmwomen were empowered.

Showed the construction and functioning of zero energy cool chamber to two groups of 56 farm women from Chhattisgarh during this period.

From the study conducted during the period revealed that zero energy cool chamber (ZECC) is an ideal storage structure for the rural farmwomen to store the fresh farm produce like vegetables and fruits for 7-10 days without any loss and quality. As the relative humidity is always more than 80% the fresh produce didn't show any shrinkage. The temperature variation between ZECC and open fields during summer was 14-16°C. Because of comparatively low temperature in the chamber the shelf life of the produce increased significantly. During rainy season the chamber was not effective as the outside temperature and humidity was comparable with ZECC. The farm women showed a keen interest to use the chamber as it's cost is low and can be constructed by any layman with locally available material.

2.1.6 Standardization of gender specific technologies in banana and papaya

(Naresh Babu, B.L.Attri & S.K.Srivastava)

Under this project, five varieties of banana e.g. Robusta, G-9, Pathakpura, Banthal and Karpuravelli (propagated by both tissue cultured and suckers) and twelve varieties of papaya e.g., Farm Selection, Manjil, Madhu, Bankim, Co5, Ranchi, PY-06-011, Co2, Pusa Dwarf, Anjil, Honey Dew and Ranchi Dwarf were collected from different places from Orissa and planted in the field for screening purpose to select the suitable varieties for homestead production. Nursery of papaya seeds has been raised in polythene bags. For that purpose, preparation of soil mixture, filling up of polythene bags, seed treatment and its sowing, regular watering and spraying of insecticides



Fig. 18. Farmwoman collecting in inflorescence for collinary prurpose

and fungicides for effective control of insect pests and diseases have been followed. Pits of 60 cm x 60 cm x 60 cm size were dug, filled with a mixture of soil, sand and farmyard manure in a 1:1:1 ratio. Neem cake @ 500 g/ plant and phorate (about 50g) were also incorporated with the soil. Neem plant is popular and available in rural houses. Women can prepare neemcake at home by collecting its seeds and applied into crops so that their expenditure on procurement of fertilizers will be minimized.

Suckers and saplings of banana and papaya were planted upright in the center of pit with 5 cm of stem remaining above the ground level and soil around was compacted. Suckers of banana were treated with bavistin @ 0.2 % for half an hour before planting. In banana, the recommended dose of NPK fertilizer 200: 100: 300g / plant/ annum were applied in five split doses. First fertilizer dose was given at the time of planting, second, third, fourth and fifth doses were applied at two months intervals after planting. Fertilizer dose of NPK 250:100:250g/ plant was applied in papaya plants in 4 splits. Vermicompost @ 100 g/ plant was also given in papaya plants as a soil application. There is a need to encourage farm women to use vermicompost and other organic manures in the crop for beneficial in improving the soil health, quality of produce, reducing use of chemical fertilizers and pollution hazards. Other cultural practices like weeding, desuckering and spraying of insecticides and fungicides for effective control of insect pests and diseases have been followed as requirement of crops. Dried or diseased leaves were also removed at regular intervals to reduce disease load and also to give exposure to sunlight. Propping in banana has been done after bunch emergence to avoid overloading on the plant/ lodging of plant. Mulching with banana leaves and dried grasses have been utilized in conserving soil moisture during summer season. Some of varieties of these crops were started flowering and fruiting and plants will take 3-4 months more for harvesting of the fruits. Observations on growth, flowering, fruiting and shelf life studies to be recorded. Other informations on flower and stalk of pseudostem of fruited banana are using for cooking purpose (useful for women) to be noted also.

2.1.7 Ergonomical evaluation of manually operated rice farming equipment with farmwomen

(S.P. Singh)

Ergonomical evaluation of manually operated CRRRI two row rice transplanter with farm women

Ergonomical evaluation of CRRRI two-row rice transplanter was carried out with 10 farm women and the data are given in Table 15. The output with this equipment was 95 m²/h and the working heart rate of farm women was 138 beats/min. The work pulse value was 64 beats/min. Higher work pulse (increase in heart rate during work over resting value) value suggests that adequate rest pauses needs to be given to the worker for day long work. One women worker can operate the equipment comfortably but two workers may be engaged in shift for day long work. The equipment needed refinement with regard to mounting of seedling tray so as to provide trouble free movement on rail. It is recommended that the seedling tray may be fixed with movement mechanism by nut-bolts and alignment of rail should be proper.



Fig. 19. A farmwoman operating CRRRI two - row rice transplanter

Table 15. Data on ergonomical evaluation of manually operated CRRRI two row rice transplanter with women workers

Sl. No.	Particulars	Values
1.	Weight of equipment, kg	13.8
2.	Total weight of equipment including the weight of seedlings mat, kg	24.0
3.	Working width of machine, cm	48.0
4.	Speed of subject, km/h	0.26
5.	Sinkage of feet of subject in field, cm	9.3
6.	Depth of standing water, cm	2 to 6
7.	Area covered, m ² /h	95
8.	Force required in pulling the equipment at 34°, N	161
9.	Working heart rate (WHR), beats/min	138
10.	Work pulse, beats/min	64

Ergonomical evaluation of manually operated CIAE IEP cono weeder with farm women

Ergonomical evaluation of CIAE IEP cono weeder was carried out with 10 farm women and the data are given in Table 16. The output with this equipment was $165 \text{ m}^2/\text{h}$ and the working heart rate of farmwomen was 153 beats/min. The work pulse value was 70 beats/min. Higher work pulse value suggests that adequate rest pauses need to be given to the worker during day long work. The equipment needs refinement, as both cones of weeder are not working properly. The handle may be relocated at the centre to solve this problem.



Fig. 20. A farmwoman operating CIAE IEP cono weeder

Table 16. Data on manually operated single row CIAE-IEP cono- weeder with women workers

Sl. No.	Particulars	Values
1.	Weight of cono- weeder, kg	6.6
2.	Working width of machine, cm	15.0
3.	Speed of subject, km/h	1.28
4.	Depth of standing water, cm	2 to 5
5.	Area covered, m^2/h	165.3
6.	Pull force at an angle of 28° , N	46
7.	Push force at an angle of 32° , N	79
8.	Working heart rate, beats/min	153
9.	Work pulse, beats/min	70

Ergonomical evaluation of manually operated OUAT ESA pedal operated paddy thresher with farm women

Ergonomical evaluation of OUAT ESA pedal operated paddy thresher was carried out with 12 farm women and the data are given in Table 17. The throughput capacity with this equipment was 79 kg crop /h and the paddy grain output was 23.8 kg/h. The working heart rate of farm women was 136 beats/min and the work pulse value was 53 beats/min. Higher work pulse value suggests that adequate rest pauses need to be given to the worker for day long work. It is also suggested that two workers may be engaged with the equipment and they can operate in shift. It is recommended that a 25 mm rubber handle grip may be given to provide comfort to worker during its lifting/transportation.

Table 17. Data on ergonomical evaluation of pedal operated OUAT-ESA paddy thresher with women workers.

Sl. No.	Particulars	Values
1.	Weight of machine, kg	41
2.	Length of crop stalk, mm	72.5
3.	Pedal strokes/min	77
4.	RPM of threshing drum	278 to 329
5.	Un-threshed percentage of crop	1.68
6.	Throughput capacity, kg crop/h	79.0
7.	Output, kg Paddy grain/h	23.8
8.	Force required at cylinder rpm of 300, N	162
9.	Heart rate during work (WHR), beats/min	136
10.	Work pulse, beats/min	53

Ergonomical evaluation of manually operated CRRRI rice winnower with farm women

Ergonomical evaluation of CRRRI rice winnower was carried out with 12 farm women (Fig 18) and the data are given in Table 18. The output with this equipment was 242 kg clean grain/h and the working heart rate of farm women was 112 beats/min. The work pulse value was 31 beats/min, which was under acceptable limit for day long work with standard rest pauses. Two workers are required with the equipment during its operation i.e. one for cranking and another for feeding the material, collection of grain etc. The

recommendations for making equipment more versatile are given below:

- The threshed grain was having paddy straw that affected flow of material for cleaning. Hence, mechanical or vibratory type agitator may be provided for stirring the threshed material in hopper.
- Hooks may be provided for hanging of bag for collecting clean material.
- A perforated cover may be provided at other end of blower shaft as it sucks loose cloths (*Sari*) worn by women workers.

Table 18. Data on Ergonomical Evaluation of CRR I Hand Operated Paddy Winnowing with Women Workers

Sl. No.	Particulars	Values
1.	Weight of machine, kg	36
2.	Handle height from ground, mm	570
3.	Grain moisture content, % d. b	18.0
4.	Chaff percentage in material to be cleaned	2.2
5.	Poor grain percentage in material to be cleaned	22.2
6.	Chaff percentage in clean grain	0.25
7.	Poor grain percentage in clean grain	11.4
8.	Percent grain coming in blown material	1.35
9.	Crank rotation, rpm	65
10.	Blower rpm	326
11.	Air speed at outlet for cleaning of chaff, m/s	3.2
12.	Output, kg clean grain/h	242
13.	Torque at 65 rpm, N-m	5.3
14.	Working heart rate, beats/min	112
15.	Work pulse, beats/min	31

2.1.8 Introduction of women friendly improved farm tools and implements in selected villages of Madhya Pradesh

(S. P. Singh & R. S. Singh)

Nipania Jat, Adampur and Dobra & Sagonikala villages were selected for introduction of women friendly improved farm tools and implements among 264 identified households of these villages. Benchmark survey of identified farm women were conducted by the women field investigators. Among 19 farm operations, maximum involvement of farm women was 93.9 % in

interculture followed by 93.2 % in harvesting, 90.2 % in cleaning-grading and 86.0 % in drying and storage.

The involvement of farm women was in similar line as per the findings of earlier study conducted for Madhya Pradesh. Data of benchmark survey indicated that about 6.4 % and 3.0 % farm women operated maize sheller and groundnut decorticator, respectively. Four training on Knowledge and Utility of Women Friendly Improved Farm Tools and Equipment were imparted to about 200 farm women of the selected villages at village sites (Fig. 21). Tubular maize sheller and improved sickle were given to all the participants as training material for use. Women friendly improved farm tools and implements namely, hand ridger, seed treatment drum, fertilizer broadcaster, CIAE and PAU seed drills, twin wheel hoe, PAU wheel hoe, grubber weeder, hanging type cleaner with sack holder, sitting type groundnut decorticator were demonstrated to farm women (Fig. 22) and these were kept in village for use. The farm women were using these equipment in the selected villages. No specific feedback was reported on use of hand ridger, seed treatment drum, fertilizer broadcaster, twin wheel hoe, PAU wheel hoe, hanging type cleaner with sack holder and sitting type groundnut decorticator by farm women except loosening of nut and chain. For groundnut decorticator, two oval sieves are required as small pods are coming out from sieve. Based on their feedback and observation, a training on Operation, Repair and Maintenance of Women Friendly Improved Farm Implements was imparted to 14 farm women (Fig. 23).

Fifty farm women participated in the programme on International Women's Day on March 8 at CIAE, Bhopal (Fig. 21). They took part in various activities organized on this occasion.



Fig.21. Training on women friendly improved farm tools and equipment to farmwomen in the village



Fig.22. Demonstration of fertilizer broadcaster women friendly improved equipment in village

Fig.23. Training on operation, repair and maintenance of women friendly improved farm implements at CIAE,Bhopal



Fig.24. Participation of farmwomen in International Women's Day at CIAE, Bhopal

2.2 EXTENSION AND INSTITUTIONAL CHANGES

2.2.1 Designing gender sensitive extension model and testing its efficacy

(B.N.Sadangi, S.K.Srivastva, Sabita Mishra, P.K.Sahoo, H.K.Dash, L.P.Sahoo & Abha Singh)

The project was developed with the objective for designing a sustainable gender sensitive extension model. One cluster consisting of two experimental villages from Begunia block of Khurda district and another cluster from Balipatna block under irrigated farming have been selected and farming conditions and enterprises in two different situations were analysed and transfer of technology strategies have been developed.

2.2.2 Development of a module for mobilization of rural women for sustainable livelihood through women self-help groups (SHGs)

(Suman Agarwal)

The women-self-help groups' formed/developed in the villages by different agencies for their economic empowerment generally do not sustain for long due to various reasons. This causes loss of many resources. Thus, through this project, attempts were made to identify their weaknesses and strengths for running/managing different types of enterprises. Participatory approach was followed to collect the information about the enterprises run by women SHGs. Ten Women SHGs running in different village of a block of Puri district were selected purposively for screening for SWOT analysis. The project has been concluded in December 2006.

The salient findings for the year under report have revealed that a group that has good linkages with other women's groups, government officers and local business people, finds it easier to sustain and enlarge its business. There exist a relationship between the risk of environmental forces affecting a business/enterprise area and the other factors affecting the prospects for developing and maintaining long term profits.

The environmental factors are economic, cultural, technological, demographic and governmental. It is necessary to impart the training to Women SHGs on the basics of enterprise management. This will translate into a much-needed, sustainable income contributing towards better living and prosperity.

2.2.3 Livelihood security through entrepreneurial activity among farm families

(Suman Agrawal & Geeta Saha)

This research project aims to ascertain the livelihood pattern of farm families/ selected SHGs and has been envisaged in participatory mode with bottom-up approach. The project is being implemented in the selected villages of the Pipili and Shakhigopal block of Puri districts of Orissa State. From each selected blocks, two villages have been selected. It was found that two women SHGs formulated four years back in village Brahamansahi are not involved in any entrepreneurial activity. Similarly, in village Harishankarpur there are two women SHGs; one existing from past two years and the other from past four months. Both of them are also not involved in any entrepreneurial activity of income generation. Thus, though the SHGs have been formed by a local NGO, but for their income generation no skill trainings have been provided to these SHGs. The details of these selected women SHGs are as below

SHG's name	Block name	No. of women	Time period of existence without any members entrepreneurial activity
Rudrayani SHG	Shakhigopal	15	2 years
Parvati SHG	Shakhigopal	13	4 months
Maa Mangla SHG	Shakhigopal	17	4 years
Choti- Budi SHG	Shakhigopal	17	4 years
Kamini SHG	Pipli block	11	1 year
Sukanya SHG	Pipli block	13	10 months
Total Women		86	

Assessment of livelihood pattern and resources available with farm families

- Majority of farmwomen were in the age group of 30 -50 years (77.66%), belonged to nuclear type of family (77.17%) and were illiterate (47.00%). They belonged to upper middle caste (42.33%) followed by SC/ST (27.67%) and other backward classes (25.00%).
- Majority were involved in agriculture/farming as their main occupation. However, (6.5%) women were found working as laborers.
- Farming is the main occupation of the people followed by daily wage earners.

- Majority of respondents had marginal land holdings (84.83%) followed by small land holdings (15.17%).
- They were the members of one or more local organizations (97.33%).
- Majority of farm women (72.17%) had small animals/ livestock and had thatched sheds for animals (66.83%).
- Only few families found to have tractor tiller/farm machinery (0.83%), pump sets (1.5%), sprayer/duster (0.33%), thresher (1.00%) and winnower (0.5%). However, majority had desi wooden plough land leveler/patella and hand tools (79.33%, 94.67%, 99.33% respectively).
- Majority of home lady had electricity in their homes (65.67%), had hand pumps/water tap (24.83%), radio/ transistor (29%), television sets (33.83%). Only few were subscribing for newspaper (3.17%).
- Majority had bicycle (91.33%) and bullock cart (21.83%). Very meager percentage of farm women (15.33%) had scooter in their home.
- Negligible percentage of family had gas stove (3.17%), pressure cooker (4.5%), refrigerator (1.17%) and other improved kitchen tools (0.67 %) in their homes.

Need assessment of the women SHGs

Since these SHGs existed from a long time without involvement in any enterprise, therefore to get them involved in income generating activities for livelihood security, efforts were made to apprise them about various enterprises which they can take-up for income generation. After this, their interests and preferences for skill training were assessed following the participatory approach. Then, skill development trainings were organized for their entrepreneurial development.

Skill Development Trainings organized

Two skill development trainings have been organized on the following for the women of SHGs:

1. Vermicomposting: This enterprise does not require much input and gives good return. Thus the concept of vermi-compost was propagated among the women of SHGs and made them interested in this enterprise. Therefore 30 Women of SHGs were trained about the preparation of vermicompost.

2. Bee-keeping: This is an enterprise which does not require land, therefore those women of SHGs, who do not have land at their disposal, can involve themselves in this enterprise. Besides, this is a quite remunerative enterprise, which does not require much time, labor and investment. A fifteen days training programme was organized in a selected village. forty women of SHGs attended this training for developing their capacity in bee- keeping.



Fig. 25. Training programme on bee - keeping

2.3 ECONOMICS AND POLICIES

2.3.1 Mechanization of rice sector and impact on gender

(H.K.Dash & B.N.Sadangi)

Farm mechanization basically means more and more use of mechanical power for carrying on different activities and gradual replacement of animal and human power by mechanical power. Under the project data were collected from 80 households in four villages in Bhubaneswar and Khurda blocks of Orissa.

Data on pattern of mechanization indicated that male dominated tasks were getting mechanized, women being left largely untouched. Even marginal landholders who were primarily wage earners went for mechanization of activities. Among the activities, land preparation (i.e. ploughing and puddling) was the most mechanized activity followed by threshing and winnowing. These two activities were found mechanized in all categories of farm families. Other activities particularly transport related i.e. carrying manure to the field; carrying harvested paddy bundles to the threshing floor etc. got increasingly mechanized. In this context use of small vehicles like tempos by small and marginal landholders and use of mini-trucks and tractors by higher category farmers were resorted to.

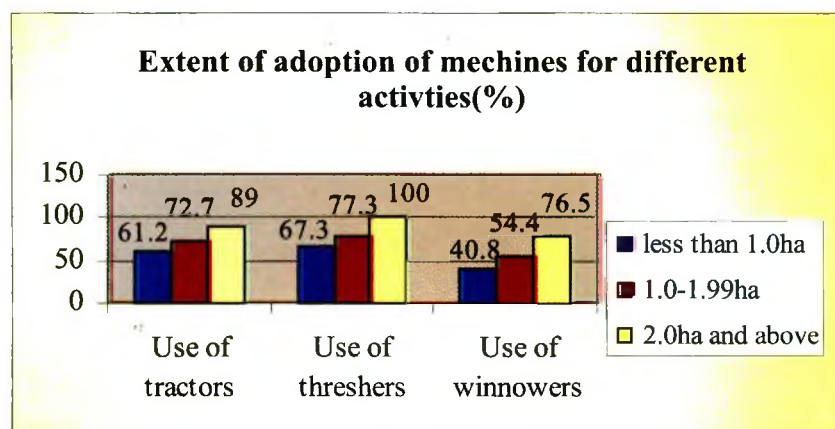


Fig. 26. Extent of adoption of machines for different activities (%)

Extent of mechanization of activities varied across different category of farms and it was found affected by two sets of factors: farm-specific factors such as no. of draft animals, size of work force in family, size of farm, location of farm (paddy fields) and size of non-agricultural income affected the extent of machine use, and external factors such as availability of machines in village/locality, cost of hiring the machines and the substitutes and availability of alternate uses of machines.

Impact assessment

Data collected so far indicated that mechanization created differential impact on different category of farm families. After all, it was a positive development for cultivator class. Use of machines not only led to cost reduction but also timely completion of tasks, time saving and increased output per unit time. The process has led to displacement of male workers from their traditional tasks and loss of working days due to mechanization of land preparation, threshing and winnowing activities and due to mechanization of other activities like manuring and carrying harvested paddy to threshing floor. So far mechanization had no adverse effect on employment situation of women wage earners. The process has created additional employment opportunities but to a limited extent for women workers particularly in threshing, an activity dominated by men.

2.3.2 Family based economic security of backward communities through ornamental and integrated fish farming funded by DBT

(P.K.Sahoo, H.K.Dash & B.L.Attri)

A total of 50 ponds with a water area of about 6.9 ha brought under aquaculture involving 194 families in eight villages of Nimapara block of Puri district and Balipatana and Baliana blocks of Khurda district of Orissa. This includes 0.8 ha area of derelict water bodies, which was renovated and put to economic use.

- Fry production of Indian major carp was taken up in 14 ponds with 0.43 ha water area involving 47 families. 2.6 lakh fry was produced from nursery rearing. All relevant packages of practices were demonstrated to the participating farmers. Total income of Rs.39, 000 was earned within two months of nursery rearing.
- In the second year from carp culture, total 9.5 tonnes of fish was harvested with an estimated average yield of 1.4 t/ha. The low yield was due to unexpected heavy rain in the peak-harvesting period i.e. in the last week of May, for which the ponds were over flown.
- Fish-duck integration was taken up in 11 ponds with water area of 3.7 ha involving 82 families.
- Fish-poultry integration was taken up in 21 ponds with an area of 2.42 ha involving 46 families
- Four number of mushroom production units were established with involvement of 20 women.
- Package of practices for vegetable cultivation and plantation crop like banana and drumstick was adopted in a space of about 1.9 ha water area.
- Nine ornamental fish production units have been established with introduction of four livebearers such as Guppy, Balloon molly, Black molly, Sword tail and three egg layers like Goldfish, Rosy barb and Gourami involving 37 families. Four units are fully functional whereas other five units are yet to be under commercial production. The average quarterly income from fully functional unit is Rs.800.
- Gross income of Rs.3, 85,000 accrued from carp production of 6.9 ha area under adoption.
- From duck component a gross income of Rs.52, 000 was realised.



Fig. 27. Scientist discussing with an ornamental fish farmer

- Total gross income of Rs.85, 000 was obtained from poultry component
- One SC youth was guided to undertake aquarium and ornamental fish selling as an entrepreneurial activity who has been earning a net income of Rs.3000 per month.
- Ten training programmes were conducted in following areas
 - Mushroom cultivation
 - Brooding and management of one-day-old ducklings and chicks
 - Vaccination of chicks
 - Aquarium setting and marketing of ornamental fish
 - Land preparation and management for nursery plants

2.3.3 Seed project in agricultural crops and fisheries (seed production of freshwater ornamental fish) funded by ICAR

(P.K. Sahoo)

The project Seed production of freshwater ornamental fish was launched in the year 2006-07 with objective to provide quality seeds under the mega project on Seed production in agricultural crops and fisheries.

Infrastructural development of the new unit is under progress. However, small scale production activity has already been initiated. So far, seed production in different species is as follow:

Lionhead goldfish	:	5000
Shubunkin	:	4000
Red gold	:	5000
Live bearers	:	5000
Koi carp	:	5000

2.3.4 Economic upliftment of rural women through integrated fish farming funded by DBT

(P.K. Sahoo & B.N. Sadangi)

- Project was sanctioned in the month of September, 2006. Village selection and pond selection were completed.
- Interview schedule was developed to collect baseline information.

3. TRAINING AND CONSULTANCY



3.1 TRAINERS' TRAININGS

Two model training courses entitled Techniques of improving extension services for farmwomen and Entrepreneurship development among Farmwomen were conducted from 17-24 August 2006 and 15-22 November 2006 respectively. This model training course was sanctioned by Directorate of Extension, Department of the Agriculture, Government of India wherein 34 middle level officers of the Department of Agriculture, Horticulture, Animal Husbandry and Fishery participated. Each one was of 8 days duration.



Fig. 28. Opening session of Trainers Training Programme

3.2 FARMERS' AND FARMWOMEN TRAININGS

Under different research projects 286 farmwomen were trained in the areas like

- (i) insect pest management of vegetables nursery,
- (ii) vermicomposting
- (iii) value addition of lime and ginger into squash, blended squash and pickle,
- (iv) preparation of sagu papad and suji papad,
- (v) oyster and straw mushroom production and
- (vi) beekeeping which helped in skill up-gradation of farmwomen.

3.3 CONSULTANCY

The centre implemented a consultancy project on Evaluation of STEP-Orissa State cooperative Milk Producer's Federation Limited, Sambalpur-II in Orissa. The consultancy project aimed at performance evaluation of women dairy cooperative societies & assessing impact of the Support to Training & Employment Programme for Women on Cross section of beneficiaries. Forty four Women Dairy Cooperative Societies were covered under the study. The study was sponsored by Ministry of Women & Child Development, Govt. of India, New Delhi.

4. PUBLICATIONS

Research Papers

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Singh, S. P., Gite, L. P. and Agarwal, N. 2006. Ergonomical assessment of manually operated seed drills for farm women. *Journal of Agricultural Engineering (ISAE)*, 43 (1): 42-48.

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Popular Articles

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Attri, B.L. and Abha Singh 2006. Rural women in post harvest handling and storage of vegetables - A case study. *Agriculture Today*. IX (7) : 36-37.

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Attri, B.L. 2006. Drumstick (*Moringa oleifera*) - A miracle tree. *Chotanagpur Hort.*, 22 (1-4): 27-32 & 23.

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Singh, S. P., Kumar, N., Gite, L. P. and Agarwal, N. 2006. Involvement of farm women in Madhya Pradesh agriculture. *Tech. Bulletin No. CIAE/2006/125*. CIAE, Nabi Bagh, Bhopal.

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Congress/Conference/Seminar/Workshop/Short Course Papers

Mishra, Sabita, Das, A. B. And Pandey, H. 2006. Presented a poster on Women friendly mushroom enterprise by using rice straw in 2nd International Rice Congress organized by IRRI and ICAR at IARI, New Delhi from 9-13 October 2006.

Mishra, Sabita, Sadangi, B.N. and Pandey, H. 2006. Presented a paper on Traditional Media - A source of information for rural people of Orissa. National Seminar on role of traditional media in rural development at BHU, Deptt. of Home Science from 9-10 December 2006.

Dash, H.K. 2006. Changing profile of rice farmers- evidences and implications. Paper presented at 2nd international rice congress held at New Delhi on 9-13 October 2006.

Dash, H.K., Sadangi, B.N. and Pandey, H. 2006. In quest for livelihood tribal women in rice based production system, in 2nd International rice congress held at New Delhi on 9-13 October 2006.

Pandey, Hema and Dash, H.K. 2006. Gender issues in rice farming -implications for rural livelihood, in 2nd International Rice Congress held at New Delhi during on 9-13 October 2006.

Sahoo, P.K., Dash, H.K., Sahoo, S., Biswal, J. and Pandey, Hema 2006. Utilization of derelict water bodies for aquaculture : a case study. Paper presented at National Consultation on Water Management in Fisheries and Aquaculture organized by Association of Aquaculturists Bhubaneswar, Orissa and Inland Fisheries Society of India, West Bengal, Barrackpore on 23-24 June 2006.

Dash, H.K. and Sahoo, P.K. 2006. Role of technology in empowerment of rural women-lessons from rural aquaculture project. Paper presented at Global Forum on Agricultural Research (GFAR) Conference held at New Delhi on 8-11 November 2006.

Satapathy, C. and Mishra, S. 2006. Extension service and tribal clients - a need for ICT intervention. Paper presented at National Seminar on Information and Communication Technology, Opportunities and Challenges for Revitalizing Extension System at Navsari, Gujarat on 27-29 December 2006.

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Singh, A. and Pandey, H. 2006. Significance of rice as a weaning food (baby food) in Coastal Orissa. Paper presented at 2nd International Rice Congress held at IARI, New Delhi on 9 - 13 October 2006.

Singh, A., Pandey, H. and Mukherjee, A. 2006. Utility of tuber crops as infant food mix for combating malnutrition. 14th Triennial Symposium of the International Society for Tropical Root Crops held at CTCRI, Sreekariyuan, Thiruvananthapuram, Kerala on 20-26 November 2006.

Singh, S. P., Gite, L.P. and Agrawal, N. 2006. Need to create awareness among the manufacturers about women friendly improved farm tools and implements. Paper presented at Seminar on Technology Transfer in Agricultural and Food Engineering at CIAE, Bhopal on 26 April 2006.

Singh, S. P., Gite, L. P., Majumder, J. and Agarwal, N. 2007. Aerobic capacity of farm women of Madhya Pradesh using sub-maximal exercise technique on

tread mill. Paper presented at 41st Annual Convention in ISAE at JAU, Junagadh on 28-31 January.

नरेश बाबू, आभा सिंह एवम् लक्ष्मीप्रिया साहू 2006. कार्यकुशलता एवम् कार्य निष्पादन में संस्थानीय तनाव की भूमिका । राष्ट्रीय कृषि अनुसंधान प्रबन्ध अकादमी हैदराबाद द्वारा आयोजित राष्ट्रीय हिन्दी कार्यशाला में 16 मई 2006 को पत्र प्रस्तुत किया ।

Training Compendium

- Gender mainstreaming in agricultural research and extension - emerging Issues and approaches compiled by Dr. B.N.Sadangi.
- Techniques of improving extension services for farmwomen compiled by Dr. B.N.Sadangi.
- Entrepreneurship development among farmwomen compiled by Dr. Suman Agrawal.

Radio Talks/ TV Programme/ Newspaper Coverage

- Barsadine panira bisudhikarana (Oriya) - a broadcasted over all India Radio on 19July 2006.
- Krushi madhyama re mahila sasaktikarana (Oriya) telecasted over Door Darshan on 8 March 2007.

5. RESEARCH PROJECTS

Sl. No.	Name of the project	Date of launching	Investigators
a. Projects Concluded During 2006-07			
Institutional Projects			
1.	Studies on eco-friendly weed management	January, 2004	Dr. M.P.S. Arya
2.	Development of modules for mobilization of rural women for sustainable livelihood through Women Self Help groups	January, 2004	Dr. Suman Agarwal
3.	Refinement of invigoration techniques as suitable to farm women for enhancing planting value of finger millet (<i>Eluesine coracana</i>) seeds	October, 2004	Smt. L.P. Sahoo
Externally Funded Projects			
4.	Family based economic security of backward communities through ornamental and integrated fish farming	May, 2004	Dr.P.K.Sahoo Dr. H.K. Dash Dr. B.L. Attri
b. On-Going Projects			
Institutional Projects			
1.	Designing gender sensitive extension model and testing its efficacy	June, 2006	Dr. B.N. Sadangi Dr. Sabita Mishra Dr. H.K. Dash Dr. P.K. Sahoo Dr. S.K. Srivastva Smt. L.P. Sahoo Smt. Abha Singh
2.	Technological empowerment of farm women for family sustenance	April, 2006	Dr. M.P.S. Arya Dr. S.K. Srivastava Dr. B.L. Attri Dr. Sabita Mishra Smt. Abha Singh Dr Naresh Babu Smt. L.P. Sahoo
3.	Livelihood security through entrepreneurial activity among farm families	April, 2006	Dr. Suman Agarwal Smt. Geeta Saha

- | | | |
|--|----------------|---|
| 4. Refinement and development of eco-friendly management technology of brinjal shoot and fruit borer (<i>Leucinodes orbonalis</i> Guence) appropriate for farmwomen | June, 2006 | Dr. S.K. Srivastava
Dr. Naresh Babu |
| 5. Standardization of gender specific technologies in banana and papaya | June, 2006 | Dr. Naresh Babu
Dr. B. L. Attri
Dr. S.K. Srivastava |
| 6. Mechanization of rice sector and impact of gender | June, 2006 | Dr. H.K. Dash |
| 7. Empowerment of farmwomen in post harvest handling of vegetables | October, 2004 | Dr. B.L. Attri
Smt. Abha Singh |
| 8. Database on gender in agriculture | February, 2004 | Dr. H.K. Dash
Dr. P.K. Sahoo
Dr. B.L. Attri |
| 9. Ergonomical evaluation of manually operated rice farming equipment with farmwomen | April, 2005 | Er. S.P. Singh |
| 10. Introduction of women friendly improved farm tools and implements in selected village of Madhya Pradesh | January, 2006 | Er. S.P. Singh
Dr. R.S. Singh |

Externally Funded Project

- | | | |
|--|-----------------|------------------------------------|
| 11. Seed project in agricultural crops and fisheries (Seed production of freshwater ornamental fish) | April, 2006 | Dr. P.K. Sahoo |
| 12. Economic upliftment of rural women through integrated fish farming | September, 2006 | Dr. P.K. Sahoo
Dr. B.N. Sadangi |

c. Newly Approved Projects

- | | | |
|--|-----------------------------|-------------------|
| 1 Capacity building of women agricultural labourers (WALs) for increasing efficiency in agro-enterprises | Date of start-
June 2007 | Dr. Sabita Mishra |
| 2. Participatory evaluation of low cost weaning mix | Date of start-
June 2007 | Smt. Abha Singh |

6. PARTICIPATION IN SEMINARS / WORKSHOPS / CONFERENCES / TRAININGS

Naresh Babu, Senior Scientist attended National Workshop on Unnat Karyakushalata Hetu Samekit Sansthaniya Tanav Prabandhan (Hindi) on 16 May, 2006 at NAARM Hyderabad.

Abha Singh, Scientist attended National Workshop on Unnat Karyakushalata Hetu Samekit Sansthaniya Tanav Prabandhan (Hindi) on 16 May, 2006 at NAARM Hyderabad.

Laxmipriya Sahoo, Scientist attended National Workshop on Unnat Karyakushalata Hetu Samekit Sansthaniya Tanav Prabandhan (Hindi) on 16 May, 2006 at NAARM Hyderabad.

Naresh Babu, Senior Scientist attended a training programme on Developing winning research proposals in agricultural research at NAARM, Hyderabad from 9-13 October 2006.

B.L. Attri, Senior Scientist attended National Seminar on Post harvest management and marketing of horticultural crops at OUAT, Bhubaneswar from 10-11 March, 2007.

Suman Agrawal, Principal Scientist and B.N.Sadangi, Principal Scientists attended Stakeholders sensitization workshop of NAIP organized at CRRRI, Cuttack on 26 August 2006.

Suman Agrawal, Principal Scientist attended National Workshop under higher education link project - Gender studies organized by H.A.U. in collaboration with British Council and DFID, held at H.A.U., Hisar on 24 - 25 March 2006.

S. P. Singh, Senior Scientist attended one day Seminar on Technology transfer in agricultural and food engineering at CIAE, Bhopal on 26 April 2006.

S. P. Singh, Senior Scientist attended Parthenium awareness week organized by NRCW, Jabalpur at CIAE, Bhopal on 6 August 2006.

S. P. Singh, Senior Scientist attended Manufacturer's Day at CIAE, Bhopal on 8 August 2006.

S. P. Singh, Senior Scientist attended Intellectual property awareness programme at CIAE, Bhopal on 25 August 2006.

S.P.Singh, Senior Scientist participated in 41st Annual Convention of Indian Society of Agricultural Engineers (ISAE) at JAU, Junagadh on 28-31 Jan., 2007.

7. HUMAN RESOURCE DEVELOPMENT

Laxmipriya Sahoo, Scientist attended summer school on Sample survey techniques in agricultural research organised by Indian Agricultural Statistical Research Institute (IASRI), New Delhi from 5-25 September, 2006.

8. RECOGNITIONS/AWARDS

- Dr. Sabita Mishra, Senior Scientist received the Award of Recognition for valuable contribution in the field of extension and transfer of technology from Mushroom Growers Federation, Orissa.
- Dr. B.L. Attri, Senior Scientist received the First prize in Hindi essay and third prize in Hindi Translation competitions organised by Nagar Rajbhasha Karyanvayan Samiti (NARAKAS), Bhubaneswar on 22 February 2007.
- Dr. Naresh Babu, Senior Scientist received the Consolation prize in Hindi Translation competition organised by NARAKAS, Bhubaneswar on 22 February 2007.
- Sh. V.Ganesh Kumar, PA received the Third prize Hindi Essay competition organised by NARAKAS, Bhubaneswar on 22 February 2007.

9. OTHER ACTIVITIES

Celebration of 'Hindi Chetna Diwas'

Hindi Chetna Divas was celebrated on 14 September 2006. On this occasion, two competitions were organized viz, writing Hindi words/dictation and Hindi debate. First, second and third prizes were given to the winners. Besides this, a programme on Hindi songs and poems was also organized to celebrate the day.



Fig. 29. Hindi Chetna Diwas observed at NRCWA, Bhubaneswar

Winter School

A Winter School on Gender Mainstreaming in Agricultural Research and Extension - Emerging Issues and Approaches was organized on 1-21 December, 2006. Twenty-five teachers, scientist and extension functionaries of ICAR, SAUs and KVKs attended the winter school.



Fig. 30. Participants discussing gender issues in the Winter School

10. IMPORTANT MEETINGS

Follow-up workshop of AICRP on Home - Science

Follow-up workshop of AICRP on Home Science was organized on 10-11 February 2007. Scientists of the Project, including the Technical Coordinators, attended the workshop. The focus of the workshop was to prepare the work plan and budget for the XI plan period.



Fig. 31. Follow-up Workshop of AICRP, Home Science held at NRCWA, Bhubaneswar

Staff Research Council

Staff Research Council meeting was held on 9 March 2007. During the meeting progress of on-going projects was reviewed and new research projects were approved.



Fig. 32. Meeting of the Staff Research Council Meeting

Research Advisory Committee

Eighth Research Advisory Committee meeting of the centre was held on 27-28 March 2007.

Institute Management Committee

Eighth Institute Management Committee Meeting of Centre was held on 29 March 2007.

11. DISTINGUISHED VISITORS

Name of Visitor : Dr Mangala Rai

Designation : DG, ICAR & Secretary, DARE

Date of visit : 29 April 2006

Name of Visitor : Mrs Ranjana Chopra, IAS

Designation : Director, Department of Agriculture
and Food Production, Govt. of Orissa

Date of visit : 17 August 2006

Name of Visitor : Dr Hrishikesh Panda, IAS

Designation : Managing Director, OMFED, Bhubaneswar

Date of visit : 15 November 2006

Name of Visitor : Dr B.B. Vashishtha

Designation : Director, National Research Centre on
Seed Spices, Ajmer

Date of visit : 13 December 2006

Name of Visitor : Dr C. Prasad

Designation : Former Deputy Director General (Agri. Extn.),
ICAR, President, VARDAN, New Delhi

Date of visit : 20 & 21 December 2006

12. PERSONNEL

As on 31 March 2007

S.N.	Name	Designation
1.	Dr Hema Pandey	Director
2.	Dr Biswanath Sadangi	Principal Scientist (Agricultural Extension)
3.	Dr Mahendra Pal Singh Arya	Principal Scientist (Agronomy)
4.	Dr Suman Agarwal	Principal Scientist (HDRM)
5.	Dr Santosh Kumar Srivastava	Senior Scientist (Entomology)
6.	Dr Brij Lal Attri	Senior Scientist (Horticulture)
7.	Dr Pravati Kumari Sahoo	Senior Scientist (Fish & Fishery)
8.	Dr Naresh Babu	Senior Scientist (Horticulture)
9.	Dr Sabita Mishra	Senior Scientist (Agricultural Extension)
10.	Er Shiv Pratap Singh	Senior Scientist (Farm Machinery and Power)*
11.	Dr Hemanta Kumar Dash	Scientist (Agricultural Economics)
12.	Mrs Laxmipriya Sahoo	Scientist (Seed Technology)
13.	Mrs Abha Singh	Scientist (Food & Nutrition)
14.	Mrs Geeta Saha	Technical Officer (T-5)
15.	Mrs Nidhi Agarwal	Technical Assistant (T-4)*
16.	Sh Debendra Nath Sarangi	Technical Assistant (T-3)(Crops Science)
17.	Sh Manoranjan Prusty	Technical Assistant (T-3)(Horticulture)
18.	Sh Prajnanu Ranjan Sahoo	Technical Assistant (T-3) (Fishery)
19.	Sh Bhikari Charan Behera	Technical Assistant (T-3)(Agricultural Extension)
20.	Sh Bishnu Charan Sahu	Technical Assistant (T-2)
21.	Sh Mata Prasad	Assistant Administrative Officer
22.	Sh V. Ganesh Kumar	Personal Assistant
23.	Ms Rina Das	Stenographer Gr-III
24.	Mrs Parisima Sen	Stenographer Gr-III
25.	Mrs Bishnupriya Moharana	Senior Clerk
26.	Sh Sanjay Kumar Singh	Senior Clerk
27.	Sh Biswanath Biswal	S.S.G.1

* Working at Sub Centre of NRCWA located at C/AE, Bhopal



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