



NRCWA

Annual Report

2004 - 2005

National Research Centre for Women in Agriculture

कृषि में महिलाओं पर राष्ट्रीय अनुसंधान केन्द्र

Bhubaneswar, भुवनेश्वर



Content

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Chapters	Page
कार्यकारी सारांश (Summary in Hindi)	i
Executive Summary	iii
The Institute	1
Research Accomplishments	4
Trainings	47
Publications	48
Research Projects	53
Participation In Seminars/ Workshops/ Conferences	54
Other Activities	55
Important Meetings	56
Distinguished Visitors	57
Human Resource Development	57
Personnel	58



Preface

Today's challenge is to sustain the development of women in agriculture while pursuing technological empowerment for them. The strategies and approaches of this Centre have been framed around this challenge. Scientists while addressing this important issue have gathered gender specific data on role of men and women in agriculture, their access to and control over productive resources, benefits accrued to them and carried out participatory trials in empowerment mode in different socio-cultural and farming situations. All these activities have helped to throw light on the gender issues in development and devise integrative gender based approaches for sustainable development. The centre achieved fairly well in creating gender database, particularly for the state of Orissa, Kerala and Haryana, developing a training module for engendering agriculture research and extension, developing drudgery reducing options for empowerment of women, mobilizing women for sustainable livelihood through group approach, developing a low cost nutritionally rich infant food and refining eco-friendly pest management practices for women.

This Annual Report of the Centre brings out the highlights of its research, training and extension activities carried out during the year 2004-2005 as well as the achievement made towards infrastructural and human resource development.

I would like to express my deep sense of gratitude to Dr. Mangala Rai, Secretary, DARE, Govt. of India and Director General, ICAR, for his guidance and sustained support. I sincerely thank Dr. P. Das, DDG (AE) and Dr. B.S. Hansra, ADG (AE) for their kind support, consistent guidance and encouragement.

My appreciations are for all the scientific, technical and administrative staff for contributing material for the Annual Report.

I appreciate the efforts put by Mrs. L.P. Sahoo, Scientist (Seed Tech.) and Dr. B.L. Attri Senior Scientist, (Hort.), for compiling, Dr. B.N. Sadangi, Principal Scientist (AE), for editing this Annual Report and Dr. Suman Agarwal, Principal Scientist (HDRM) for Hindi translation of the Executive Summary.

HEMAPANDEY
DIRECTOR

कार्यकारी सारांश

कृषि में महिलाओं की साझेदारी के महत्व को ध्यान में रखते हुए, कृषि अनुसंधान व प्रसार कार्यक्रमों में लिंग सम्बंधित तथ्यों पर प्रकाश डालना आवश्यक है तथा यह कृषि नीति का एक महत्वपूर्ण पहलू हो गया है। केन्द्र ने इस वर्ष कृषि विकास से सम्बंधित व्यक्तियों को इस तथ्य के बारे में सम्वेदनशील बनाने में काफी कार्य किया है। इस वार्षिक प्रतिवेदन में वर्ष 2004-05 में किये गये विभिन्न शोध-परियोजनाओं से प्राप्त जानकारीयों का लिंग से सम्बंधित विकास कार्यक्रमों के लिए प्रयोग किया गया है।

केन्द्र में पहलीबार एक नेटवर्क शोध परियोजना जिसका शीर्षक “कृषि अनुसंधान व प्रसार का लैंगिकीकरण” को देश के तीन राज्यों जैसे केरल, हरियाणा व उड़ीसा में कार्यान्वित किया गया। इस परियोजना में लिंग सम्बंधी विभिन्न आयामों का कृषि की नौ प्रणालियों के अन्तर्गत अध्ययन किया गया है। कृषि प्रणालियों में लिंग सम्बंधी विश्लेषण 360 परिवारों से इकट्ठे किये गये आँकड़ों व परिवार-विशेष का अध्ययन के आधार पर किया गया है। अनुसंधान व प्रसार कार्यक्रमों में लिंग सम्बंधी तथ्य को समाहित करने के लिए, मानव संसाधन विकास को प्राथमिकता दी गई है। इसके लिए अन्तर्राष्ट्रीय व राष्ट्रीय सलाहकारों की सहायता से एक प्रशिक्षण मोड्यूल जिसका शीर्षक “कृषि अनुसंधान व प्रसार का लैंगिकीकरण” विकसित किया गया है। जिससे कृषि से सम्बंधित व्यक्तियों को कृषि में महिलाओं की भूमिका व उनकी आवश्यकताओं के प्रति संवेदनशील किया जा सके। इस शोध प्रक्रिया में कृषि में लिंग से सम्बंधित महत्वपूर्ण आँकड़े व इलेक्ट्रॉनिक जनसंचार माध्यम की सामग्री व रिपोर्ट इकट्ठी हो गयी है। इनके प्रयोग से राष्ट्रीय स्तर पर कृषि में लिंग सम्बंधी अनुसंधानों को काफी सहायता मिल सकेगी।

केन्द्र की कार्यसूची में दूसरा मुख्य मुद्दा, ग्रामीण महिलाओं की कार्य क्षमता को बढ़ाना व कृषि कार्यों में उनकी कठिनाईयों को कम करना था। इस दिशा में सस्यविज्ञान के उन्नत तरीकों द्वारा महिलाओं की कठिनाईयों को कम करने के लिए एक शोध-परियोजना ‘पर्यावरण हितैषी खर-पतवार के प्रबन्धन का अध्ययन’ शुरू की गई है। इसके अन्तर्गत खर-पतवारों को दबाने के लिए जननद्रव्यों का मूल्यांकन, खर-पतवारों का घातकता स्तर एवं खर-पतवारों के नियंत्रण हेतु मूंगफली व धान की फसलों में पंक्तियों व पौधों की आपस की दूरी में सम्बंध पर अध्ययन किया गया है। इन फसलों की विभिन्न किस्मों जिनमें पर्यावरण हितैषी खर-पतवार के प्रबन्धन की क्षमता है, को आँका गया है तथा इनकी क्षमता की पुष्टि के लिए और प्रयोग किये जा रहे हैं।

कृषि कार्यों में महिलाओं की कठिनाईयों को कम करने के लिए एक अन्य शोध-परियोजना जिसका शीर्षक “मध्यप्रदेश राज्य में महिलाओं की कृषि व इससे सम्बंधित गतिविधियों में भागीदारी” पर कार्य किया गया है। इस शोध-परियोजना के अन्तर्गत सर्वेक्षण द्वारा 7346 महिलाओं से आँकड़े इकट्ठे कर उनका विश्लेषण किया गया है। महिलाओं की सबसे अधिक भागीदारी 77.3: अनाज को सुखाने व उसके भण्डारण में है तथा 73.9: महिलाएं इन्टरकल्चर एवं 72.1: महिलाएं फसल काटने में भाग लेती हैं। करीब 11.0: परिवारों के पास ट्रैक्टर व 27.0: परिवारों के पास बैलगाड़ी पायी गई है। 19.0: परिवार के पास पहियों वाली कुदाल (Wheel-hoe) पाई गयी। इनमें से 15.0: महिलाएं इन पहियों वाली कुदाल का प्रयोग करती थी। करीब 53.0: कृषक महिलाएं समेकित कृषि के प्रशिक्षण के लिए इच्छुक थी। 19.3: कृषक महिला कृषि मेला में आयीं। कृषक महिलाएं 5.3 घंटा/दिन कृषि कार्यों के लिए प्रयोग करती थी। परन्तु कृषि कार्यों में महिलाओं की भागीदारी मौसम के अनुसार थी। फसल के समय वह 7.3 घंटा/दिन तक कार्य करती थी व जब फसलों का मौसम नहीं होता तो उनकी भागीदारी 3.5 घंटा/दिन तक की थी। इसके अतिरिक्त “हाथ से चलाये जाने वाले यंत्र जैसे अनाजों की सफाई करने का यंत्र, ग्रेडर, सीड-ड्रिल, फर्टीलाइजर्स ब्रोडकास्टर, व मंड बनाने का यंत्र (रिजर) का महिलाओं द्वारा प्रयोग एवं महिलाओं की शारीरिक संरचना के सन्दर्भ में इन यंत्रों की बनावट का परिस्थिति अध्ययन” नामक शोध-परियोजना के अन्तर्गत 15 उपलब्ध कृषि-यंत्रों का महिलाओं के सन्दर्भ में मूल्यांकन किये जाने पर 11 कृषि यंत्र, जैसे, बीज-शोधन यंत्र, नवीन खुरपी, पहियोंवाली कुदाल, फसल काटने का उन्नत हंसिया, मक्का अलग करने का यंत्र (Tabular Maize sheller), बैठकर मूंगफली छीलने का यंत्र, लटकाकर अनाज की सफाई यंत्र, फर्टीलाइजर्स ब्रोडकास्टर सी.आई.ई.ई का पंक्तियों में बीज व उर्वरक डालने का यंत्र, पी.ए.यू. (P.A.U) सीड-ड्रिल व मंड बनाने का हाथ के यंत्र, महिलाओं के लिए उपयोगी पाए गये।

जैविक-विविधता के संरक्षण में महिलाओं की भूमिका, केन्द्र के लिए एक अनुसंधान का विषय था। पर्यावरण हितैषी कीट प्रबंधन में जैविक कीटनाशकों, बीज-उपचार व वानस्पतिक-कीटनाशकों की महत्वपूर्ण भूमिका को ध्यान में रखते हुए इससे सम्बंधित एक शोध-परियोजना जिसका शीर्षक “कृषक महिलाओं के द्वारा गृह वाटिक में उगायी सब्जियों में कीट प्रबंधन के लिए पर्यावरण हितैषी तकनीकी ज्ञान को कृषक महिलाओं में लोकप्रिय करना” शुरू की गई। इस परियोजना के अन्तर्गत महिलाओं में उपरोक्त विषय से सम्बंधित तकनीकी ज्ञान की कमी व उपयुक्त देशी तकनीकी ज्ञान को माप कर 175 महिलाओं को प्रशिक्षण दिया गया है।

“कृषक मजदूर महिलाओं द्वारा संसाधनों का दक्षतापूर्ण प्रबंधन” नामक शोध-परियोजना के अन्तर्गत, मजदूर महिलाओं के रहन-सहन की स्थिति, उनकी कार्यकारी स्थिति एवं उनकी क्षमता को प्रभावित करने वाले कारकों का अध्ययन किया गया है। इस शोध से प्राप्त जानकारी के आधार पर, उड़ीसा में कृषक मजदूर महिलाओं की कार्य क्षमता बढ़ाने के लिए कृषि से सम्बंधित उपकरणों जिनसे श्रम की बचत हो, के बारे में जानकारी देने की व यंत्रों के प्रयोग के लिए प्रशिक्षण देने की आवश्यकता है जिससे कि वह कृषि यंत्रों द्वारा कृषि कार्य कर अपनी कार्य दक्षता बढ़ा सकें।

बच्चों में पोषण सम्बंधी समस्याओं को देखते हुए केन्द्र द्वारा एक शोध-परियोजना शुरू की गई जिसका शीर्षक “शाकरकन्दी को विभिन्न अनुपातों में मिलाकर शिशुओं के आहार का मानकीकरण” है। इसका मुख्य उद्देश्य शिशुओं के लिए प्रोटीन व विटामिन से युक्त एक सस्ता उपरी आहार विकसित करना है। इस वर्ष केन्द्र में जो अन्य शोध-परियोजनाएं शुरू की गईं वह हैं “कृषि में लिंग सम्बंधी आँकड़ों का कोष बनाना”, “ग्रामीण महिलाओं को स्वयं सहायता समूहों द्वारा निरन्तर जीविका के लिए प्रोत्साहित करने के लिए मोड्यूल बनाना” “सब्जियों को खेत से तोड़ने के बाद उनकी देखभाल एवं प्रबंधन से सम्बंधित प्रशिक्षण देना”, “बीज बलबर्धक तकनीकी ज्ञान में संशोधन कर कृषक महिलाओं के लिए उपयुक्त बनाना जिससे वह मडुआ की उपयोगिता बढ़ा सकें” तथा “परवल में सूक्ष्म प्रजनन”।

प्राकृतिक संसाधनों को नष्ट किये बिना, ग्रामीण महिलाओं को मछली पालन के उन्नत तरीकों को उनकी सहभागिता विधि द्वारा सिखाने के लिए शोध-परियोजना जिसका शीर्षक “महिलाओं के सशक्तिकरण के लिए निरन्तर मछली पालन की विधियों का अध्ययन” के अन्तर्गत तीन गांव की 35 ग्रामीण महिलाओं के प्रत्यक्ष ज्ञान से प्राप्त आँकड़ों का विश्लेषण कर, मछली पालन के पैकेज में सुधार किये गये।

जैव-प्रौद्योगिकी विभाग द्वारा स्वीकृत दो शोध-परियोजनाओं जैसे “पिछड़ी-जाति समुदायों में परिवारिक आर्थिक सुरक्षा के लिए रंगीन व समेकित मछली पालन”। दूसरी परियोजना का शीर्षक “महिलाओं को मछली पालन में लगाना - आर्थिक व पोषण सुरक्षा की ओर एक कदम” इन शोध-परियोजनाओं को उड़ीसा के पुरी व खुर्दा जिलों के ग्रामों में शोध व विकास कार्य के रूप में परिचालित किया जा रहा है। उपरोक्त से सम्बंधित तकनीकी ज्ञान को ग्रामों के सामाजिक व आर्थिक परिवेश में व महिलाओं के पास उपलब्ध संसाधनों के परिपेक्ष्य में आँका गया है। इन महिलाओं के साथ मिलकर किये गये प्रयोगों से पोषण व आर्थिक सुरक्षा के अतिरिक्त मछली पालन से सम्बंधित महत्वपूर्ण आँकड़े व जानकारियाँ प्राप्त हुई हैं।

राष्ट्र कृषि तकनीकी परियोजना “कृषि में महिलाओं का सशक्तिकरण” लक्ष्य-रूप में परिचालित परियोजना के प्रभाव का मूल्यांकन किया गया है। आँकड़ों के विश्लेषण से प्राप्त जानकारी के आधार पर यह कहा जा सकता है कि परियोजना कृषि से सम्बंधित कार्यों में महिलाओं की कठिनाईओं को कम करने में सहायक रही है। क्योंकि महिलाओं द्वारा कृषि तकनीकी ज्ञान व उन्नत कृषियंत्रों का प्रयोग सफलता पूर्वक किया गया है। इस परियोजना के अन्तर्गत महिलाओं ने लघु उद्योगों को लगाकर अपने परिवारों की आय को बढ़ाया है। इससे उनके परिवारों का पोषण व आर्थिक स्तर अच्छा हुआ है। परियोजना का प्रभाव महिलाओं के सामाजिक व मनोवैज्ञानिक पहलुओं पर भी पड़ा है तथा इससे सम्बंधित प्रभावशाली जानकारियाँ प्राप्त हुई हैं।

केन्द्र में इस वर्ष विभिन्न क्षेत्रों से सम्बंधित छह प्रशिक्षक - प्रशिक्षण कार्यक्रम आयोजित किए गये जैसे - पर्यावरण सम्बंधी तकनीकी ज्ञान, कार्बनिक-खेती, महिलाओं में उद्यमता विकास, प्रभावमाली शोध-परियोजना बनाना, खाद्य एवं पोषण सुरक्षा, एवं मछली पालन। सत्रह (17) प्रशिक्षण कार्यक्रम कृषक महिलाओं के लिए विभिन्न ग्रामों में विभिन्न शोध-परियोजनाओं के अन्तर्गत आयोजित किए गए।

केन्द्र ने दो महत्वपूर्ण कार्यक्रम राष्ट्रीय स्तर पर आयोजित किये, जैसे ‘यात्रिक कृषि में महिलाओं की भूमिका’ पर राष्ट्रीय सेमिनार। इसे राष्ट्रीय महिला आयोग, नई दिल्ली द्वारा प्रायोजित किया गया। इसके अतिरिक्त, ‘केन्द्रीय धान अनुसंधान संस्थान’, कटक के साथ मिलकर “धान की खेती में महिलाओं की कठिनाईयों में कमी करना” पर एक राष्ट्रीय कार्यशाला का आयोजन किया गया। केन्द्र पर हिन्दी चेतना दिवस का भी आयोजन किया गया जिसमें केन्द्र के सभी सदस्यों ने उत्साहपूर्वक भाग लिया।

प्रयोगशालाओं में शोध कार्य के लिए उपयुक्त उपकरणों को खरीदने व केन्द्र के पुस्तकालय को समृद्ध करने, सभागृह कक्ष, बैठक कक्ष व प्रशिक्षण कक्ष इत्यादि को सभी आवश्यक सुविधाओं से युक्त करने की दिशा में सफल प्रयास हुए।

इस वर्ष का सबसे विशिष्ट क्षण वह था, जब माननीय केन्द्रीय कृषि मंत्री, श्री शरद पवार जी ने केन्द्र पर पधार कर केन्द्र की नई बनी इमारत का अवलोकन किया तथा केन्द्र के वैज्ञानिकों व गांव से आई हुई कृषक महिलाओं के साथ बात-चीत की। बात-चीत के दौरान उन्होंने महिलाओं के सशक्तिकरण में इस केन्द्र की भूमिका को सराहा व केन्द्र को हर सम्भव सहायता देने का आश्वासन दिया।

Executive Summary

From the facts on gender in agriculture development, there is apparently every reason to state that "Agricultural Research and Extension must address the gender issues" this must soon become an important agriculture policy statement. The centre during the year has made substantial progress to occupy a distinct position to sensitize and guide the stakeholders involved in agricultural development. This annual report 2004-05 while forwarding the findings emanating from different research projects has drawn implications for gender sensitive development programmes and sustainable development of women in agriculture.

The centre for the first time executed a network project entitled "Approaches to engendering agricultural research and extension" in three selected states namely Kerala, Haryana and Orissa by studying the different gender dimensions in agriculture under nine farming systems. Gender analysis in the selected farming systems was taken up by collecting data from 360 households and recording cases. Developing human resources for taking gender sensitive research and extension programmes was taken up on priority basis. A training module entitled "Engendering Agricultural Research and Extension" has been developed to sensitize the stakeholders through national and international consultations. In the above process a lot of gender sensitive data, materials such as electronic media and reports have been gathered to aid further research in gender perspective at national level.

Increasing efficiency and reduction of drudgery of rural women in farming was another important agenda of research for the centre. Efforts were initiated to find out ways and means to reduce the drudgery of women through improved agronomical practices under the project "Studies on eco-friendly integrated weed management". Studies on evaluation of genotypes for weed suppression, threshold weed density and spacing dynamics with respect to rice and groundnut crop were conducted. The varieties having potentiality to support eco-friendly integrated weed management have been identified and more experiments will be conducted for verification.

Centre has attempted to reduce the drudgery of women in farm operations through projects on "Involvement of farm women in agriculture and allied activities in the state of Madhya Pradesh." Under the project, household survey data of 7346 women have been compiled and analyzed. Maximum involvement of farm women was 77.3% in drying and storage followed by 73.9% in interculture and 72.1% in harvesting. About eleven per cent and twenty seven per cent households were having wheel hoes and fifteen per cent farm women operated the wheel hoe. About fifty three per cent farm women were interested in composite trainings on agriculture whereas only 19.3% women visited agricultural fair. The farm women were utilizing 5.3 hr / day in agricultural activities. The utilization of time in agriculture varied from 3.5 hr to 7.3 hr during lean to active seasons. Under project "Ergonomical Evaluation of Manually Operated Cleaner Grader, Seed Drill, Fertilizer Broadcaster and Ridger with Women Workers" 15 equipments were evaluated, 11 equipments namely seed treatment drum, naven dibbler, wheel hoe, improved sickle, tubular maize sheller, sitting type groundnut decorticator, hanging type cleaner, fertilizer broadcaster, CIAE seed cum fertilizer drill, PAU seed drill and hand ridger were found suitable for women.

Role of gender in bio-diversity conservation was another area of research identified by the centre. Considering the important role of bio-pesticides and botanical pesticides for promoting eco-friendly pest management, a project entitled "Popularization of eco-friendly pest management technologies for vegetable among farm women in homestead lands" was implemented. Technological gaps and ITKs appropriate in the field have been identified and 175 farm women have been trained.

Under the project "Efficient resource management of women agricultural labourers (WALs)", the living conditions of WALs, their employment status, and factors affecting their efficiency were studied. The findings suggest that WALs of Orissa should be exposed to skill training on farm activities particularly in using labour saving devices and methods, so that their efficiency and skill can be increased.

Attempt is being made to combat infant malnutrition through developing a low cost weaning mix under the project "Standardization of weaning mix using different proportions of sweet potato" for developing a non-traditional weaning mix enriched with protein and vitamin. The other projects started during the year include "Data base on gender in agriculture", "Modules for mobilization of rural women for sustainable livelihood through women self-help groups", "Post harvest handling of vegetables", "Refinement of invigoration techniques suitable to farm women for enhancing planting value of finger millet" and "Micro propagation of pointed gourd".

In order to enable the rural women to produce fishes on sustainable basis without degradation of natural resources, on farm participatory trials under the project "Studies on sustainable aquaculture packages for empowering rural women" were conducted in three villages by involving 35 rural women belonging to upper and schedule caste. The perceptions of the rural women and data from field were analyzed for developing logical relationships and initiating modification in the packages.

Two DBT projects namely "Family based economic security of backward communities through ornamental and integrated fish farming" and "Involving women in aquaculture - A step towards economic and nutritional security" on development-cum-research mode were taken up in neighboring areas of Puri and Khurdha districts of Orissa. The recommended technologies on the above field were tested in the prevailing socio-economic conditions and available resources of the rural women. The participatory trials in fishery have yielded worthwhile data on the potentiality of the technologies and methodologies of working with women in addition to nutritional and economic security.

The impact assessment of the NATP project on "Empowerment of women in agriculture" was taken up. The analysis of data revealed that the project helped women in reducing drudgery, increased use of agricultural technologies and improved implements, generating additional income and bringing improvement in family nutrition. The socio-psychological outcomes were also quite encouraging.

Six trainers training programmes in the areas of environmental sound technology, organic farming, entrepreneurship development, effective project planning, food and nutritional security and aquaculture were held. Seventeen farm women trainings were conducted in different villages under the approved projects.

The centre organized two important events namely National Workshop on "Role of women in mechanized farming" sponsored by National Commission for Women, New Delhi and National Seminar on "Drudgery reduction for women in rice farming" in collaboration with CRRI, Cuttack. Hindi Chetna Diwas was celebrated wherein staff members participated in great enthusiasm.

For optimizing the laboratory facilities need based equipments were purchased and work stations in the laboratories were installed. Library was enriched and conference hall, committee rooms and training hall were furnished.

The visit of the Hon'ble Union Minister of Agriculture Shri Sharad Pawar to the centre was a landmark event of the year. He visited the newly constructed Office-cum-lab building and took part in the scientist-farm women interface. During the deliberations he lauded the role of the centre for women empowerment and assured full support to the centre.

1. THE INSTITUTE

1.1. Brief History

The Working Group in 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) during the Eighth Five Year Plan. 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 of the centre to streamline the research programmes and make it more relevant.

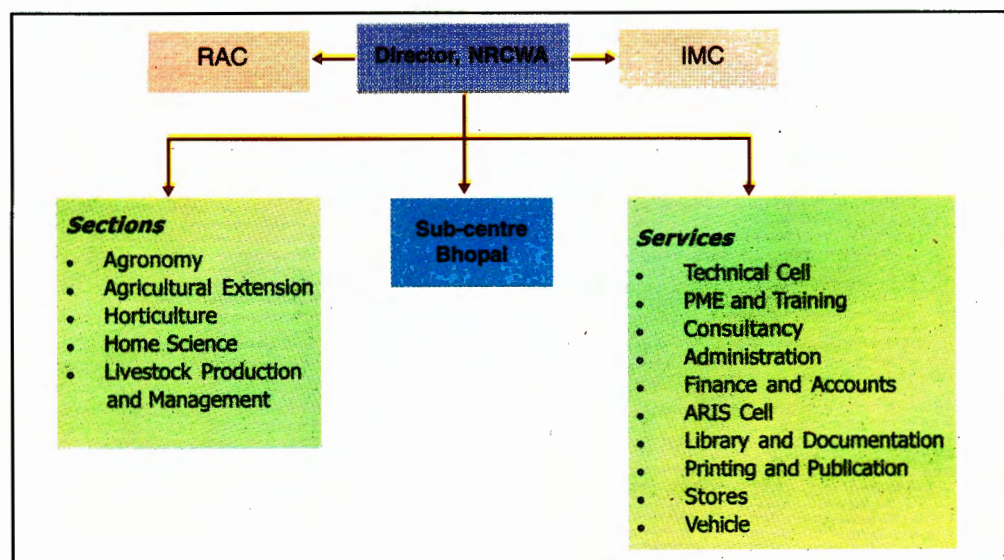
Mandate

To identify gender issues and test appropriateness of available farm-technologies/ programmes/ 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



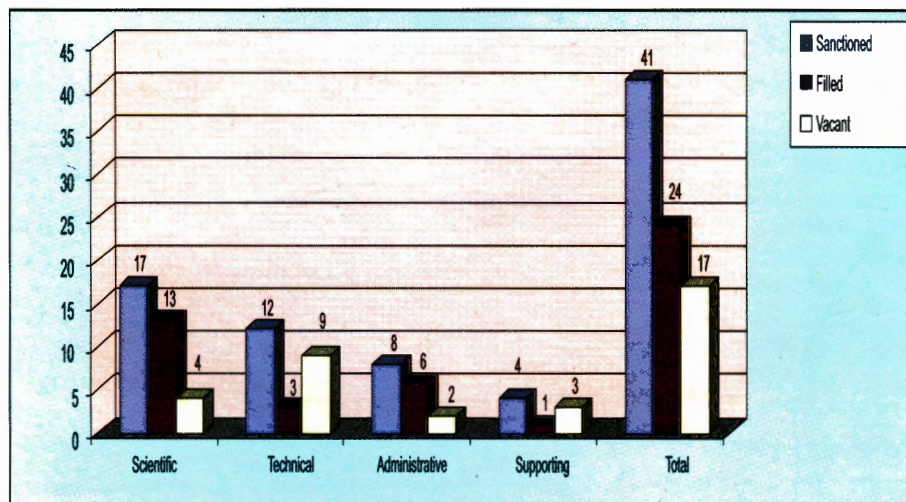
1.4 Budget and Expenditure (Main and Sub centre)

(In lakhs)

Sl. No.	Head of Account	Budget		R.E.		Expenditure	
		Non-plan	Plan	Non-plan	Plan	Non-Plan	Plan
A. Recurring							
1.	Estt. Charges including LSP and PF contractual charges	49.90	-	58.20	-	58.15	-
2.	Traveling Allowances	0.10	6.00	0.10	6.00	0.10	5.96
3.	HRD	-	2.00	-	1.20	-	1.14
4.	Contingency	10.00	43.00	17.70	43.00	12.58	42.53
	Total	60.00	51.00	76.00	50.20	70.83	49.63
B. Non-recurring							
1.	Equipments	-	20.00	-	20.00	-	20.04
2.	Works	-	67.00	-	35.00	-	34.98
3.	Vehicle	-	-	-	-	-	-
4.	Library	-	2.00	-	2.00	-	1.99
5.	Furniture/Livestock	-	30.00	-	30.00	-	30.00
	Total	-	119.00	-	87.00	-	87.01
	Total (A+B)	60.00	170.00	76.00	137.20	70.83	136.6

1.5 Manpower (Main and sub Centre)

Category	Sanctioned	Filled	Vacant
Scientific	17	13	4
Technical	12	3	9
Administrative	8	6	2
Supporting	4	1	3
Total	41	24	17



1.6 Scientific Staff (Main and Sub centre)

Sl.	Discipline	Sanctioned Strength			In position as on 31.3.2005		
		Scientist	Sr. Scientist	Pr. Scientist	Scientist	Sr. Scientist	Pr. Scientist
1	DIRECTOR			RMP (1)			RMP (1)
Scientific							
2	Agricultural Economics	1	-	-	1	-	-
3	Entomology	-	1	-	-	1	-
4	Agricultural Extension	-	1	1	-	1	1
5	Agronomy	-	-	1	-	-	1
6	Farm Machinery and Power	-	1	-	-	1	-
7	Food and Nutrition	1	-	-	1	-	-
8	Family Resource Management	-	1	-	-	-	-
9	Home Development Resource Management	-	-	1	-	-	1
10	Livestock Production and Management	-	-	1	-	-	-
11	Dairy Technology	-	1	-	-	-	-
12	Fish Processing Technology	-	1	-	1*	-	-
13	Horticulture	2	1	1	2	1	-
	Total	4	7	6	5	4	4

* One scientist (F&F) working against the post of Senior Scientist (Fish Processing Technology) as Scientist, Sr. Scale.

1.7 Technical Staff

Designation	Sanctioned Post	In position as on 31.3.2005
Technical Assistant (T-II-3)	9	2
Technical (T-1)	3	1

1.8 Administrative Staff Including Supporting

Designation	Sanctioned post	In position as on 31.3.2005
Asstt. Administrative Officer	1	1
Asstt. Finance and Accounts Officer	1	0
Personal Assistant	1	1
Sr. Clerk	2	1
Stenographer, Gr-III	2	2
Jr. Clerk	1	1
S.S.G.1	4	1
Total	12	7

2. RESEARCH ACCOMPLISHMENTS

During the period under report thirteen projects were being implemented, two projects were concluded and two new projects were planned and initiated as per the mandate of the Institute. The details of research achievements are given below:

2.1. Approaches to engendering agricultural research and extension – on networking mode

Hema Pandey, B.N.Sadangi, P.S.Geethakutty & Indu Grover

The project lunched during March 2004 at three selected centers namely National Research Centre for Women in Agriculture, Bhubaneswar, Centre for Studies on Gender Concerns in Agriculture, KAU, Kerala and Department of Home Science Extension Education, CCHAU, Hisar concentrated on gender analysis in selected farming systems in the above locations and development of Training Module for policymakers, planners, scientists and extension functionaries. The following activities and achievements have been made during the year under report.



Gender Role in water use

Gender analysis of selected farming systems

The field studies of gender analysis in agriculture in selected major farming systems in the regions of Orissa, Kerala and Haryana were conducted during the period of 2004-2005.

Considering the farm scenario of each region, three major farming systems from each region were identified for in depth analysis. Case studies on farmwomen involved in different farming systems were made to uncover many issues which are difficult to observe and quantify. The details of farming systems studied in each region are provided in the table 1.

Table 1 : Locale and sampling plan

Sl. No.	Name of the state	Farming systems	Villages / panchayats	Sample size
1	Orissa	Rice based	Kamira, Anilachhat (Sonepur district)	40
		Vegetable based	Katakapatna, Kumardiha (Khurda District)	40
		Livestock based	Balakati, Basanta (Puri District)	40
2	Kerala	Rice based	Pattambi and Wadakenchery Panchayats of Palakkad District	40
		Coconut based	Mukkum/ Chelannur of Client District	40
		Mixed farming homesteads	Malayankuzhu and Venganur Panchayats of Trivandrum District	40
3	Haryana	Wheat-Cotton based	Kaimer Bhariya (Hisar dist)	40
		Dairy based	Chinder, Challi (Fatehabad dist.) Pandopindare Sachakhera (Jind dist.)	40
		Vegetable based	Dhari kushal Dhanna Kalan (Hisar dist.) Bhindhroti Akbarpur Barota (Senapat)	40

Stratified random sampling technique was followed to select the households under different farming systems. Sampling was carried at the four levels such as district, cluster/panchayat, village and household. District where a particular farming system had highest coverage was selected.



Gender role in transportation of farm produce



Basing on the same criterion cluster / panchayat and villages (two) were selected. The assumption behind adopting the criterion is that gender issues would be very observable where the concentration of the system is highest.

Big, small, marginal and agricultural labourers households were selected by adopting proportionate random sampling to make up the total sample size of 40 for each farming system. Thus the entire study covered 360 households in three states.

Data collection and analysis

Gender analysis of the selected farming systems were carried out through personal interview with the men and women heads of the households selected under different farming systems.

Relevant data on socio-economic and gender dimensions of those families were collected using gender sensitive interview schedule specially prepared, tested and standardized for the purpose. The comprehensive interview schedule has been integrated with different frame works of gender analysis like – activity profile frame work, time clock analysis, access and control of farm resources, technologies utilization, constraint analysis, nutritional pattern, wage differentials, health hazards, domestic violence's etc. The data collected were analyzed by using simple statistical tools such as frequency, percentage, standard deviation and t-test.



Gender Role in Irrigation



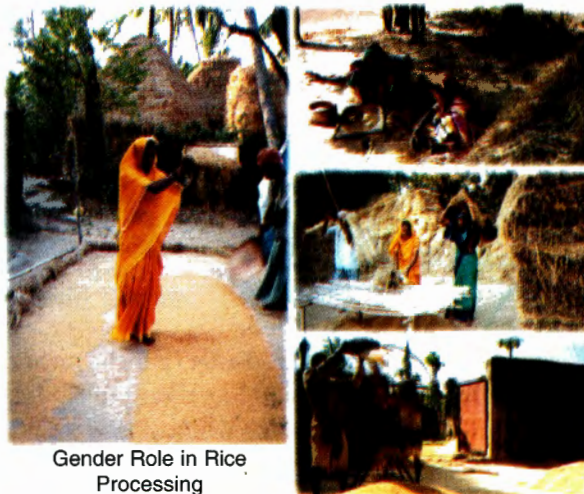
Dimensions of gender analysis

The gender analysis was carried out under the following broad headings

1. Socio economic profiles of gender of different farming systems.
2. Time utilization pattern and work load of the men and women farmers.
3. Extent of involvement.
4. Identification of tools and implements used by the men and women.
5. Wage differentiation among men and women labourer.
6. Levels of knowledge and constraints.
7. Extent of intra-household access to and control over resources.
8. Involvement of men and women farmers in the home management activities viz. usages of water, fuel, fodder and food in the farming systems.
9. Extent of participation of men and women farmers in the local development programmes.
10. Extent of access to basic amenities among men and women of the systems.
11. Health hazards, diseases and vices prevalent among the men and women of the farming systems.

Development of training module

- Case studies, Video cassettes, photographs, slides had been developed for incorporation in the module for gender sensitization.
- A 24 hours men and women work profile was compiled in CD-ROM
- Pictorial directory was also developed to depict gender role and relationship in different fields such as social, nutritional, health, education and farming.
- A workshop on gender analysis was held at KAU with collaboration of FAO from 20-29th September, 2004 to train project scientists.
- A workshop for PIs of the project was held at NRCWA from 21-25th November, 2004 to develop training module on gender sensitization and analysis.
- Regional workshop and trainers training programme was conducted at KAU & NRCWA for the scientists and extension functionaries for the respective zones. It was aimed to test the module and develop their capacity to formulate gender sensitive research and extension programmes.
- The module initially developed for seven days duration was restructured into a eight day programme after getting the feedback from the regional workshops.
- The final module containing the day wise details and the annexure was developed during the wrap of workshop held at NRCWA from 13-16th April, 2005. The training module is ready for printing.



Gender Role in Rice Processing

Findings

The findings emanating from different centres have been summarized to draw implications for research and extension

Age: The maximum involvements of men and women were observed from middle age group (30-50 years) in all the states. One third of the systems functioned as women headed in Kerala.



Gender Role in Post Harvest and value addition

Education: Regarding education in Haryana and Orissa, majority of men were having primary level education and majority of women were illiterate, whereas, the Kerala situation was different in the sense that majority of men had higher secondary education and women had primary education. Thus illiteracy among women is a serious gender issues in case of Haryana and Orissa region.

Nutritional status: Majority of women farmer from all categories found suffering from mild to severe malnourishment in Orissa; women in rice and vegetable based farming systems were found to be worst affected by malnutrition than the women from livestock based farming system.

Occupation: It was observed that both agriculture and labour work were major occupation among the men and women of Haryana and Orissa. Agricultural work and home management were identified as major occupation in Kerala.

Religion: In all the three states *Hindu* was the religion of majority. In Kerala only 15% of farmers belonged to *Muslim* category.

Caste: In Haryana *Jat* was observed to be more dominant caste among large and small farmers, whereas majority of farmers from marginal and labourer categories belonged to SC and BC. In Kerala and Orissa maximum percentage of farmers belonged to backward community.



Gender Role in Household Chores

Annual Income: Majority of large farmers were getting more than one lakh per annum and other categories of farmers were getting Rs.30,000-50,000 per annum in Haryana. In Orissa the situation was worse that majority farmer's incomes ranged from Rs.10000-30000 per annum and worst was the situation of women farmer who had no clear cut income and it was also observed in Orissa that the income of women farmers in livestock based farming systems was better than other systems. In Kerala, the situation was some what better in the sense that majority of farmers were getting Rs.30000-50000 per annum. Women farmers of all the three states had no clear cut annual income. So access of women to family income is a matter of concern for development.

Family Type: Nuclear family systems was prevalent in Kerala and Orissa state, whereas, joint family system were found popular in large farmer category of Haryana.

Time Utilization: Participation of men and women farmers in different farming systems were observed and the time devoted by men and women was in the proportion of 7.05 hours : 5.2 hours, 7 hours : 5.25 hours in Kerala and Orissa respectively. In Haryana there was big difference in time utilization pattern of different categories of farmers in the sense that labourers were spending more time in productive work in comparison to large farmers. By comparing three regions, women from labourer category in Haryana were contributing highest time in field i.e. 8.8 hours per day. Women from three regions were solely responsible for home management activity irrespective of their categories.

Wage difference: A wide difference that existed in the wage rate of the paid labour in the three situations was brought out. Women's daily wages in selected farming systems constituted lesser amount than men, even less than half of the men in Kerala state. Farmers from Orissa were getting lowest rate for their work in comparison to Haryana and Kerala. Working hours spent by Orissa farmer was lowest among three regions i.e. approximately 7.05 hours per day in comparison to 9 hours and 8 hours in Haryana and Kerala respectively. Regarding the time utilization among men and women, the maximum differences in working hours was observed in Haryana state followed by Orissa and Kerala.

Mechanization: Mechanization of main field operations, threshing and transportation were noticed to be men operated in Kerala and Haryana. In Orissa the situation was worst in the sense that even in the era of science, the farmers had not practised modern machines for different operations. Very few modern machines like tractor, thresher etc. were found in Orissa but these were very familiar among the farmers of Haryana and Kerala. Thus, the access of women to modern implements and technologies is a major concern. Manual operations like transplanting, weeding, post harvest operations etc which are more drudgerous were done by women farmers.

Constraints: Lack of knowledge about field operations in rice farming, non-suitability of tools, scarcity in the regions and high labour cost were expressed as constraints by the women farmers. There was no significant difference in their perceptions about the general constraints between men and women. Except harvesting and

threshing in all major activities in rice farming men farmers had highest involvement in Orissa. Women farmers were not involved in activities like ploughing, manuring and spraying in Haryana.

Access and Control: In three regions access to and control over productive resources by men farmers were more pronounced than women farmers.

Food preparation and uptake: women farmer's role found dominant in food preparation but men were served first as per the dining style in all regions.

Collection of fuel, fodder and water: The collection of fuel, fodder and water were again the sole responsibility of women farmers in all the state but the management of Kerosene and LPG were men's concern. LPG was found to be very popular in Haryana and Kerala but the use of LPG and even the Kerosene in Orissa was very negligible. The collection, preparation and storage of cow-dung cake and twigs were found very popular in Orissa and Haryana.

Development Programmes: Very few percentage of women farmers had access to development programmes.

Diseases: Diseases such as joint pain, back pain, exhaustion, tiredness, rheumatism and cold were commonly observed and found to be more frequent with women farmers from all categories in Orissa and women labourer category in Haryana. Whereas, in Kerala these were infrequently perceived by women farmers even never by men farmers. These may be due to poor health status, lack of knowledge and use of traditional manual methods of doing farm work by the farmers of Orissa.

Vices: Pan chewing and bidi were more frequently used by women and men respectively in Orissa and Kerala.

The one year pilot study covering three states of the country focused on many gender related parameters for making gender mainstreaming more efficient. The implications from gender analysis brought out that utmost attention be paid by research organizations for women who are mostly middle aged, educationally backward, malnourished and belonged to schedule caste, schedule tribe and backward communities. The time use efficiency the women in Kerala and Orissa need improvement by empowering women in farm diversification activities. Wage difference between men and women labourer was common in all the selected farming systems and women of Kerala were most affected. Poor mechanization in farming by men and women in Orissa was very common which need urgent attention of scientists and extension functionaries. Policy and programme interventions are commonly needed in all the study area to ensure that women's access to productive farm resources and services from development programme increases. The plight of women in the prevailing dining styles, collection of fuel, fodder and water, diseases and taking betel and tobacco are some other social issues connected with farming.

2.2 Studies on eco-friendly integrated weed management

M.P.S. Arya

Among various pests, weeds constitute one form, which affects productivity and sustainability of agricultural production. Women play immense role in weed management. They share about fifty percent of the total manual power being used for weed control in different crops. The manual weed control was inefficient and involves cumbersome practice of crawling with traditional tools. Chemical weed control which was fatal from the point of health of human and animals was also not environmentally sound. In view of the weed problem and role played by the women in weed management the project was initiated in January 2004 with following objectives

- Evaluation and refinement of available technology in reference to women in agriculture
- On-farm testing and creating awareness among the women in agriculture through training and demonstration.
- Generation of basic information for further studies on environmentally safe methods of weed control.
- Creating awareness of available improved weed management technology among farmwomen.

- Reducing operational drudgery and health hazards.
- Improving yield level of crops and economic condition of the farming community.

Screening of rice genotypes for weed suppression

The field trial was conducted during Kharif, 2004 aiming to study the six genotypes (Khandagiri, Udaigiri, Nilgiri, Ghanteswari, ORS 102-4 and OR 1519-2) of rice with reference to their ability to compete with weeds so that weed intensity could be reduced and the women especially working on their own field will be relieved to some extent from heavy burden of weeding. The experiment was conducted in Randomized Block Design with four replications. The results of experiment revealed that rice variety Udaigiri recorded the lowest weed dry weight i.e.78.2g/m² (Table 2, Fig. 1 & 2).

Table 2 : Grain yield (q/ha) of rice varieties v/s dry weight of weeds under weedy and weed free conditions

Variety	Weed free	Weedy	% over weed free	Dry wt of weeds (g/m ²)
Khandagiri	8.52	5.50	64.55	107.85
Udaigiri	23.33	8.58	36.78	78.20
Nilgiri	6.09	2.88	47.29	122.90
Ghanteswari	8.04	4.68	58.22	101.50
ORS 102-4	16.67	8.90	53.38	111.90
OR 1519-2	8.31	5.46	65.69	112.50

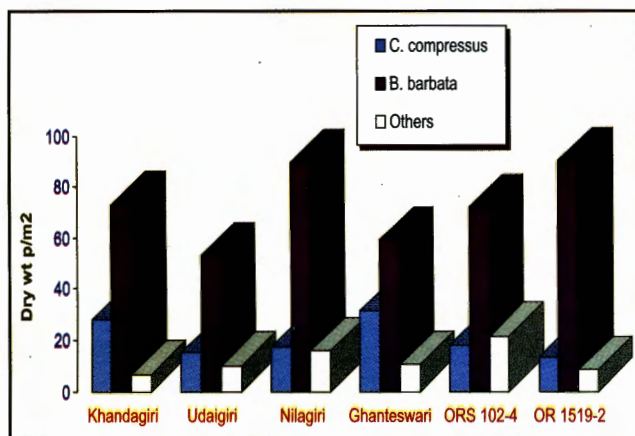


Figure 1: Dry wt of weeds (g/m²) in rice varieties

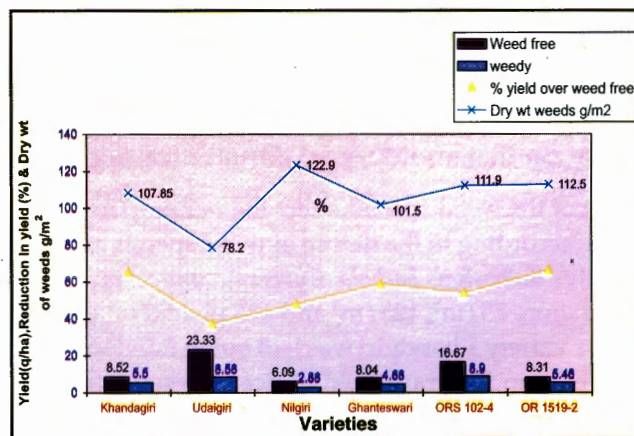


Figure 2: Crop-weed competition in rice

However, the variety suffered heavily due to weed competition and recorded only 36.78 % yield over weed free check. Even than the grain yield under weed competition was second highest (8.58q/ha). Under weed free condition also Udaigiri recorded the highest yield of 23.33q/ha. The experiment will be continued in Kharif, 2005 for verification of the first year results.

Screening of groundnut genotypes for weed suppression

The field trial was conducted during Kharif, 2004 aiming to study six genotypes (Somanath, TAG 24, TG 3, TMV 2, AK 12-24 and Smruti) of groundnut with reference to their ability to compete with weeds so that weed intensity could be reduced and the women especially working in weeding will be relieved to some extent from heavy burden of weeding. The experiment was conducted in Randomized Block Design with three replications.

The results of experiment revealed that groundnut variety Smruti recorded the lowest weed dry weight i.e. 148.8g/m², resultantly the pod yields under weedy and weed free conditions were also highest (Table 3 & Fig. 3). Variety Somnath found to be the least competitive among all the tested varieties. The experiment will continue in Kharif, 2005 for verification of the first year results.

Table 3 : Pod yield (q/ha) of groundnut varieties under weedy and weed free conditions

Variety	Weed free	Weedy	% yield of weed free	Weed dry wt (g/m ²)
Somnath	18.89	12.36	65.43	278.67
TAG 24	24.61	20.83	84.65	322.93
TG 3	23.47	19.72	84.02	294.93
TMV 2	23.75	19.86	83.62	346.67
AK 12-24	16.81	16.39	97.5	149.07
Smruti	26.28	22.64	86.15	148.8

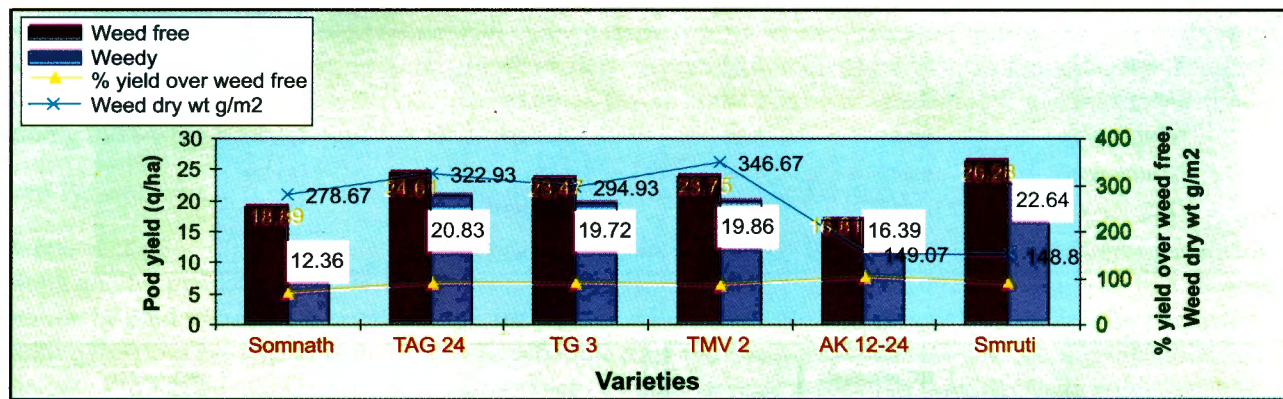


Figure 3: Crop-weed competition in groundnut

Study on threshold weed density for economic level competition in Kharif rice

Many of the weed species 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. A field trial consisting of three-weed species namely- *Bulbostylis barbata*, *Cyperus compressus* and *Perotis indica* and four levels of weed population i.e. Zero population, 25/m², 125/m² and 625 plants/m² was, therefore, conducted during Kharif, 2004. The experiment on rice variety Khandgiri was laid out in Randomized Block Design with four replications. There was almost no difference in the grain yield of rice between weed free and the weed density of 25 plant/m² under *Bulbostylis barbata* and *Perotis indica* weeds (Table 4 & Fig. 4).

Table 4 : Grain yield (q/ha) of rice under varying levels of weed densities

Treatments	P 0	P 25		P 125		P 625		Average	
	q/ha	q/ha	Yield compared to check (%)	q/ha	Yield compared to check (%)	q/ha	Yield compared to check (%)	q/ha	Yield compared to check (%)
Weed free (check)	20.71	-	-	-	-	-	-	-	-
<i>Bulbostylis barbata</i>	-	20.73	100	20.00	96.57	19.15	92.44	19.96	96.37
<i>Cyperus compressus</i>	-	18.75	90.54	16.23	78.37	15.00	72.43	16.66	80.44
<i>Perotis indica</i>	-	20.63	99.61	18.54	89.52	16.04	77.46	18.40	88.86
Average	-	20.04	96.74	18.26	88.15	16.73	80.78	-	-

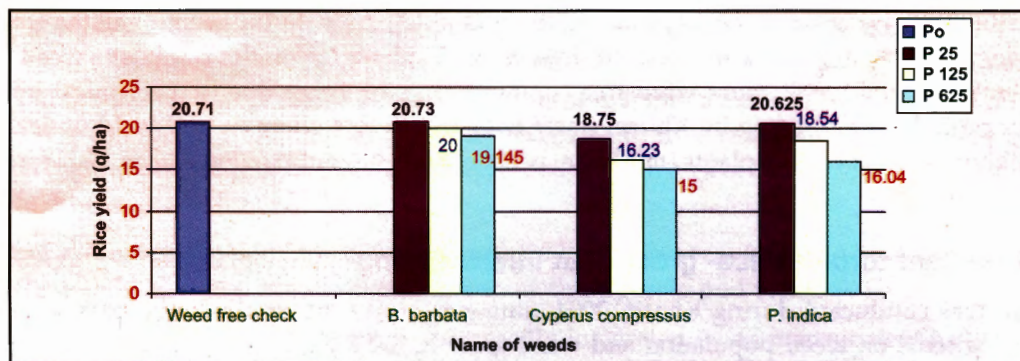


Figure 4: Grain yield of rice under varying densities of different weeds

Cyperus compressus, however, reduced the yield even at weed density of 25 plant/m². Further, increase in weed density, however, found to reduce the grain yield and lowest yield (15.00q/ha) was recorded at a weed density of 625 plant/m² under *Cyperus compressus*. Thereafter, the trend was almost same as of the other weeds. The experiment will continue in Kharif, 2005 for verification of the first year results.

Study on threshold weed density for economic level competition in Kharif groundnut

Groundnut crop was affected by a variety of weed species. The yield of crop varies according to the nature of weed species and their intensity. A field trial consisting of three levels of weed species i.e. *Bulbostylis barbata*, *Cyperus compressus* and composite and four levels of weed population i.e. Zero population, 25/m², 125/m² and 625 plants/m² was, therefore, conducted during Kharif, 2004. The experiment on groundnut variety Smruti was laid out in Randomized Block Design with four replications. There was almost no difference in the grain yield of groundnut under weed free and the weed density of 25 plant/m² of all the weeds (Table 5 & Fig 5).

Table 5 : Pod yield (q/ha) of groundnut under varying levels of weed densities

Treatments	P 0	P 25		P 125		P 625		Average	
	q/ha	q/ha	% to weed free (check)	q/ha	% to weed free (check)	q/ha	% to weed free (check)	q/ha	% to weed free (check)
Weed free check	12.39	-	-	-	-	-	-	-	-
<i>Bulbostylis barbata</i>	-	12.5	100.19	11.15	89.99	8.75	70.62	10.8	87.17
<i>Cyperus compressus</i>	-	12.60	101.69	10.21	82.41	9.17	74.01	10.66	86.04
Composite weeds	-	13.02	105.08	11.15	89.99	8.02	64.73	10.73	86.60
Average	-	12.71	102.58	10.84	87.49	8.65	69.81	-	-

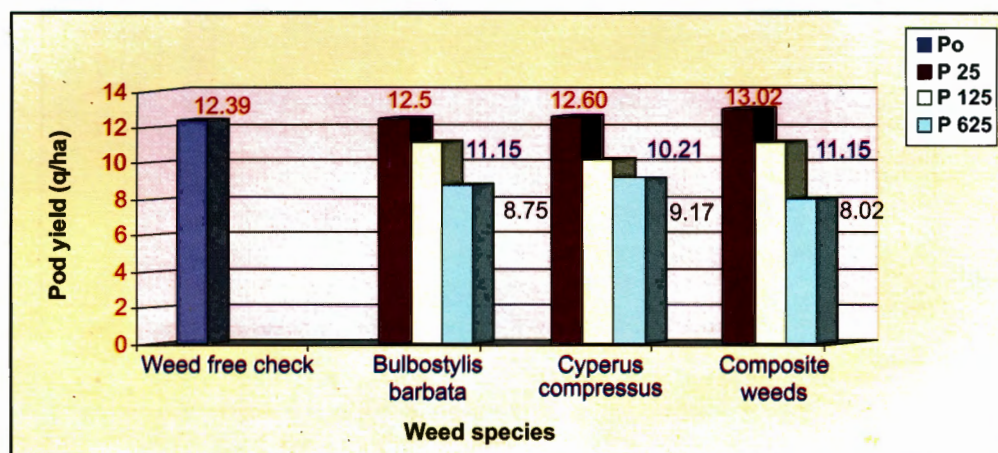


Figure 5 : Ground nut yield under varying densities of different weeds

However, further increase in weed density reduced the pod yield under the influence of all the weeds and the lowest pod yield (64.73%) was recorded at weed density of 625 plants/m² under composite weed population. Marginal decrease in pod yield under weed free condition may be either due to mechanical injuries to the initiating root pegs during weeding by Khurpi (local hoe) or synergic effect on pod yield under lower level competitions at weed density of 25 plants/m². The experiment will be continued in Kharif, 2005 for verification of the first year results.

Weed management through rice- groundnut intercropping

The field trial was conducted during Kharif, 2004 aiming to study the smothering/ competition effect of intercropping patterns on weed population and weed growth. Six intercropping treatments of rice (variety Khandgiri) and groundnut (variety Smruti) were tested for field evaluation in Randomized Block Design with four replications.

- i. Rice + Ground nut in 1 : 1 rows
- ii. Rice + Ground nut in 2 : 1 rows
- iii. Rice + Ground nut in 3 : 1 rows
- iv. Rice + Ground nut in 3 : 2 rows
- v. Rice pure
- vi. Ground nut pure

The results revealed that pure rice recorded the lowest weed dry weight, while it was second highest in pure stand of groundnut (Table 6 & Fig. 6).

Table 6 : Yield (q/ha) of rice and groundnut and weed dry weight (g/m²) under different intercropping systems

Treatments	Rice	G. nut	Total	Total weed dry wt
Rice+G. nut 1:1	3.43	5.32	8.75	465.85
Rice+G. nut 2:1	4.98	4.71	9.69	369.6
Rice+G. nut 3:1	5.03	4.55	9.58	450.28
Rice+G. nut 3:2	4.73	4.09	8.82	529.55
Rice pure	8.37	0	8.37	320.78
Groundnut pure	0	13.74	13.74	521.85

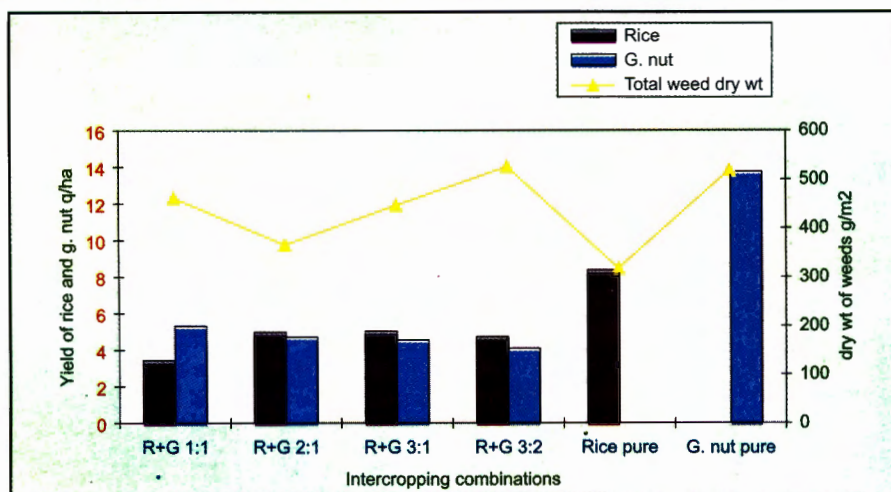


Figure 6 : Dry wt. of weeds vs. yield of rice and groundnut

However, groundnut under pure stand gave the highest economic (pod) yield. Among intercropping patterns, rice + groundnut planted in 2:1 row ratio found superior both in respect of total economic yield (rice+groundnut) and lower weed dry weight. The experiment will be continued in Kharif, 2005 for verification of the first year results.

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

The field trial was conducted during Kharif, 2004 with the objective to study the effect of spatial dynamics of groundnut variety Smruti on population and growth behaviour of weeds in groundnut. Three levels of area per plant (160, 240 and 320 cm²) were tested using three levels of row into plant spacing ratios (2:1, 3:1 and 4:1). The experiment was conducted in Randomized Block Design with three replications. The result of experiment revealed that highest pod yield of 12.31q/ha was recorded with an area of 160 cm² per plant using row to plant spacing ratio 3:1 (Table 7 & Fig 7).

The treatment also found to record lower weed count (600/m²). This was followed by a combination of 320cm² area per plant and 2:1 row to plant spacing ratio only with respect to pod yield.

The varieties having potentiality to support eco-friendly integrated weed management have been identified and more experiment will be conducted in Kharif 2005 for verification of the first year results.

Table 7 : Pod yield (q/ha) of groundnut under different spacing management (Kharif 2004)

Treatment	R 2:1	R 3:1	R 4:1	Av
S 160	7.94	12.31	8.76	9.67
S 240	9.07	7.34	7.72	8.043333
S 320	10.08	8.16	9.35	9.196667
Av	9.03	9.27	8.61	
Stover yield of groundnut under different spacing (Kharif 2004)				
S 160	21.68	21.22	20.85	21.25
S 240	21.26	18.01	15.16	18.143333
S 320	21.8	16.6	18.42	18.94
Av	21.58	18.61	18.143333	
Total weed count /m2 in G. nut spacing experiment at 30 days				
S 160	732	600	662.6667	664.8889
S 240	729.3333	606.6667	578.6667	638.2222
S 320	846.6667	694.6667	796	779.1111
Av	769.3333	633.7778	679.1111	
Total weed wt /m2 in G. nut spacing experiment at 30 days				
S 160	78.27	91.2	67.4	78.95667
S 240	80.39	71.2	68.4	73.33
S 320	70.13	107.54	81.6	86.423333
Av	76.263333	89.98	72.46667	

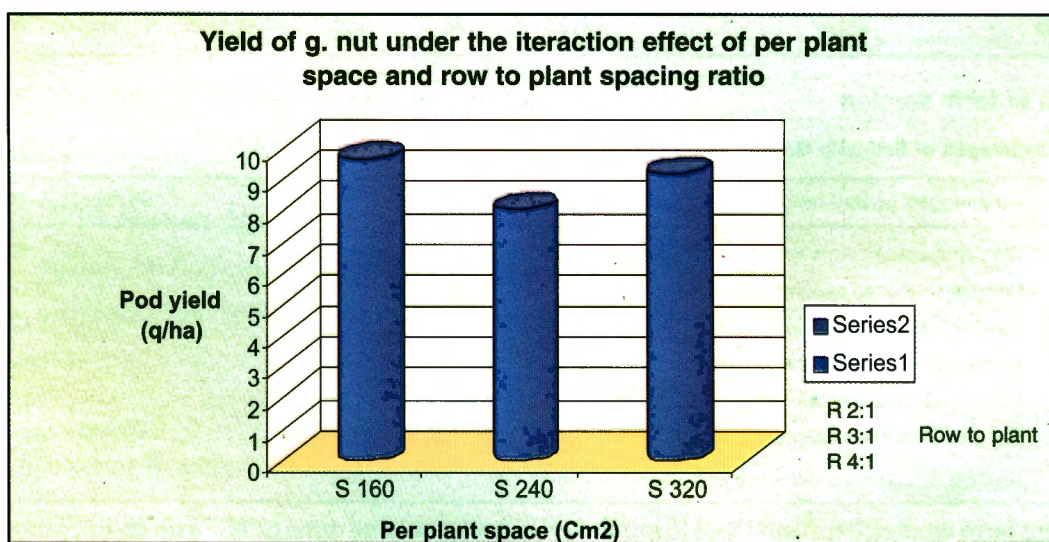


Fig. 7 : Yield of ground nut under the interaction effect of per plant space and row to plant spacing ratio

2.3 Development of modules for mobilization of rural women for sustainable livelihood through Women Self-Help Groups (WSHGs)

Suman Agarwal

Objectives

- To identify WSHGs involved in different types of entrepreneurial activities related to different production systems
- To undertake SWOT analysis of the selected WSHGs involved in different entrepreneurial activities related to different production systems
- To analyze the details about the linkages established by different WSHGs at various levels

Data were collected from secondary sources on Self-help groups enlisted in different coastal districts of Orissa (Table 8) and found that 49247 Women Self-help Groups (WSHGs) were existing (up to July, 2004) in ten different districts. These WSHGs were formed on different schemes of Governmental and non-governmental organizations. However, in Puri district 5111 WSHGs was formed. Out of these, only 3226 (63.11%) WSHGs were found to be linked with credit Bank.

Table 8 : Number of Women Self Help Groups in different coastal districts of Orissa (April 2001-July 2004)

Sl. No.	Name of the district	Cumulative No. of groups formed since 01.04.2001					No. of members	Cumulative No. of SHG credit linked since 01.04.01
		ICDS	BDO	NGO	Others	Total		
1	Balasore	4771	156	1341	9	6277	71538	4190
2	Bhadrak	1918	290	1580	0	3788	46294	1550
3	Cuttack	4138	1330	283	0	5751	74445	1167
4	Gajapati	1113	1	857	0	1971	27274	1283
5	Ganjam	9747	7	0	0	9754	117397	7729
6	Jajpur	3207	652	1094	0	4953	77417	1246
7	Jagatsinghpur	1195	0	2722	0	3917	53753	2330
8	Kendrapara	1729	81	1434	0	3244	49939	1144
9	Khurda	2815	256	1410	0	4481	73935	1252
10	Puri	1926	682	2467	36	5111	81658	3226
	Total	32559	3455	13188	45	49247	673650	25117

Perception of farm women

Table 9 : Advantages of Self-help Groups as perceived by farmwomen

Sl. No.	Advantages of Self-help Groups	Percentage (%)
1.	With cooperation work can be done easily with co-operation	100
2.	Provide economic security to women	97.43
3.	Women develop self confidence	97.43
4.	Women acquire special recognition in society	56.41
5.	Better education for children	38.46
6.	Big problems become small	35.13
7.	Festival can be celebrated together	35.13

Cent per cent farm women expressed that through SHGs work could be done easily with co-operation. Majority of them expressed that advantages of SHGs were that women get economic security and develop self confidence

(97.43%). The other advantages of SHGs expressed by farm women were that women get special recognition in the village (56.41%), big problems became small and festivals were celebrated together (35.13%).

Self-help Groups identified for SWOT analysis

The SWOT analysis of the successful groups was made in the first phase of the project and in the coming year the failure groups will be studied to find out the reasons of failure.

The SHGs which were running their enterprises successfully were identified. SWOT analysis of each self-help groups was carried out in their respective villages involving all the members. Necessary clarification on the concepts and guidelines of interaction were given to the members for enabling the members to contribute and share on each aspect. The enterprises run by them have been listed in Table 10.

Table 10: Details of enterprises run by SHGs

Sl. No.	Name of SHG	Enterprises run by SHGs
1.	Maa Jageswari	Agro-farming (Paddy +Groundnut +Vegetable cultivation), floriculture, Pisciculture, Coir work
2.	Narikalyan	Vegetable growing+ floriculture + Badi making+ Incense stick making+ White Phenyl making
3.	Sangrame-Vikram	Vegetable growing + Value addition of fruits & vegetables + Haldi growing and preparation of masala pkt.
4.	Saibaba	Vegetable growing + floriculture + Mushroom cultivation+ Pisciculture
5.	Beleswari	Pisciculture + Agro- processing (Paddy parboiling).

Results from the Table 10 revealed that successful SHGs were running 2 to 4 enterprises for getting the income round the year. The SWOT analysis of these SHGs and their enterprises generated the following information:

Strengths:

- Ability and Commitment to work
- Positive attitude towards change
- Eagerness to grasp new ideas/ practices
- Honesty in dealing with money and work
- Ability to avail the opportunity

Weaknesses:

- Delay in decisions making
- Lack of confidence
- Inadequate cash flow
- Difficulty in independent movements to far-off places

Opportunities:

- Credit facilities from Banks
- Subsidy facilities on Bank loans
- Training provisions for capacity building from different Govt. & non-Govt. agencies

Threats:

- Product competition/Quality of the product
- Lack of marketing facilities

The study will continue in the next year for covering the remaining objectives.

2.4 Empowerment of Farmwomen in post harvest handling of vegetables

B.L.Attri and Abha Singh

Based on the survey conducted for post-harvest handling of vegetables in rural areas in two districts i.e., Puri and Khurda covering 160 farmers of sixteen villages in four blocks one follow up project was formulated with the following objectives

- To introduce and compare new methods and technologies for reducing post harvest losses of the perishables along with
- To assess economic impact of these methods on the farm families.

Under this project, performance of the Zero Energy Cool Chamber (ZECC) and bamboo iceless refrigerator (BIR) will be tried in four villages as well as at the NRCWA demonstration unit to assess the impact of these in enhancing the self life of vegetables. These storage structures will be compared with the ambient and low temperature storage. The seasonal vegetables and fruits will be stored and the effect of storage on physico-chemical and quality parameters will be assessed. The ZECC is under construction at NRCWA and the same will be constructed in the villages and the storage studies will be conducted.

In the coming year low cost storage structures will be developed at village level for the use of farm women and testing of its efficiency in storing different fruits and vegetables.

2.5 Popularization of eco-friendly pest management technologies for vegetables among farm women in homestead lands

S.K.Srivastava, B.L. Atri & L.P. Sahoo

The project was taken up with the following objective. To promote pesticide free production of vegetables through empowerment of women in the use of eco-friendly pest management technologies.

Data collected from two hundred farm women from 4 districts comprising 23 villages of Orissa were compiled and analyzed to find out the technological gaps in pest management. Results regarding technological gaps in crop protection technology have been presented in Table 11. It is clear from the results that farmwomen were having good knowledge of seed storage of vegetables but there was a vast gap in the knowledge of seed treatment and bio-pesticides, which varied from 78.4 to 95.2%. Overall technological gap among farmwomen in vegetable protection technology was found to be 52.6% in Orissa.

Table 11 : Estimation of technological gaps in the knowledge of plant protection technology of farmwomen of Orissa

Sl. No.	Different aspects of plant protection technology	Maximum score obtained	Average score	Difference in score knowledge (%)	Technological gap in	Rank
1.	Seed Treatment	12.5	2.7	9.8	78.4	II
2.	Nursery Protection	12.5	8.8	3.7	29.6	VI
3.	Spray Solution preparation	12.5	8.3	4.2	33.6	V
4.	Pesticidal Hazards	12.5	9.3	3.2	25.6	VII
5.	Waiting Period	12.5	4.9	7.6	60.8	IV
6.	Bio-Pesticide	12.5	0.6	11.9	95.2	I
7.	Botanical Pesticide	12.5	3.2	9.3	74.4	III
8.	Seed Storage	12.5	9.6	2.9	23.2	VIII
	Total	100	47.4	52.6	52.6	

Eighteen eco-friendly pest management technologies and ITKs related to vegetables farming which were collected and documented from the farm women of different villages of Orissa and from the different organizations located at Bhubaneswar, during 2004-2005 are presented in Table 12.

Two participatory validation trials of cabbage and brinjal with four varieties of cabbage viz, Priya, Green Samrat, Green Diamond and Gold Star and four varieties of brinjal viz, Green Star Long, BB-44, Green Star and Chandrika, under eco-friendly and conventional method were conducted. Seed material of different varieties, Pheromone Trap and Lure, neem Shield and Neem Oil were distributed to the selected farmwomen for participatory validation trials. Data of Participatory Trials were compiled and are under statistical analysis for the interpretation of the results.

Table 12: List of eco-friendly pest management technologies and ITKs collected from different sources in Orissa during 2004-2005.

Sl.	Name of the eco-friendly pest management	Crop	Pest
1.	Soaking of neem seed powder overnight and application of the extract	Cabbage	Diamond back moth
2.	Soil application of Neem and Pongamia cake (Three Times) @ 250 kg/ha	Brinjal	Shoot and fruit borer.
3.	Soil application of Neem cake @ 250 kg/ha	Cabbage	Diamond back moth
4.	Spraying of Neem soap and Pongamia soap @ 1%	Tomato, Cabbage	Tomato fruit borer (<i>Helicoverpa armigera</i>) and diamond back moth
5.	Six release of <i>Trichogramma brasiliensis</i> @ 40,000/ha at weekly intervals with the first release coinciding with 50% flowering along with 3-4 application of NPV @ 250 larval equivalents/ ha.	Tomato	Tomato fruit borer
6.	Plucking of infested leaf affected by insects from vegetable crops and spraying of Holy water of Lord Shiva Temple which contains Curd, Milk, Ghee, Honey and Basil leaves	All vegetables	Different insect pests in vegetables
7.	Mixing of Ash with the seed of vegetables and keeping in Polythenes/ Glass bottles/ Tin containers	All Vegetables seed	Storage pest
8.	Putting Bitter Guard (Karella) seed in Cow dung and Paste it on the wall inside the house	All Vegetables seed	Storage pest
9.	Neem seed kernel suspension 5%	All vegetables	Oviposition deterrent, ovicide, antifeedant and insect growth regulator.
10.	Tobacco leaf decoction @ 5 Kg / ha prepared from tobacco dust	All vegetables	Sucking pests and <i>Helicoverpa</i>
11.	Spraying of jaggery (4 kg of jaggery dissolved in 8 liters of water acts as the stock solution, which is made to 80 litres and is sufficient for one acre) solution to attract the ants for feeding on pests.	Brinjal and Tomato	Eggs and neonate larvae
12.	Spraying of cattle urine + dung extract (cattle urine 12.5 litre + dung 12.5 kg + water 12.5 litre+375 gm lime, after fermentation for four days, stock solution thus obtained is made to 80 litre will be sufficient for one acre) preferably after 3.30 P.M.	Tomato	To repel <i>Helicoverpa</i> moths
13.	Spraying of NPV @ 500 L E / ha	Tomato	<i>Helicoverpa</i>
14.	Spraying of green chilli + garlic extract @ 7.5kg chilli extracted in water (4 kg chilli should be drenched in 8 litres of water for overnight) + 1.25 Kg garlic extracted in kerosene (750 gm pounded garlic made to soak in 200 ml of kerosene for overnight) + 100 gm dissolved detergent, for one hectare.	Tomato	Repel <i>Helicoverpa</i> to lay eggs
15.	Spraying of <i>Jatropha curcas</i> (Baigava, Ratanjyothi) leaf extract.	All vegetables	Sucking pests
16.	Spraying of <i>Kochilla</i> (<i>Strychnos nuxvomica</i>) seed powder	Brinjal and Tomato	Shoot and fruit borer and <i>Heliothis</i>
17.	Spraying of Cow milk with water	Kitchen garden	Sucking and borer pest
18.	Application of Mahua (<i>Madhuca longifolia</i> (Koen)), cake in seed beds	All vegetables	Nursery pests



Training on Installation of pheromone Trap



Scientists making observation on the damage of fruit borer in Brinjal



Healthy fruits of Tomato

The role of bio-pesticides, seed treatment and botanical pesticides for promoting eco-friendly pest management is very important. It was found that the women had knowledge gap ranging from 95%-74% on the above areas. The research and extension systems should work in close cooperation to develop simple technologies in the above fields and disseminate them for their application.

Eight Technical Bulletins viz; eco-friendly pest management practices each for Cabbage, Brinjal and Tomato, Manual for Farmwomen to reduce Pesticidal Hazards Vermiculture and Biotechnology for Eco-friendly Agriculture. Four training programmes on eco-friendly pest management and vermicomposting were organized for capacity building of 175 farmwomen.



Farm women using vermi composting

2.6 Efficient Resource Management of Women Agriculture Labourers

Sabita Mishra

The study was taken up with the following objectives:

Objectives

- To make an assessment of status of women agriculture labourers (WALs) of different farming situations like irrigated and non- irrigated.
- To examine time management, family resources use and household activities of the women agriculture labourers and to find out means and ways for improvement through different human resource inputs.
- To develop a strategy on the basis of result of the study for increasing efficiency for better utilization of family resources to strengthen their socio-economic standing in the society.
- To help some selected farm women adopt the strategy and measure the extent of improvement in their socio economic levels.

After pre-testing and modifying the interview schedule data were collected from 100 (WALs) belonging to Niali block of Cuttack district (irrigated) and Dhenkanal Sadar of Dhenkanal district (non-irrigated). Respondents were selected randomly from ten villages from each situations at the rate of five respondents from each village. The analysis of data was done on the following variables.

Present living conditions of Women Agriculture Labourers in Orissa

- Majority of the WALs were from backward caste families (96%). Most of them were illiterate, having low economic and living standards, having more earning members in the family and belonged to the age group of 26-55 years.
- Majority (94%) of them were landless, 6% of them had land ranging from 2 -12 gunths. Forty per cent of the WALs took up farming in leased-in lands, maximum up to 3 acres.
- Majority of WALs perceived their health status weak which may be due to lack of nutritious food and rest before and after delivery. Even (14%) of them did not get rest on the day of delivery.

- Sometimes they went out of village, 15-20 kilometers by walking to search labour work.
- They did hard physical work in other's farm for 8-9 hours per day on working days along with household activities for another 7-8 hours. During lean period, they wasted their time by playing cards or gossiping.
- Majority of WALs lived in one or two roomed kacha and semi pucca houses. The female headship was found in 35% of the families.
- Some WALs did part time activities like mopping clay house, fuel collection for par boiling, winnowing of milled rice, rearing animals, preparation of cow dung cake, calf rearing and cowshed cleaning in others houses, they did not get any wage for the work but received help in kinds and loan.
- They had no social contact with Panchayat organizations.

1. Employment status of WALs in irrigated and non-irrigated situations of Orissa:

Table 13 : Comparison on employment status of WALs in different seasons in irrigated (Cuttack) and non-irrigated (Dhenkanal) districts

Sl.	Cuttack (N-50)			Dhenkanal (N-50)		
No.	Areas of engagement	Period of engagement	Percent age	Areas of engagement	Period of engagement	Percent age
Summer						
1.	Harvesting ground nut	8-10 days	8.00	Collection of <i>Kendu</i> leaves	20-45 days	50.00
2.	Harvesting of grams	15 days	6.00	Collection of <i>Khajuri</i> leaves	10-12 days	20.00
3.	Harvesting of sugar cane	30 days	4.00	Collection of fuel	20-30 days	60.00
4.	Bond work	20 days	4.00	Brass work	50-60 days	10.00
5.	Work in betel farm	10 days	4.00	Cow dung cake preparation	20-25 days	10.00
Winter						
1.	Harvesting of rice	15-60 days	76.00	Harvesting of rice	8-50 days	70.00
2.	Harvesting of sugar cane	30 days	4.00	Collection of <i>Kendu</i> leaves	10-15 days	30.00
3.	Harvesting ground nut	10 days	4.00	Collection of <i>Salia</i> leaves	10-20 days	5.00
4.	Sowing of green gram	8 days	8.00	Collection of fuel	15-20 days	30.00
Rainy						
1.	Transplanting of rice	24-60 days	80.00	Transplanting of rice	25-32 days	70.00
2.	Weeding of rice	7-20 days	80.00	Weeding of rice	7-30 days	80.00
3.	Application of fertilizer	8 days	4.00	Collection of fuel	15-20 days	30.00
				Collection of grass	10-12 days	10.00

The comparison between the WALs of the two different situations brought out the following differences:

- The employment of WALs in Cuttack district (irrigated) was little different from Dhenkanal district (non-irrigated) in Orissa. During summer. In Cuttack district, the WALs (4 to 8%) got employment for harvesting sugarcane (30 days), bond work (20 days), work in betel farm (10 days), harvesting ground nut and grams (15 days) while not a single WAL in Dhenkanal district got employment for a single day in farm activities. Rather, sixty percent of WALs were engaged (20 -30 days) for collection of fuel, 50% for kendu leaves for bidi making (20-45 days), 20% for palm leaves (10-12 days) for mat making, 10% in brass handicraft (50-60 days) as caste profession and another 10% in cow dung cake preparation (20-25 days) for house hold cooking purpose.
- In winter, 76% of WALs were engaged in rice harvesting (15 – 60 days) in Cuttack while 70% (8 – 50 days) in Dhenkanal. In addition, the WALs in Cuttack got employment in other field activities like sowing of green gram (8 days) and harvesting of both sugarcane (30 days) and ground nut (10 days). But, for Dhenkanal

situation, the WALs were busy in collection of kendu leaves for 10-15 days, fuel for 15-20 days and salia (khali) leaves for 10-20 days.

- In rainy season majority of WALs (80%) in irrigated and (70%) in non-irrigated situations were employed in transplanting for 24 - 60 days and 25-32 days respectively. In both the situations 80 % of WALs were engaged in weeding. However, in irrigated situation 4% of WALs were found in fertilizer application (8 days) but none of the WALs were involved in this activity in non irrigated tract. The WALs were found more in collection of fuel and grass which was not found in irrigated tract.

2. Factors perceived by WALs affecting their efficiency:

The discussion held with the WALs during pilot study has helped to identify the following factors affecting their efficiency. The perception of the respondents is presented in the Table 14.

Table 14 : Factors perceived by WALs for their efficiency

N =100

Sl. No.	Factors	Whether affecting or not		Contributing to the efficiency			Harming the efficiency		
		Yes (%)	No (%)	Much (%)	Moderate (%)	Little (%)	Much (%)	Moderate (%)	Little (%)
1.	Health	58	42	-	6	-	42	10	-
2.	Wage rate	100	0	14	-	-	86	-	-
3.	Family pressure	68	32	-	-	-	58	10	-
4.	Family support	60	40	2	6	-	38	14	-
5.	Use of labour saving devices	52	48	8	4	-	16	22	2
6.	Extent of use of leisure time	74	26	-	6	-	64	4	-
7.	Distance	60	40	-	-	-	36	24	-
8.	Attitude	42	58	-	8	-	32	-	2
9.	Seasonal work	34	66	-	10	6	10	8	-
10.	Contractual work	38	62	2	8	2	14	10	2
11.	Inter-personal relationship	52	48	-	2	-	32	16	2
12.	Other incentives	10	90	2	-	-	2	6	-
13.	Age	62	38	6	2	4	30	16	4
14.	Experience	18	82	12	-	-	6	-	-
15.	Skill	10	90	8	-	2	-	-	-
16.	Cultural factors	42	58	2	2	-	34	4	-

The perception of WALs as presented in the above table revealed that the wage rate was the most important factor (100%) affecting their efficiency. 86% women perceived their wage rate low which had reduced their efficiency. The rest 14% expressed the wage rate "good" which is contributed much for their efficiency. The major factors (where more than 50% respondents affected) affecting the efficiency were use of leisure time, family pressure, age, family support, distance, health, use of labour saving devices and inter-personal relationship. The other minor factors were skills employment, other incentives, experience, seasonal work, contractual work, cultural factor and attitude. One interesting finding to state here is that majority of WALs perhaps had not acquired or used the skills in farming. Those WALs (10%) who used their skills in farming perceived the skills contributing for their efficiency. The findings suggest that women agricultural labourers of Orissa should be exposed to skill learning for farm activities particularly in using labour saving devices so that they can get more demand as well as contracts for farm work. The women agricultural labourers from irrigated and non-irrigated of Andhra Pradesh will be studied and compared with the findings of Orissa state.

2.7 Studies on sustainable aquaculture packages for empowering rural women

P.K.Sahoo & B.N.Sadangi

Objectives

- To assess the availability of inputs with different category of farmwomen and develop the cultural practices accordingly to maximize the production.
- Capacity building of the women in aquaculture through trainings and demonstration and personal contact.
- To analyze the perceptions of the women regarding productivity of the packages and factors associated with sustainable aquaculture.

The project was launched in 3 villages namely Bisuniapada, Panikata and Singrisasan of Balipatna Block, Khurda district. Thirty five women beneficiaries belonging to general and Schedule caste were included. Nine ponds covering approximately 0.32 hectare were taken under the project.

Table 15: Location and area of selected ponds

Sl. No.	Village name	No. of group	No. of women participants	Caste category (Backward/ general)	No. of ponds	Pond area (m ²)
1.	Bisuniapada	1	10	General	2	443
2.	Panikata	1	12	Backward	2	800
3.	Singri	1	7	General	3	1448
4.	Sasan	1	6	Backward	2	502.5
	Total	4	35		9	3193.5

Aquaculture practices selected under recommended and low cost package of practices

- Two aquaculture package of practices, (a) recommended and (b) low cost method, developed in consultation with CIFA and local stakeholders where used
- In recommended package of practice scientific methods of carp culture was followed whereas in low cost method pond fertilization and feed management were undertaken as per the locally available materials i.e., instead of chemical fertilizer only cow dung was used for fertilization, secondly feeding was done mainly by kitchen waste, rice bran and other agricultural byproducts.
- Each group had minimum two ponds, one for low cost intensive and the other for recommended package of practices. Participating women were given hands on training to carry out different activities.

Harvesting of the pond will be undertaken during the month of May 2005.

Difficulties faced in the field

- Non-availability of pond for the women group to try different package of practices.
- Operationalizing a moderate cost intensive package of practice quite different from low cost intensive was found difficult.
- Ponds available with the women groups were often not comparable
- In the changed scenario of water uses, women were found accustomed in cleaning utensils by using water from the tube wells, which hampered the application of kitchen waste in the pond.

2.8 Database on gender in agriculture

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

Objectives

To create a database on:

- Gender participation in farm-household systems
- Access to and control over different resources, extent of utilization of resources/inputs, time use in different activities
- To characterize the farm women and their farming, and socio-economic environment for variation in their participation

The result presented below is based on data from 70 households collected from three villages in Nimapara block of Orissa. All the households covered belonged to SC category of amongst then 38.5% were landless and rests were having marginal land holding with 45.7% of sample households having land holding less than 0.25ha and 85.7% of households getting some leased-in land to cultivate. Agriculture wage labour was the primary occupation of the households. In 90% of households both men and women worked as agricultural laborers and 7.0% of households were women headed.

Gender participation in household chores and other productive activities was influenced by apart from other factors, structure and size of household. Women were found to contribute on an average 7.2 hrs per day whereas men contribute 1.6 hrs per day to household activities. The burden of household activities fell heavily either on married young and middle aged women or on unmarried young girls. Number of women in a family was also a determinant of the actual work burden on a woman.

In livestock owning households that account for 77% of sample households, participation of men in livestock related activities were found to be more than that of women. This finding contradicts the normally accepted hypothesis that participation of women in livestock related activities was more. Importantly, it was the elderly male member of the household or old man that takes care of the livestock, particularly cattle. Hence it is the family structure and the type of household that decides the gender participation in livestock.

Regarding gender participation in crop related activities, there was some clear cut division of labour along gender lines with some common activities for both men and women. Intra-household difference in contribution to crop activities was discernable. It was observed that while a woman was engaged on an average for 138 days in a year in crop-related activities including post harvest activities as against only 98 days in case of a man. Technological changes are often the factors creating differential opportunities for men and women

Access to resources and services is an important dimension that makes gender difference or inequality more pronounced.

Poor households do have access to certain resources that are not even owned by them, particularly physical resource. Importantly women also enjoy such access. But men are at an advantageous position so far as access to agricultural implements are concerned. Poor access of households to extension and training is clearly discernible. Only 35% of men were aware of the agriculture extension agents and their role. But none felt the need of their services. Women were not aware of agriculture extension agents but quite aware of the health workers and benefited from them. Similarly gender difference with respect to access to credit was quite visible. Men were quite aware of the institutional sources of credit and 30% of men have availed institutional credit facilities. For individual woman, it was the self-help-groups that mostly serve as a source of credit. This was because over 80% of women were organized into Self-Help-Groups. But the question is "if mere access to certain resources is enough"? Certainly, access to resources must be seen in the context of gender responsibilities, gender need and opportunities.

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

L.P.Sahoo

The study was taken up with the following objectives:

Objectives

- To assess the extent of deterioration in quality of farm saved seeds and the concern of men and women in this regard of major crops.
- To collect various invigoration techniques available and determine potentiality of its application by farm women, employing checklist and conducting lab experiments.
- To refine the invigoration techniques which are socio-economically relevant and sustainable with the participation of farm women.
- To train the women on the identified invigoration techniques and study the changes in the seed maintenance behaviour

As a preliminary step, data were collected from 20 farm women to understand the present status in use of invigoration techniques. It was found the farm women used popularly invigoration techniques in cucurbits and rice.

- i. Cucurbitaceous vegetables are soaked in extract of fermented rice for enhancing germination process
- ii. Rice is pre germinated before sowing

To start the experiment freshly harvested seeds of five cultivars of finger millet were collected from research station of OUAT. The varieties were Divyasingha, Bhairabi, Chilika, Neelachal and Subhra. Germination percentage was tested and seeds were stored in ambient conditions.

Six month old seeds of finger millet were collected from farmers and tested for germination percentage and stored. It is proposed to treat the seeds by both recommended and local practice of invigoration by using locally available materials.

2.10 Standardization of weaning mix using different proportions of sweet potato

Abha Singh & Archana Mukherjee

Objectives

- To identify various feeding practices of children, traditional weaning mix and assess their nutritional value in rural and backward areas of Orissa.
- To identify protein and vitamin A rich locally available food materials suitable for non-traditional weaning mixes and assess their nutritive value, palatability and acceptability.
- To standardize the methodology for the preparation of non-traditional protein and vitamin A rich weaning mix for children.
- To disseminate the methods of preparation of weaning mixes through training and demonstration in rural areas.

Data were collected from Puri and Khurda districts comprising of four Blocks Pipili, Nimapara, Bhubaneswar and Balipatna. One village was selected from each block and from each village 25 respondents were selected randomly and interviewed.

Table 16 : Profile of the mothers

N = 100

Profile	Category (years)	Percentage
Age	20-25	17
	25-30	51
	30-35	23
	35-40	09
Education	Illiterate	14
	Primary	64
	High school	16
	Graduate	06
	Post graduate	-
Religion	Hindu	75
	Muslim	25

Majority of women of sample belonged to 25 – 35 age group, having primary education and Hindu population. Each mother had one child. Out of the infants 37% were in the age group of 0 – 6 months and 63% in the age group of 6 months to 1 year.

Table 17 : Distribution of infants as per their onset of weaning

N = 100

Sl.No.	Age of onset of weaning	Percentage
1.	Less than 4 months	18
2.	4-6 months	22
3.	6-8 months	26
4.	8-12 months	30
5.	More than one year	4
	Total	100

From population of 100 infants, 60 infants (60%) were exclusively breast fed for the period of 6 months where as 18% were exclusively breastfed for less than 2 months only. Four percent infants were exclusively breastfed up to one year. Up to 6 months only liquid food like cow's milk, powered milk, water and honey were given to the infants. It was also observed that exclusively breastfed infants were nutritionally normal in comparison to partial breastfed infants up to the age of 6 month. (Table 18).

Table 18 : Matrix ranking regarding common weaning foods given to the infants

Sl.No.	Common weaning foods	Matrix ranking
1.	Roasted chura powder + milk + sugar	I
2.	Boiled sago with salt	X
3.	Lactogen(powdered milk)	II
4.	Cow's milk	V
5.	Cerelac	IV
6.	Rice water +soft rice +boiled potato	III
7.	Soft boiled rice + dal	VII
8.	Boiled rice + boiled vegetable	VI
9.	Sattua	IX
10.	Biscuit + milk	VIII

Matrix ranking was done to know the common weaning foods given to the infants and it was found that roasted flakes (chura) powder + milk + sugar was the most preferred weaning food followed by rice water + soft boiled rice + dal and so on. It was also observed that studied families prefer Lactogen (powdered milk) in relation to cow's milk with the belief that cow's milk causes cough and cold problem in infants (Table 19).

Table 19 : Matrix ranking regarding common weaning foods given to the infants

N = 100

Sl.No.	Category	Percentage
1.	Up to 6 month only breast milk	60
2.	Up to 6 month breast milk + outside milk	10
3.	Up to 6 months breast milk + other solid foods	30
4.	Up to one year only milk (breast +Lactogen or cow's milk)	15
5.	Up to one year milk + solid food	85
	Total	100

After the age of 4-5 months mother's milk alone is not sufficient to sustain growth and development of infants due to increased demand of protein and calorie. Feeding pattern and quantity of food given to the infants was also studied. It was found that up to the age of 6 months only 30% infants were getting some solid foods along with mother's milk and 15% were getting only milk(mother's milk + Lactogen / cow's milk) up to one year which could meet the requirement of protein, calorie and other nutrients of the infants. Quantity wise majority of infants (47%) were getting 40-60 gm in one serving. (Table 20 - 21).

Table 20 : Distribution of infants as per the quantity of food given to them in one serving

N = 100

Sl.No.	Quantity	Percentage
1.	20-40g	07
2.	40-60g	47
3.	60-80g	13
4.	80-100g	33
	Total	100

Table 21 : Distribution of infants according to the frequency of weaning foods given to them

N = 100

Sl.No.	No. of times	Percentage
1.	2 times in a day	3
2.	3 times in a day	33
3.	4 times in a day	39
4.	5 times in a day	20
5.	6 times in a day	5
	Total	100

Frequency of the weaning foods given to the infant was also studied and it was found that majority of the infants i.e. 39% were getting outside food 4 times in a day and only 2% were getting two times in a day (Table 22).

Table 22: Locally available foods used in the preparation of weaning foods

1.	Cereal	Rice and rice products
2.	Pulse	Moog, urd, gram
3.	Oil seeds	Til, groundnut
4.	Millets	Ragi, bajra
5.	Vegetable	Green leafy vegetable and almost all other vegetable
6.	Fruits	Banana, papaya (available throughout the year
7.	Tubers	Yam, sweet potato, potato

All the foods available in the locality were found nutritionally rich. Rice and tubers are rich in energy, mung and urd in protein, til and groundnut in fat, vegetables and fruits in vitamins and minerals. It was decided to use the above food in preparation of balanced weaning food for proper nourishment of the infants (Table 22). Besides the above single food items used in the infant feeding different combinations were observed during study. The most preferred weaning food in the studied families was roasted chura (flakes) powder + milk

+sugar and soft boiled rice +boiled potato. These weaning foods were deficient in protein, fat, vitamin A and other nutrients which were very much required for growing infants.

As the sample consists of 25% mothers belonging to Muslim religion it was point of interest to understand their feeding practices. They did not give colostrums to the newborn infants. They gave breast milk to the infants after three days. Before that they gave water and honey to them. It was also observed that Muslim mothers did not give chura powder or other solid foods to their infants. They mostly gave only milk up to one year.

Most of the families preferred Lactogen (powdered milk) to cow's milk with the belief that cow's milk may causes cough and cold problem in infants. Poor families due to money problems gave diluted and contaminated milk to their infants which caused diarrhea and under nutrition. The preferred processes for preparation of weaning foods were Roasting, Grinding and Boiling. Important constraints in serving weaning foods were poverty, non-availability of foods and ignorance.

Standardization of weaning mix

Based on the availability and common weaning food, some combinations of mixes were tried out. A mix consisting of sweet potato (var. Gouri rich in vitamin A), green leaves (amaranthus) and potato was planned by considering the requirements for a balanced weaning mix. The methodology suitable for dehydration was followed to dehydrate all the constituents of the mix. All the dehydrated constituents kept separately in airtight containers and polythene bags to study the possible degradations. It was found that sweet potato and potato chips could be kept in good condition up to one year in airtight container and green leaves up to 6 months in polythene bags. By making use of the above ingredients a low cost weaning mix will be developed and tested.

2.11 Micro propagation of pointed gourd (*Trichosanthes dioica* Roxb) for empowerment of women

Bharati Killadi & Archana Mukharjee

Objectives

- Collection and evaluation of 10 local varieties of pointed gourd.
- Standardization of *invitro* techniques for micro propagation of the improved lines.
- Evaluation of role of farmwomen in pointed gourd farming.
- Different cultivars of pointed gourd were collected to study their characters which would provide useful information in developing a suitable line, micro-propagation techniques and women empowerment.

Table 23 : Plant characteristics

Sl.No. of cultivars	Place of collection	Observations on plant characters
1	Bolobhadrapur	Leaves medium size, round, green colour and medium internode length.
2	Padampur	Small leaves, round, green colour and small internode length.
3	Khamang Sasan	Small leaves, elongated, green colour and long internode.
4	Podona	Small, pale green and round leaves with small internode length.
5	Kopasi	Big, round, pale green leaves and long hairy internodes.
6	Kulojalarpur	Cordate shaped, big leaves and light green in colour with long internode.
7	Sodoso	Small, light green and round leaves with medium internode length.
8	Pohanga	Elongated and light green leaves with medium internode length.
9	Santhapur	Cordate shape, small leaves and dark green in colour with small internode.
10	Barang	Big elongated, dark green leaves and hairy long internode.

During collection of the local cultivars the cultural practices followed for growing the crop in the locality were also collected.

Table 24 : Indigenous cultivation practices followed in Pointed gourd (*Trichosanthes dioica*)

Sl.No	Activities	Cultural practices
1	Planting time	Mid February to March
2	Planting material	Roots along with 2-3 nodes of the vine
3	Planting method	Centre of the ridge width 1m-1.5m.
4	Planting distance	1.5m -2.0m
5	Cultural practices	Flood irrigation, weeding, fertilizer application and harvesting. Replanting is done only after two years.

The experiment was laid out in the institute farm. Ten local cultivars were planted in randomized block design (RBD) for evaluating the yield potential and other distinguishable characters.

2.12 Involvement of farm women in agriculture and allied activities in the state of Madhya Pradesh

S.P.Singh & Nirmal Kumar

To examine the involvement of farm women in various farm operations, to know the types of tools/ equipment/ machine used by them and to get information on their working pattern and drudgery status, the survey work is in progress to get this information from about 10000 farm women in twelve districts of Madhya Pradesh. Till date, household survey data of 7346 farm women from 206 villages of ten districts namely, Bhopal, Sagar, Rewa, Guna, Narsinghpur, Chhindwara, Shahdol, Balaghat, and Chhatarpur have been compiled and analysed. Major crops during Kharif season was soybean in Bhopal, Sagar, Guna, Narsinghpur, Chhindwara, and Chhatarpur districts while rice was the major crops in Kharif season in Rewa, Shahdol and Balaghat districts. Wheat was the major crop for all the above-mentioned surveyed districts in rabi season. The farm women were utilizing 5.3 h/ day in agricultural activities. The utilization of time in agriculture varied from 3.5 h to 7.3 h during lean to active seasons.

Table 25 gives the brief information about the survey of farm women/households in the ten districts of the state. Data of farm women's involvement in various agricultural operations and details of possession and operation of improved farm machinery are given in Table 26 and 27. The data showed that

- The farm women were utilizing 5.3h/day in agricultural activities. The utilization of time in agriculture varied from 3.5 ha to 7.3 ha during lean to active seasons.
- 53.5 % farm women showed keen interest in taking training on agriculture related topics in composite manners whereas 42.3 % farm women showed their interest in taking training on non-agricultural activities.
- The maximum involvement of farm women was 77.3 % in drying & storage followed by 73.9 % in interculture, 72.1 % in harvesting, 65 % in sowing/ planting, 55.5 % FYM application, 54.6 % in carrying crops from field to threshing yard, 53.2 % in grain carrying, 50.5 % in preparatory tillage and grading grains, 49.6 % in threshing, 42.9 % in seed treatment, 41.7 % in winnowing, 34.5 % in shelling/ decortication, 31.9 % in fertilizer application, 29.9 % in irrigation and 19.7 % in spraying.
- Involvement of marginal and small categories of farm women was maximum in all the field operations.
- Wheel hoes were possessed by 19.2% households followed by threshers (15.2 %), maize sheller (13.4 %), tractors 11.3 %, tractor-operated cultivators (11.2%), tractor-operated seed drills (9.6 %), groundnut decorticators (2.5 %), seed treatment drums (2.4 %), and 0.9 % cleaner-graders.
- 14.9% farm women operated wheel hoes whereas 13.0 % farm women worked with threshers, 12.2 % with maize shellers, 2.6 % with groundnut decorticators & seed treatment drums, 0.9 % with tractors and 0.7 with cleaner-graders

Table 25 : General information of survey conducted in the selected districts of Madhya Pradesh

Particulars/ Categories	General Information in %						
	Land less	Marginal	Small	Semi-medium	Medium	Large	Mean
Farm women surveyed, %	18.6	22.5	21.6	19.3	9.6	8.3	
Age, years	36.1	38.6	40.2	40.7	42.7	43.5	40.3
Land holdings, ha		0.736	1.563	3.075	5.073	8.396	2.814
Possession of bullock carts, %	7.7	24.3	32.0	35.0	36.3	32.5	26.8
Possession of metallic bin, %	4.8	12.3	14.9	18.4	22.4	27.8	14.9
Availability of biogas plants, %	1.0	4.6	7.7	9.6	12.5	19.1	7.5
Visit to agril. fair etc., %	12.1	18.6	22.4	20.5	22.3	23.4	19.3
Entrepreneurial activities, %	4.6	5.7	7.0	5.7	9.1	6.6	6.2
<i>Training needs of women</i>							
• Agricultural topics	47.9	54.3	55.0	55.1	53.0	54.3	53.3
• Non-agril. topics	42.4	42.5	43.4	41.2	39.8	45.3	42.3
<i>Farm women's awareness about extension officials</i>							
• Agricultural	82.7	86.2	85.5	83.7	87.4	88.3	85.2
• Aaganwadi workers	86.6	85.9	87.0	86.6	89.8	90.8	87.2

Table 26 : Category-wise data of farm women regarding their Involvement in various agricultural operations in selected districts of Madhya Pradesh

Agricultural operations/ Categories	Involvement of Farm Women in %						
	Land less	Marginal	Small	Semi-Medium	Medium	Large	Mean
Preparatory tillage	49.1	58.9	50.5	47.7	47.0	41.4	50.5
FYM application in field	52.0	62.3	59.3	54.3	50.4	43.2	55.5
Fertilizer application	24.3	35.4	35.6	31.6	33.3	29.5	31.9
Seed treatment	30.9	44.4	47.1	45.8	44.7	46.0	42.9
Sowing/ planting	61.5	67.8	66.5	67.7	62.4	58.2	65.0
Interculture	71.6	77.3	76.4	74.2	71.8	62.1	73.9
Irrigation	17.9	32.7	34.4	30.8	33.3	31.1	29.9
Spraying	13.5	20.5	20.4	21.3	21.3	23.6	19.7
Harvesting	72.5	76.9	72.6	70.1	72.5	61.4	72.1
Carrying crops to threshing yard	53.2	60.4	57.5	53.7	53.3	37.7	54.6
Threshing	44.8	54.8	51.4	48.6	50.8	43.0	49.6
Winnowing	35.7	47.6	43.4	41.8	40.0	36.4	41.7
Shelling/ decortication	29.2	31.2	35.4	38.4	40.0	37.6	34.5
Grading grains	43.5	50.5	53.7	54.7	49.6	49.4	50.5
Grain carrying	54.6	59.2	52.5	52.0	50.4	41.4	53.2
Drying & storage	62.1	79.2	80.4	83.5	80.7	79.9	77.3

Table 27 : Possession of improved agricultural machinery by the households in Madhya Pradesh.

Improved Agricultural Machinery/ Categories	Possession of Improved Farm Machinery in %						
	Land less	Marginal	Small	SemiMedium	Medium	Large	Mean
Tractor	0.3	1.7	6.1	14.3	29.2	48.3	11.3
Tractor-operated cultivator	0.3	1.7	5.9	14.1	28.5	48.1	11.2
Seed treatment drum	0.3	1.2	1.8	4.0	3.7	6.4	2.4
Tractor-operated seed drill	0.3	1.4	5.1	12.8	26.0	38.7	9.6
Wheel hoe	7.8	15.6	20.2	23.3	26.7	33.8	19.2
Maize Sheller	3.6	11.5	13.4	16.9	20.6	24.1	13.4
Groundnut Decorticator	3.3	1.3	2.1	2.5	3.4	4.8	2.5
Thresher	2.3	5.0	10.4	20.4	35.5	48.4	15.2
Cleaner-grader	0.4	0.4	0.6	0.6	2.3	3.0	0.9

Table 28 : Operation of improved agricultural machinery by the farm women in the selected districts of Madhya Pradesh.

Improved Agricultural Machinery/ Categories	Operation of Improved Agricultural Machinery in %						
	Land less	Marginal	Small	Semi-Medium	Medium	Large	Mean
Wheel hoe	13.2	17.1	15.8	15.8	15.2	14.8	14.9
Thresher	14.8	14.6	13.8	13.8	14.9	9.6	13.0
Maize Sheller	9.1	10.5	11.9	11.9	15.3	16.8	12.2
Seed treatment drum	1.9	2.2	2.4	2.4	4.0	3.8	2.6
Groundnut Decorticator	1.8	2.2	2.3	2.3	3.4	3.8	2.6
Tractor	0.1	0.5	0.5	0.5	1.8	2.0	0.9
Cleaner-grader	0.5	0.5	0.4	0.4	0.4	2.1	0.7

2.13 Ergonomical evaluation of manually operated Cleaner Grader, Seed Drill, Fertilizer Broadcaster and Ridger with women workers

S.P.Singh

Following farm equipment were evaluated ergonomically to assess their suitability for farm women:

1. Ergonomical evaluation of manually-operated CIAE Hanging Type Cleaner with women workers

The equipment was refined on the basis of observations recorded during the period 2003-04. The equipment was operated with women workers for cleaning soybean grain obtained after threshing. The mean heart rate of the women worker was 103.1 beats/min with increase in heart rate over rest of 19.9 beats/min. Total time required/batch of 8 kg. soybean was 2.15 min. The output per hour was found to be 184.2kg.



Ergonomical Evaluation of refined hanging type cleaner with women worker.

2. Ergonomical evaluation of cleaning basket (supa) with women workers

Five women workers participated in the cleaning soybean with supa. The mean values of age, height and weight of women worker was 38.4 ± 9.1 years, 151.3 ± 2.2 cm and 54.5 ± 7.6 kg, respectively. The dry bulb temperature, wet bulb temperature and relative humidity during the trials were 36.8 ± 1.6 °C, 24.4 ± 2.4 °C and 37.3 ± 10.4 %, respectively. The duration of trial was of 2.5 hours. The experimental results are given in Table 29.



Measurement of heart rate and oxygen consumption of women worker using metamax energy measuring equipment

3. Ergonomic evaluation of CIAE pedal-operated cleaner-grader with women workers

CIAE pedal operated cleaner-grader was tried for cleaning soybean with women workers. After doing the needful, it was observed that the farm women were not able to operate this design of pedal-operated cleaner-grader even for 10 minutes. This might be due to the following reasons:

- The aerobic capacity of women is 75 % of men, i.e. 1.5l/min.
- The strength of women is 2/3rd of men.
- They were not habitual to cycling.

Therefore, at present it is not recommended for farm women.

Table 29 : Data on ergonomical evaluation of winnowing basket (Supa) with women workers for cleaning soybean.

Sl. No.	Particulars	Details
1.	1000 grain weight, g	83.64
2.	Size of grain (length x breadth x thickness), mm	5.36 x 5.33 x 3.72
3.	Moisture content of grain, % d.b	11.47
4.	Time required in cleaning soybean/batch of 1.5 kg, min	3.3 ± 1.2
5.	Number of horizontal stroke/batch	65.5 ± 29.0
6.	Number of vertical stroke/batch	99.4 ± 46.1
7.	Frequency of horizontal stroke/batch	3.5 ± 1.1
8.	Frequency of vertical stroke/batch	6.0 ± 2.5
9.	Frequency in change of posture during trial	3.8 ± 2.0
10.	Output, kg/h	24.5 ± 7.1
11.	Overall discomfort score (0-10 scale)	3.5 ± 2.2
12.	Working heart rate, beats/min	93.5 ± 9.9
13.	Increase in heart rate over rest, beats/min	9.7 ± 4.5
14.	Oxygen consumption rate during working, l/min	0.384 ± 0.132
15.	Increase in oxygen consumption over rest, l/min	0.110 ± 0.080

Mean working heart rate of women worker was 93.5 beats/min with oxygen consumption of 0.384 l/min. The increase in heart rate over rest (Δ HR) was 9.7 beats/min with oxygen consumption rate (OCR) of 0.11 l/min. The capacity per hour was found to be 24.5 kg.

4. Ergonomically evaluation of refined manually-operated fertilizer broadcaster with women workers

A commercially available manually operated fertilizer broadcaster was ergonomically evaluated for broadcasting urea with 11 women workers in year 2003-04. Based on the observations and feed back received from the farm women, the commercially available fertilizer broadcaster was refined to make it suitable for farm women. Anthropometric data of women workers collected under AICRP on Ergonomics and Safety in Agriculture were used for refinement of broadcaster.

The specifications of the refined fertilizer broadcaster in comparison commercial fertilizer broadcaster are given below in Table 30.

Table 30 : Specifications of refined and commercially available manually operated fertilizer broadcaster

Sl. No.	Particulars	Dimension for Broadcasters Commercial	Refined
1.	Length of Hopper, mm	290	190
	Ratio of dia to length of hopper	0.83	1.26
	Shape of hopper bottom	Conical with a slope of 26.5°	Conical with slope of 30°
	Lid over Hopper	Yes	Yes
	Peeping hole dia, mm	No	950
	Capacity of hopper, l	12.5	10
2.	Tare weight of broadcaster, kg		
	• With belt	4.0	3.5
	• Without belt	3.7	3.2
3.	Crank length, mm	185	150
4.	Handle size, mm	30 mm dia & 105 mm length of plastic handle	30 mm dia & 105 mm length of plastic handle
5.	Total length of broadcaster, mm		
	• Crank handle is at top	450	350
	• Crank handle is at bottom	610	475
6.	Length of belt for cross-mounting the broadcaster, mm	850 mm for hanging on neck	1140 with cushioning pad to provide support on shoulder

The refined fertilizer broadcaster was again evaluated ergonomically with six women workers for broadcasting urea in the field before sowing wheat. The mean values for age, stature and weight of the women were 34.0 ± 6.8 years, 152.4 ± 3.7 cm and 48.0 ± 8.7 kg, respectively. The dry bulb, wet bulb, globe bulb temperatures and relative humidity were 29.2 ± 0.7 °C, 17.9 ± 0.4 °C, 43.7 ± 4.7 °C and 33.3 ± 3.6 %, respectively during the experiment. The air velocity was in the range of 0.25-1.2 m/s. The data obtained during trial with refined fertilizer broadcaster and that of original broadcaster are given in Table 31. Using paired t-test, it is found that there was no significant difference at 5 % level between the data of speed of subject and crank revolution of both the fertilizer broadcaster. The mean heart rate of the subject was found to be 133.5 beats/min with refined fertilizer broadcaster while it was 146.6 beats/min during broadcasting operation with original broadcaster. The mean increase in heart rate over rest (Δ HR) was found to be 48.7 beats/min with refined fertilizer broadcaster while it was 65.5 beats/minute with the original broadcaster. It is observed that the increase in heart rate over rest (Δ HR = 48.7 beats/min) was significant lower with refined fertilizer broadcaster than original fertilizer broadcaster (Δ HR = 65.5 beats/min) at 5% level. The area covered and swath width was same i.e. 5.0 m and 1.15 ha/h respectively. The women workers liked the refined broadcaster. The force required to rotate the crank for broadcasting urea @ of 100 kg/ha was observed to be 20.3 ± 7.4 N.



Ergonomical evaluation of refined fertilizer broadcaster with women

Table 31: Data of women workers during the operation of manually operated refined and commercially fertilizer broadcasters for broadcasting urea.

Sl. No.	Particulars	Fertilizer Broadcasters	
		Original	Refined
1.	Urea filled in hopper, kg	9.0	5.0
2.	Speed of worker, km/h	4.0 ± 0.3	3.9 ± 0.5
3.	Crank revolution, rpm	42.2 ± 7.6	37.8 ± 6.5
4.	Speed of spreading disc, m/min	426.7 ± 72.6	382.7 ± 65.7
5.	Working heart rate, beats/ min	146.6 ± 13.3	133.5 ± 17.7
6.	Increase in heart rate over rest, beats/min	65.5 ± 16.8	48.7 ± 13.6

Thus, the physiological workload with refined fertilizer broadcaster has been reduced by 25.6 % as compared to commercially available fertilizer broadcaster. The refined broadcaster has been found suitable for women workers.

5. Ergonomical evaluation of refined manually-operated CIAE seed cum fertilizer drill with women workers

CIAE seed cum fertilizer drill was ergonomically evaluated with women workers for sowing wheat only in year 2003-04. Based on the observations and feed back received during the trials, the seed drill was refined using anthropometric data. The specifications of refined and original CIAE seed drills are given in Table 32.

Table 32: Specifications of refined and original CIAE seed cum fertilizer drills

Sl. No.	Particulars	CIAE Seed drill	
		Original	Refined
1.	Overall dimensions (lxwxh), mm	1960x700x815	870x415x945
2.	Total handle height from ground, mm	800	945
	Length of handle grip, mm	195	215
	Angle of push (handle) at ground level, °	60	76
3.	Furrow opener		
	• Type	Shoe	
	• Length, mm	205	215
	• Width of boot, mm	55	35
4.	Size of harness [lxw], mm	1185x 165-770	Hooks for pulling through rope
5.	Weight of seed drill, kg	11.3	10.3

The refined CIAE manually-operated seed cum fertilizer drill was evaluated ergonomically with six women workers for sowing of wheat only. Mean values of age, height and weight of the subjects were 34.3 ± 6.8 years, 152.0 ± 3.8 cm and 50.2 ± 7.8 kg, respectively. Mean dry bulb temperature, wet bulb temperature, relative humidity, globe temperature and air velocity during the trials was 28.0 ± 0.8 °C, 18.5 ± 0.8 °C, 40.2 ± 5.9 % , 44.4 ± 2.0 °C and 0.8 to 1.7 m/s, respectively during the experiment. The soil moisture content, bulk density and clod mean weight dia was $12.68 \pm 2.87\%$ (db), 1.02 ± 0.04 g/cc and 19.8 ± 13.1 mm, respectively.



Ergonomical evaluation of refined CIAE seed-cum-fertilizer drill with women workers

Two subjects were engaged for operation of seed drill in the field, i.e., one for pulling and another for pushing. Irrigation was provided just after sowing of wheat in the field. The experimental results are given in Table 33.

Table 33. Comparative data on ergonomical evaluation of refined and original CIAE seed cum fertilizer drills with women workers

Sl. No.	Particulars	Details of CIAE seed cum ferti drills	
		Refined	Original
1.	Walking speed of subject, km/h	2.5 ± 0.3	2.55 ± 0.52
2.	Effective field capacity, ha/h	0.043 ± 0.005	0.054 ± 0.012
3.	Row spacing, mm	239 ± 1.3	269 ± 28.4
4.	Seeding depth, mm	43 ± 7.5	42 ± 6.2
5.	Average plant populations/m length	45	49
6.	Pull force required, N	83.39 ± 7.85	125.6 ± 8.34
7.	Push force required, N	31.49 ± 5.89	25.31 ± 7.1
8.	Working heart rate, beats/min		
	• Pull	134.8 ± 10.2	147.5 ± 18.5
	• Push	118.9 ± 8.8	132.4 ± 16.4
	• Mean	126.9 ± 6.4	139.9 ± 11.6
9.	Increase in heart rate over rest, beats/min		
	• Pull	45.6 ± 7.9	59.2 ± 11.7
	• Push	27.9 ± 10.3	42.2 ± 9.4
	• Mean	36.7 ± 8.2	50.7 ± 7.4

The mean heart rate of women workers (pulling and pushing mode) during operation of refined CIAE seed cum fertilizer drill was found to be 126.9 beats per minute against 139.9 beats/min with original seed drill. The increase in heart rate over rest was 36.7 beats per minute with refined seed cum fertilizer drill whereas it was 50.7 beats per minute with the original drill. It is observed that the mean working heart rate (pulling+ pushing mode of operations) of women workers was significantly lower (127 beats/min) with refined CIAE seed cum fertilizer drill at 5 % level than original (140 beats/min) CIAE seed cum fertilizer drill. The women workers liked the refined seed drill. The increase in heart rate over rest (Δ HR) was also found significant less in pulling mode, pushing mode and pulling + pushing mode of operation with refined CIAE seed cum fertilizer drill than original. The area covered with the refined seed cum ferti drill was 0.043 ha/h.

Thus, the physiological workload with refined CIAE seed cum fertilizer drill has been reduced by 27.6 % as compared to original.

6. Ergonomical evaluation of refined manually-operated PAU seed drill with women workers

PAU seed drill was ergonomically evaluated with women workers for sowing wheat in year 2003-04. Based on the observations and feed back received during trials, the seed drill was refined using anthropometric data of farm women. The specifications of refined seed drills in comparison to original are given in Table 34.

The refined seed drill was ergonomically evaluated with six women workers for sowing wheat variety Malwa Shri [HI: 8381] during rabi season of year 2004-05. Mean values of age, height and weight of the subjects were 34.3 ± 6.8 years, 152.0 ± 3.8 cm and 50.2 ± 7.8 kg, respectively. Mean dry bulb temperature, wet bulb temperature, relative humidity, globe temperature and wind velocity was 29.3 ± 1.3 °C, 17.8 ± 0.7 °C, 34.8 ± 5.3 %, 44.4 ± 2.1 °C, respectively during the experiment. The air velocity was in the range 0.25 to 1.37m/s. The soil moisture content, bulk density and clod mean weight dia was 12.68 ± 2.87 % (db), 1.02 ± 0.04 g/cc and 19.8 ± 13.1 mm, respectively. Two subjects were engaged for operation of seed drill in the field, i.e., one for pull and for push. Irrigation was provided just after sowing wheat in the field. The experimental results are given in Table 35.



Ergonomical evaluation of refined PAU seed drill with women workers

Table 34: Specifications of refined and original PAU seed drills

Sl. No.	Particulars	Details of CIAE seed cum ferti drills	
		Original	Refined
1.	Overall dimensions (lxwxh), mm	1350x545x1050	1180x545x1040
2.	Total handle height from ground, mm	1010	1050
	Handle height from handle grip to ground, mm	1030	890
	Length of handle, mm	994	950
	Angle of push (handle) at ground level, °	50	48
	Weight of seed drill, kg	13.2	12.7

Table 35. Comparative data on ergonomical evaluation of refined and original PAU seed drills with farm women.

Sl. No.	Particulars	Details	
		Refined	Original
1.	Walking speed of subject, km/h	2.5 ± 0.3	2.56 ± 0.23
2.	Effective field capacity, ha/h	0.046 ± 0.005	0.054 ± 0.01
3.	Row spacing, mm	24.8 ± 19.4	263 ± 23.5
4.	Seeding depth, mm	43 ± 7.8	4.1 ± 0.9
5.	Average plant populations/m length	45	49 ± 9.7
6.	Pull force required, N	79.26 ± 4.81	84.37 ± 11.87
7.	Push force required, N	34.43 ± 2.84	45.43 ± 3.83
8.	Working heart rate, beats/min		
	• Pull	122.3 ± 9.0	135.3 ± 17.4
	• Push	126.8 ± 13.2	131.5 ± 12.6
9.	Increase in heart rate over rest, beats/min		
	• Pull	36.9 ± 9.4	47.8 ± 11.0
	• Push	40.5 ± 14.7	44.5 ± 8.2
	• Mean	38.7 ± 10.9	46.1 ± 7.3

The mean heart rate of women workers (pulling and pushing mode) during operation of refined PAU seed drill was found to be 124.6 beats per minute with the increase in heart rate over rest as 38.7 beats per minute whereas it was 133.4 beats per minute with the increase in heart rate over rest as 46.1 beats per minute during operation of PAU seed drill. It is observed that the mean working heart rate (pulling+ pushing mode of operations) of women workers was significantly lower (125 beats/min) with refined PAU seed drill at 5 % level than original (133 beats/min) PAU seed drill. The increase in heart rate over rest (Δ HR) during pulling mode of operation of refined PAU seed drill was also found significantly lower (37 beats/min) than original (48 beats/min). The area covered with the refined seed drill was 0.046 ha/h. The women workers liked the refined seed drill. Thus, the physiological workload with refined PAU seed drill has been reduced by 16.1 % as compared to original.

7. Ergonomical evaluation of hand ridger with women workers

Manually operated hand ridger was ergonomically evaluated with six women workers for making ridges. Two subjects were required for the operation of hand ridger i.e., one for pulling and another for pushing. Mean values of age, height and weight of the subjects were 32.3 ± 7.6 years, 150.6 ± 4.8 cm and 47.5 ± 8.3 kg, respectively. Mean dry bulb temperature, wet bulb temperature, relative humidity and globe temperature was 31.1 ± 1.9 °C, 25.8 ± 1.3 °C, 65.5 ± 12.8 %, and 46.2 ± 2.1 °C respectively during the experiment. The air velocity during trial was 0.4 to 1.9 m/s. The duration of trial was of 30 minutes. The soil moisture content, bulk density and clod mean weight dia was 14.3 ± 2.9 % (db), 1.1 ± 0.05 g/cc and 13.2 ± 2.7 mm, respectively. The tilling depth of soil was 93 ± 14.5 mm. The experimental results are given in Table 36.



Ergonomical evaluation of hand ridger with women workers

The heart rate of farm women in the operation of hand ridger was 127.2 beats / min and 114.5 beats / min during pulling and pushing mode, respectively. The mean heart rate (pulling and pushing mode) of women workers was 120.8 beats / min. The increase in heart rate over rest (Δ HR) was 36.8 beats / minute. The area covered per hour was found to be 0.033 ha at an operating speed of 2.4 km / h.

Women workers were comfortable in operation of hand ridger except the need of T-type handle on beam for proper pulling and gripping.

Table 36 : Data on ergonomical evaluation of hand ridger experiment with women workers.

Sl. No.	Particulars	Details	
1.	Ridge spacing, mm	302	± 18
2.	Height of ridge, mm	133	± 53
3.	Total no. of ridges of 25 m length made/ hour		43
4.	Area covered, ha/h	0.033	± 0.006
5.	Pull force, N	72.71	± 9.87
6.	Push force, N	26.78	± 2.85
7.	Walking speed, km/h	2.4	± 0.4
8.	Working heart rate, beats/min		
	• Pull	127.2	± 21.1
	• Push	114.5	± 16.4
	• Mean	120.8	± 17.4
9.	Increase in heart rate over rest, beats/min		
	• Pull	43.9	± 10.1
	• Push	29.7	± 5.2
	• Mean	36.8	± 7.4

Based on feedback and observations during trials, T-type handle on pulling harness was provided. The refinement in length of pulling harness (beam) was done based on anthropometrical data. The length of beam was reduced from 1550 mm to 1420 mm. The width of T-type handle should be 530 mm with diameter of 26mm. The total weight of refined ridger was 2.8kg. The pull and push force required with refined hand ridger was 60.04 ± 3.63 N and 38.35 ± 2.45 N, respectively. Women workers liked the equipment as it avoids bending posture which is generally adopted at the time of ridge making with short handled tools.

Salient Findings

The sub-centre has ergonomically evaluated fifteen farm tools and equipment with women workers, of which, eleven equipment namely, seed treatment drum, refined hand ridger, refined CIAE seed-cum-fertilizer drill, refined PAU seed drill, Naveen dibbler, refined fertilizer broadcaster, CIAE wheel hoe, improved sickle, tubular maize sheller, refined sitting type groundnut decorticator and refined CIAE handing type cleaner were found suitable for farm women.

Prototypes of the above equipment can be supplied by CIAE, Bhopal.

PROJECTS UNDER NATIONAL AGRICULTURAL TECHNOLOGY PROJECT

2.14 MM NATP ‘Empowerment of women in agriculture’

Suman Agarwal & L.P.Sahoo

Mission : Technological and economic empowerment of farm women to reduce their drudgeries and increase work efficiency in the context of agriculture and animal husbandry.

The major work done during the year was the impact assessment of the project carried out for past 2 years. The results are presented below:

Impact of the Project:

- **Drudgery reduction of farm women :** Twenty three improved technologies related to agriculture and animal husbandry were disseminated among 600 farm women had contributed greatly in reducing the drudgery of farm women. The ergonomic assessment of the technologies, indicated that technologies had contributed in reducing the physiological cost of work by reducing heart rate and energy expenditure during the agricultural operations. The technologies had helped for increasing output and reducing the postural discomfort of the farm women during the different agricultural operations performed by them.

- **Increased use of agriculture technologies/ improved implements :** Technological empowerment had led the women

for more use of improved implements for performing farm operations. Women had reported that the implements given to them were also being used by the other farm women of the village as they took these equipments from them on custom-hiring basis. Thus, Custom-hiring of the improved implements/ technologies was on demand among the farm women. Table 37 indicates the data regarding the implements given for custom hiring and income earned by the women/SHGs.



Use of twin wheel hoe for weeding by the far women



Use of seed treatment drum by farm women



SHG women using bhindi plucker

Table 37: Custom hiring of Agricultural Implements from Women Self-help groups

Sl. No.	Name of Implements	Rate for custom hiring/ day (Rs)	Average seasonal income per group (Rs)
1	Groundnut Decorticator	10	350
2	Pedal Thresher for Paddy	25	440
3	Sprayer	20	180
4	Paddy Winnowing	25	225

- **Income generation through enterprises :** Self-help Group approach and Skill development trainings had helped the farm women to set-up different enterprises. Each SHG has set-up two to three enterprises and had earned money. Data related to enterprises have indicated that enterprises run by SHGs from two years to six months duration have earned money in between of Rs. 13900/- to Rs. 2559/- respectively.



Farm women vaccinating poultry birds



Rearing poultry birds is a gainful employment for women SHG



SHG women taking out vermicompost from the pit prepared by them

- **Improved family Nutrition :** Farm women of SHGs involved in vegetable growing and pisci-culture beside getting income, from these enterprises, are also using their produce for their family consumption. Thus, the family diet was enriched. This has provided enhanced food and nutrition security to the farm families.

Socio- Psychological Impact of the project

The social-psychological impact of the project was assessed in terms of confidence building, self esteem, decision making, capacity building, social empowerment and psychological aspect like hope and over all satisfaction with life. Farm women's perception regarding these aspects were obtained on a five point scale before and after the project. Mean scores were calculated separately for each aspect.

Confidence building: Prior to project implementation farm women's confidence level was below average but after the participation in project activities their confidence level had gone above average level. About 64% women have gained confidence in talking in SHGs meetings, 69% women have reported that they had developed confidence in talking at public Offices/ meetings and Gram Sabhas.

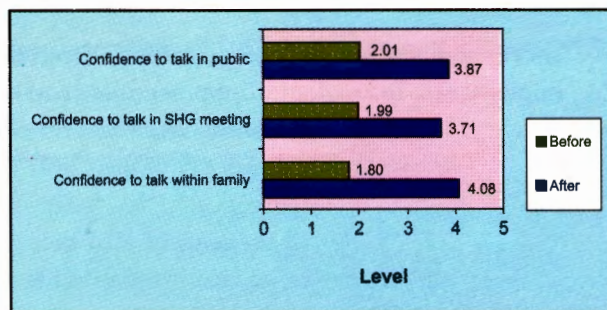


Figure 8: Confidence Building of Members

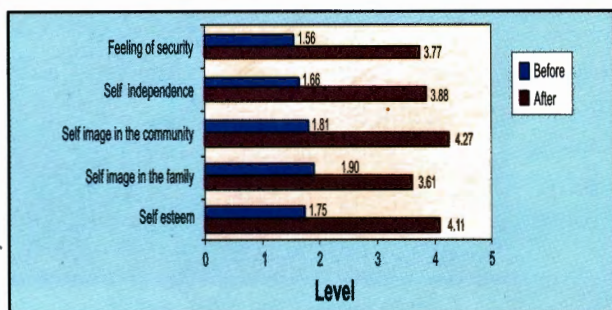


Figure 9: Self Esteem of Members

Self esteem: It was assessed in terms of women's self image in the family, community, her self reliance/ independence and feeling of security. All the farm women reported that their self esteem had improved towards higher level as compared to the before participation level.

Decision making: It was assessed with respect to involvement of farm women in taking decision in the family regarding children's education; family planning; buying and selling land, property, and household goods; daily household expenditure; attending family and social functions and the like. Findings indicated that involvement of farm women in taking decisions in the family matters has increased towards higher level compared to before level. Women also reported that now they could influence the decision of their husbands. Thus, it implied that joint decision making came up to family instead of no involvement of women.

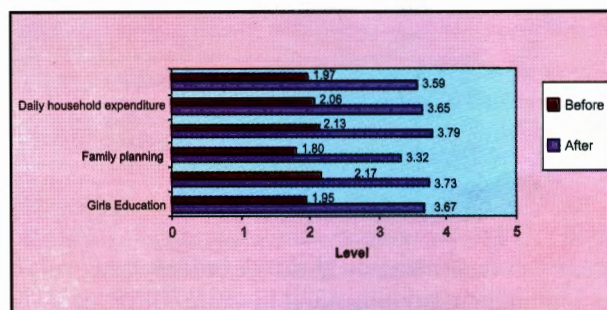


Figure 10: Decision Making Pattern of Members

Capacity building: It was assessed in terms of ability to take risk, ability to understand and solve problems, ability to try new ventures, ability to take criticism and managerial ability. Results indicated that capacities of women enhanced and ability to take risk occupied first rank (66.50%), followed by in trying out new ventures (63.33%), ability to take criticism (61.83%) and ability to solve problems (53.67%).

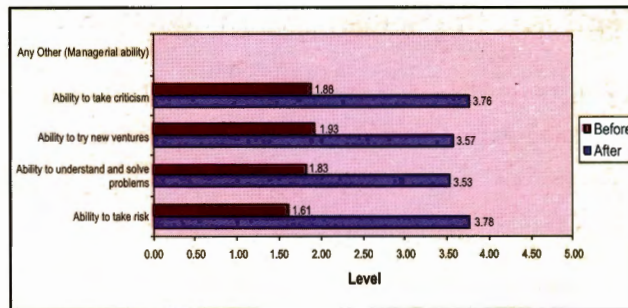


Figure 11: Capacity Building of Members

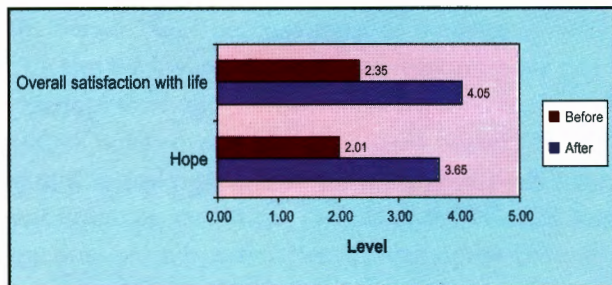


Figure 12: Psychological Aspects of Members

Psychological Aspects: It was assessed in terms of hope of farm women and their over all satisfaction with life. Findings revealed that the farm women were more satisfied with their lives after the participation in the project and it has generated hope among them for better life.

Social empowerment: The different parameters taken for assessment of the social empowerment of farm women were leadership, ability to work with others/team spirit, communication skills, assertiveness, and participation in village activities. Findings indicated that women have developed in all these aspects. Higher mean scores were obtained in case of participation in village & community activities (4.05), followed by assertiveness (4.04), and team spirit (4.02).

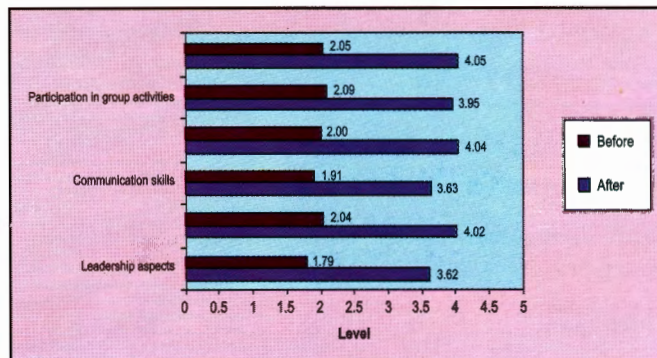


Figure 13: Social Empowerment

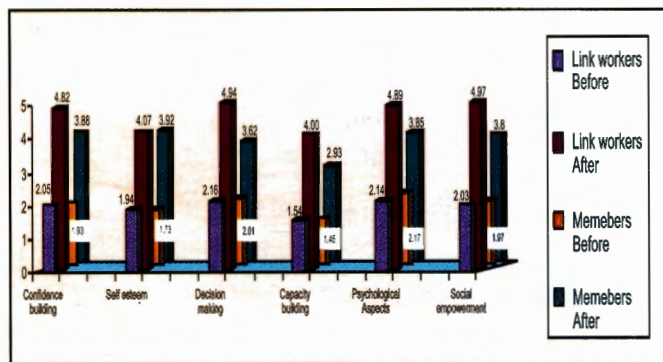


Figure 14: Impact assessment link workers and members

Changing status of socio-psychological empowerment of Link workers and members of SHGs:

Visible differences were found in regard to confidence building, decision making, capacity building, psychological aspects and social empowerment between the link workers of the project (group leaders) and members of SHGs. However, least differences were observed between before and after score in regard of self-esteemed.

Farm women's opinion regarding benefits/ valuable part of the project:

All the farm women reported that the most valuable part of the project was their accessibility to improved technologies and financial assistance in the form of thrift money.

The other benefits/ valuable parts of the project as perceived by the women were as below:

- Income generation through enterprises (95.66% women).
- Skill development trainings (91.5% women).
- Establishment of the Technology Resource Center (90.0% women).
- Improvement in knowledge (75.5% women).
- Widening of social circle (63.0% women) and
- Recognition in the village (54.16% women).

Farm women Opinion regarding their strengths:

Most of the farm women expressed that they had developed the strength on the following aspects due to participation in the project

- Money savings
- Developed cooperation among each other
- Development of group feeling
- Enhanced competence
- Ability to work hard
- Positive thinking

Farm women's Opinion about 'Self' after participation in the project:

Farm women were asked "what changes they find in themselves after participating in the project". The changes they felt in themselves were given below:

- Improved behaviour in dealing with others
- Active member of the group
- Confidence in contacting Block Officials
- Become conscious about the diet for the family
- Less dependency on men
- Changed outlook for daughter's education
- Enhanced leadership quality
- Improved communication ability
- Recognition in the family
- Improvement in living condition
- **Change in outlook/attitude:** It was found out that women had changed their outlook/ attitude towards diet of the family, daughter's education and felt more satisfied with their lives.
- **Improvement in living conditions:** It has been found that money earned through enterprises has been used by the women for purchase of Television sets, Bicycles, cloths, food and for children education. This indicates a change in their living condition/ status.

2.15 Family based economic security of backward communities through ornamental and integrated fish farming

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

Selection of village, ponds and beneficiaries

The project was launched in Puri and Khurda district of Orissa. In Puri district Nimapara block and in Khurda district Balipatana and Baliana blocks were selected depending on pond availability. In the beginning difficulties were faced to finalize the beneficiaries because most of the people, belonging to the SCs and backward classes, were resource poor and without any ponds of their own. To overcome these difficulties derelict water bodies infested with aquatic weeds nearer to the villages were explored and reclaimed. About 0.5 ha of such water bodies was put under aquaculture. Details of the villages, water area and the number of beneficiaries is given in the Table 38.



Reclamation of water body for Aquaculture

Table 38 : Village wise distribution of beneficiaries and water area ,

District	Block	Village	No. of ponds	Water area (ha.)	No. of families involved	
Puri	Nimapara	Kothi Sahi	1	0.15	17	
		Sagada	1	17		
Khurda	Balipatna	Bagalpur	6	2.73	26	
		Gandilo	11	11		
		Rhoedopara	3	7		
		Panchalo	3	0.03		
		Singrisasan	4	13		
		Baliana	Tiranapada	13		0.30
		Total	42	3.99		111

Total of 42 ponds covering water area of 3.99 ha were selected involving 111 farm families.

Survey to collect baseline information:

An interview schedule was developed to collect the base line data on socio-economic condition, resource inventory, knowledge level, and attitude of the beneficiaries. Baseline survey was conducted before taking up the aquaculture activities. Some of the important findings of the survey are:

Socio-economic

- Majority (42.85 percent) of participating families were landless, 44.42 percent were having land less than 0.50 ha.
- Agriculture is the backbone of the participating households, both for land owning and landless households.
- Income of the participating households was estimated taking into account all the sources like agriculture, fishery, livestock and non-agricultural sources. Thirty six percent of households were having an annual income of less than Rs.10000, 27.78 percent having income between Rs.10,000 and Rs20,000, 19.45 percent with income Rs.20,000-30,000 and its rest 16.66 percent of households were with an annual income of Rs30,000 and above.
- Only 16.2 percent were found practicing aquaculture and only 7.5 percent of the total water area was put to aquaculture prior to project implementation their average yield was 0.6t/ha.

- Most of the aquaculture practicing households used to procure seeds from vendors in the village and stocked fries randomly without considering species proportion, size and stocking density. Their practice was limited only to stocking and harvesting without any intermediate management practices.

The following activities were undertaken with the selected sample. Interactive demonstration fish farm visits and training were organized for technological empowerment of farm families.

(a) Carp fry rearing in nursery ponds

Fish seed being the most critical input for success of any culture operation for fish due emphasis was given on carp seed rearing at village level. This was done to overcome the problems related to availability of fry of desired species, quality and size at village as well as transport of fry over a long distance.

Four (4) ponds with a total water area of 0.09 ha were adopted for nursery to meet the fry/fingerling demand under project. Simultaneously 31 farm families were trained in spawn rearing activity. All the relevant package of practices like pond preparation; fertilization; stocking; feed management; sampling etc. were demonstrated to the farmers.

Details of pond area, species stocked, survival, average size at 20 days rearing etc. were summarized in the Table 39. Carp spawn was procured from state fish farm and the Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar.

Table 39 : Stocking and harvesting details of nursery ponds

Village	Pond area (ha)	Species stocked	Average size (mm)	Survival (%)	Income from sale of fry (Rs)	Pond area stocked
Tiranapada	0.05	C: R: M (2:1:1)	32	45	1300/-	0.3 ha
Singrisasan	0.02	Mrigal	28.5	36	700/-	0.45 ha
Singrisasan	0.02	Rohu	25	42	800/-	0.45 ha
Singrisasan	0.025	Catla	22	40	1000/-	0.45 ha

Fry produced in these nurseries could meet the partial fry requirement of the ponds under the project. In addition, selling fry generated some income for families. A maximum income of Rs 1300/- was obtained from a pond of size of 0.05 ha.

(b) Carp culture

Fish culture is the core of integrated fish farming. So the farm families were oriented with the scientific culture practices of composite carp culture. Different steps for culture like weed eradication, removal of weed and predatory fishes, pond fertilization, multi-tier species stocking, supplementary feeding were undertaken in each pond with the active participation of the farm families. Ponds were stocked with advanced fry of the three Indian Major Carp species viz., catla (*Catla catla*), rohu (*Labeo rohita*), mrigal (*Cirrhinus mrigala*) @ 10,000 per hectare with the ratio of 25:35:40. In 22 ponds silver barb (*Puntius gonionotus*), a medium carp, was stocked along with IMC. In such ponds the ratio catla:rohu:mrigal:puntius :: 25:30:30:15 was maintained. Eight ponds were stocked with hatchery-produced seed of giant freshwater prawn (*Macrobrachium rosenbergii*) @ 10,000 per hectare along with carp species. The whole trial was (Table 40) intended to optimize the production from unit water area.

Table 40 : Stocking ratio and species stocked in different ponds

Species	No. of Ponds stocked	Water area (ha)
R+C+M (35:20:45)	16	0.391
R+C+M+P (30:20:30:20)	9	3.205
R+C+M+P+Pr (30:20:30:20)	5	0.12
Culture of Pr+P	4	0.08

R-Rohu, C-Catla, M-Mrigala, P-Silver barb, Pr-Freshwater prawn

In some ponds marketable size of *Puntius* was harvested after a rearing period of 4-6 months. *Puntius* species, harvested after four-month period, recorded average weight of 165g with maximum weight 250g whereas those harvested after 6 months recorded an average weight of 235g with maximum weight of 400g. These fishes were sold at the pond sight @ Rs.50 per kg. Four ponds were re-stocked with the same species during the month of March, 2005. Cultural operations in all the adopted ponds are in progress. The final harvesting would be done before monsoon in the month of May-June.



Harvest of *Puntius gonionotus* from backyard pond

(c) Integrated fish farming

The core objective of the project was to transfer and evaluate technologies relating to integrated fish farming. The rationale for taking integrated fish farming is judicious utilization of space and the farm waste from the culture of fish-cum-duck, fish-cum-poultry farming and to optimize the production from unit area. Before starting the integration, group meetings were organized and existing scenario relating to different integration systems was assessed. Taking into account the farmers' choice and resource availability different integrations, fish-cum-duck, fish-cum-duck horticulture, fish-cum-poultry were planned which are explained in Table 41.

Table 41 : Types and extent of integration undertaken in different villages

Sl. No	Village name	No. of families	No of ponds	Water area (Ha)	Type of integration
1.	Bagalpur	26	6	2.9	Fish-duck-Horticulture
2.	Kothi Sahi	17	1	0.15	Fish-duck-Horticulture
3.	Sagada	17	1	0.3	Fish-duck
4.	Gandilo	5	2	0.06	Fish-duck
		6	6	0.17	Fish-poultry
5.	Rhoedpara	7	3	0.14	Fish-duck
6.	Panchalo	3	3	0.028	Fish-poultry
	Total	81	22	3.748	

After finalizing the integrations, farmers were advised to construct the duck shed @2sq.ft per adult duck near the ponds or on pond dykes using locally available materials. Similarly poultry sheds @ 1.5-2.5sq.ft per adult bird has been constructed either on the pond dykes or on the elevated platform in the pond wherefrom poultry droppings could go directly to the ponds.

Fish-cum-poultry

Poultry cum fish farming is being demonstrated in ponds covering nine families. Grama Priya, a variety supplied by Regional Centre of Central Avian Research Institute, Bhubaneswar, was stocked @ 500 nos. per ha water area. Poultry care, shed cleaning, feeding and vaccinations were taken up in participatory mode. At present birds are of 14 weeks old and are supposed to lay eggs at 19-20 weeks. Four day old Chicks were vaccinated for Ranikhet (RD) disease. Second vaccination against R2B was given to 12 wks old chicks.

Fish-cum-Duck

In fish-duck integration twenty-day old ducklings of variety Khaki-Campbell, were released into the ponds after three months of stocking of ponds with fish fry. Orientation and demonstration on Duck care, feed management and vaccinations were given to farmers. Interestingly, both men and women farmers actively undertook the activities. Up to 4 months, growth of ducks was monitored through sampling. Maximum growth of 1.350 kg and an average weight of 0.850kg were recorded. At this age male and female could be separated and the farmers were advised to sale the males. Some female ducks started laying eggs in 17 wks. However,



Fish-duck integration with Khaki-cambell duck



Demonstration on duck vaccination

there are variations in growth and egg laying from village to village. Causal factors are under study. Ducks of 12-14 wks age were vaccinated against plague disease.

Fish-cum-Duck-cum-Horticulture

Most of the ponds under study have narrow dykes, which are not suitable for any horticultural activities. Dykes of community ponds in two villages which had remained completely unutilized have been put to cultivation of horticultural crops such as banana



Sale of vegetables grown on pond dike



Production of vegetable in pond dike

and drumstick and winter vegetables. Aquatic weeds removed from the ponds were used as manure for the horticulture plantation. Benefits from the same are summarized in the Table 42.

Table 42 : Area and Production of winter vegetables

Village	Pond dyke area (m ²)	Vegetable grown	Harvest (Kg)	Income from sale (Rs)	Consumption (Kg)
Bagalpur	300	Beans	150	600/-	50
	100	Tomato	75	150/-	45
	220	Brinjal	105	700/-	35
	100	Bitter gourd	20	-	20
Kothi Sahi	200	Tomato	170	500	70
	100	Cabbage	25	-	25

(d) Ornamental fish production

- Ornamental fish production has started in three villages of Nimapara block of Puri district involving 4 groups and a total of 17 women. The groups were heterogeneous with respect to the age, education, occupation and economic condition.
- Low cost indigenous technology is being used. For culture, locally prepared earthen pots are used for breeding and rearing of ornamental fishes. These pots are of 2.0ft diameter at the top, 1.5ft height and with a water holding capacity of 70 litres.
- To start with, live bearers like guppy (*Poecilia reticulata*), Molly (*Poecilia sphenops*), and sword tail (*Xiphophorus hellerii*), were given. Women are continuously being trained to take care of the brooders and the small ones.

After getting necessary feed back regarding benefits and constraints in production, management and marketing from the participating women, steps will be taken to expand the units with inclusion of few more valued species.

Under the project ten training programmes were arranged for the farmers on different aspect of aquaculture and total no of 177 farmers were trained. Training's were supported by farm visits.

The project has helped the participating farm women in income generation from carp fry rearing, carp culture, ornamental fish production and integrated fish farming. The nursery rearing in small rural pond has amply demonstrated its utility in terms of both tangible and intangible benefits to the families and to the locality. The different integrated fish farmings such as fish-cum-poultry, fish-cum-duckery, fish-cum-duckery-cum-horticulture have generated new worthwhile experience for the participants and proved new avenues of employment for others in different villages.



Indegenously developed shed for ducks

The project has helped the participating farm women in income generation from carp fry rearing, carp culture, ornamental fish production and integrated fish farming. The nursery rearing in small rural pond has amply demonstrated its utility in terms of both tangible and intangible benefits to the families and to the locality. The different integrated fish farmings such as fish-cum-poultry, fish-cum-duckery, fish-cum-duckery-cum-horticulture have generated new worthwhile experience for the participants and proved new avenues of employment for others in different villages.

2.16 Involving women in aquaculture – A step towards economic and nutritional security

P.K.Sahoo and Dr.H.K.Dash

Achievement

The project is operating in Puri and Khurda district of Orissa 195 women beneficiaries with a water area of 4.0 ha area are covered under the project. In the second year the following progress has been made.

A. Carp seed rearing

Success of nursery rearing in the first year was an eye opener for the rural women in terms of knowledge and economic benefits. The advantages of fry production at village level are:

- Empowering women in aquaculture technologies
- Assured and timely supply of desired and quality fry
- Avoidance of undue inconvenience in organizing fry procurement and transport
- Economic benefits to women within short period

Success of nursery trials prompted us to take up fry production as an income generating activity for rural women. Fourteen numbers of small ponds with individual pond area between 0.02 and 0.1 ha and in close proximity to homestead were selected for fry production. Women were given necessary orientation to different steps of nursery raising of fry and the precautions to be taken during the period. Importantly all such steps were undertaken in participatory mode.

Participating beneficiaries were given on- farm demonstration on different aspects such as:

- Procedure to collect plankton and assess the productivity status of pond on the basis of plankton count.
- Procedure for pond fertilization to be done prior to the release of spawn into pond.

- Recording the water transparency
- Recording the water temperature
- Assessing survival percentage of fry
- Oxygen packing

Outcome of nursery rearing

Out of 14 ponds fry harvesting could be taken up successfully in 11 ponds during July-August, 2004. Figures related to stocking of ponds, fry survival and growth at 20th day and economic benefits from each pond are summarized in Table 43

Table 43 : The production and income from second year nursery

Sl. No	Approx. pond area (ha)	Species stocked	Survival (%)	Avg. Length (cm)	Avg. weight (gm)	Income from sale of fry(Rs)	Other benefits
1.	0.02	Mrigal	60	3.33	0.53	1000	
2.	0.02	Rohu	4	1.9	0.706	680	
3.	0.022	Catla	43	4.12	0.7	9000*	
4.	0.15	Rohu & Catla	29	2.88	0.274	3000	Fries distributed in 1.2 ha water area under the project
5.	0.04	Mrigal	33.3	1.99	0.075	1000	Fries distributed in 1.2 ha water area
6.	0.06	Rohu & Mrigal	46	2.73	0.431	6000	
7.	0.023	Rohu	50	2.82	0.248	2000	
8.	0.015	Rohu & Mrigal	20	3.8	0.591	500	
9.	0.015	Rohu	40	2.84	0.247	2000	
10.	0.02	Mrigal	60	2.0	0.190	4300	
11.	0.07	Mrigal	30	2.5	0.21	3000	

* Two crops.

Nursery rearing technology has brought in benefits of increased fry production as well as additional income to the participants. As evident from the above Table, maximum income of Rs. 9000/- (Rupees nine thousand only) was obtained in a pond of size 0.022 ha for two successive crops of nursery followed by Rs 6000/- of one crop of nursery in a pond of 0.06 ha from sale of fry.

B. Carp poly-culture

- Under the project women of more number of households (116) were motivated to practice poly-culture in their ponds wherein compatible species with different feeding habits ranging from zooplankton feeders to herbivores, to organic material in the mud were cultured together.
- Stocking density was maintained at 7000-15000/ha depending on the fry size.
- Different management practices like feed management (quantity and method) and pond management (weed clearance, fertilizer application etc.,) were taught and wherever required, on- farm demonstrations were taken up.
- A new species silver barb (*Puntius gonionotus*) was stocked in 31 ponds to assess its performance and test the acceptability of the species in rural areas.

Analysis of fish production, consumption and benefit from selling the fish are explained in Table 44.

Table 44: Benefits incurred from the project from pond of different sizes

Variables	< 500 m ²	500-1000 m ²	≥1000 m ²	Remarks
Yield (ton) per ha.	3.26	1.76	1.1	The progressive decline of yield from lower to higher category (ponds under one category considered in aggregate) can be attributed to the better management of small ponds and adverse effect of flood in bigger size pond.
Per pond production (Kg)	76	112	202	Progressive increase in per pond production is quite obvious in the sense that production from bigger size pond is more.
Per family production (Kg)	76	37.2	16.87	Decline in per family production from category of smaller to bigger size pond is due to the fact that more number of families are involved in larger size ponds while only one to two families in smaller size ponds
Consumption per family (Kg)	39	12.6	5.3	The decline in per family consumption is largely due to decline in per family production. Besides this the proportionately higher sale of fish in case of bigger size pond is also a factor for low family consumption
Sale per family (Rs)	37.50	11.31	24.40	
Earnings from direct sale (Rs)	1425.00	429.00	927.00	
Value of per family production (Rs)	2888.00	1413.60	674.80	

C. Integrated fish farming

- Depending on the suitability, integrated fish farming has been taken up in 8 ponds covering a total water area of 0.67 ha for making efficient use of space, resources and nutrients and to optimize the return from unit water area. Of these, 7 ponds were put to fish-cum-duck and only one pond to fish-cum-poultry integrated farming.

For integration 20 days old duckling of variety Khaki-campbell were supplied @ 400 nos. per ha water area, two to three months after fry stocking.

Upon sampling after 4 months ducks recorded an average weight of 850g and maximum weight of 1350 g.

Poultry cum fish farming is being demonstrated in one pond where 20 days old chicks of variety Grama Priya were reared @ 500 per ha of water area.

Table 45 : Integrated fish farming undertaken in different villages with water area

Sl. No	Village name	No. of ponds	Water area(ha)	Type of integration
1.	Hansapara	3	0.40	Fish-duck
2.	Chanarapada	1	0.04	Fish-duck
3.	Sasana	2	0.10	Fish-duck
4.	Bania Sahi	2	0.11	Fish-duck
5.	Sathilo	1	0.021	Fish-poultry
		9	0.67	

Farmers' Training

With an objective to transfer the scientific management procedures Training programmes pertaining to nursery pond preparation and management, breeding behaviour and culture of fresh water prawn (*Macrobracium rosenbergii*), and breeding of Indian Major Carps were organized where 119 women were trained. Training programmes were supported by field visits to CIFA farm.

Impact of Project

Prior to the implementation of the project, only thirteen of the selected ponds, covering a water area of 0.5 ha were put to aquaculture. It has been estimated from data collected through survey that the average production of these 13 ponds was 1.05 ton/ha. Considering the whole of the water area (4.0) under the project, the average production stood at 0.125 ton/ha. After the first year of the project the average yield of ponds has been found to be 1.98 ton/ha, with a maximum yield of 5.8 ton/ha. Regarding the average yield of the 13 ponds wherein aquaculture was being practiced, it has increased from 1.05 to 3.25 ton/ha (Table 46).

Table 46 : A comparison to show enhanced productivity of backyard ponds

Variables/Parameters	Before the implementation of project	After first year of implementation
Number of ponds practicing aquaculture	13	50
Water area practicing aquaculture (Ha.)	0.5	4.0
Average yield of 13 ponds(ton)	1.05	2.86
Overall avg. yield of ponds under the project (ton)	0.125	1.98
Maximum yield obtained from a pond (ton)	1.2	5.80

- The analysis of data was done in the second year and findings pertain to the first year crop. Data pertaining to the second crop is not yet available and harvesting of fishes is scheduled in April-May. As and when harvesting is complete data will be analyzed with respect to different parameters.

Value of the overall benefit from the project for the first year was Rs206586.00. For second year the benefits will be estimated in June-July as all data relating to second year efforts are available.

3. TRAININGS

3.1 Trainers' Trainings

The centre organized trainers' training programmes for the Scientists/ Extension functionaries of the ICAR Institutes/SAUs/State Departments of Agriculture, Horticulture, Animal Husbandry and Fishery to sensitize them on the productive roles of women farmers and to train them on application of appropriate technologies in agriculture and allied fields. The details are given in table 47.

Table 47 : Trainers' training programme conducted during 2004-2005

Title of the Trainers' Trainings	Days	Duration
Environmentally sound Technologies for women in Agriculture	3	18 th – 20 th August, 2004
Organic farming for sustainable food security	10	15 th – 24 th September, 2004
Entrepreneurship Development among farm women	5	1- 5 th November, 2004
Ornamental fish farming – An instrument for rural women's prosperity	4	2 – 5 th November, 2004
Food and Nutritional security of farm families through micro enterprises	3	9 – 11 th November, 2004
Effective project planning for Rural Development	5	7 – 11 th February, 2005

3.2 Farmer's and Farmwomen Trainings

Table 48 : Farmwomen training programmes conducted under the projects

Sl No.	Topic	Number of Participants
1.	Eco-friendly pest management Technologies on 27.7.2004 at village-Singari Sassan, Block- Balipatna, Distt. – Khurda, Orissa.	32
2.	Eco-friendly pest management Technologies and Vermicomposting on 29.11.2004 at village- Bagalpur, Block- Balipatna, Distt. – Khurda, Orissa.	26
3.	Eco-friendly pest management Technologies and Vermicomposting on 22.02.2005 at village- Bania Sahi, Block- Nimapara, Distt. – Puri, Orissa.	27
4.	Land preparation and nursery raising for vegetables	24
5.	Pond preparation and pond management	47
6.	Culture and breeding of the freshwater prawn.	24
7.	Ornamental fish breeding and fry rearing	12
8.	Record keeping	33
9.	Care and management of ducklings	35
10.	Breeding behaviour and culture of fresh water prawn (<i>Macrobracium rosenbergii</i>)	15
11.	Breeding of Indian Major Carps	15
12.	Record keeping	15
13.	On farm training on common carp breeding	15
14.	Care and management of ducklings	74
15.	Use of women friendly equipment (Sub-centre Bhopal)	100
	Total	494

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- श्रीवास्तव, एस्.के. एवम् पाण्डेय, हेमा 2004 । कृषि महिलार्ये एवम् वानस्पतिक पीड़कनाशी एक मार्ग दर्शिका । तकनीकी बुलेटिन-21 कृषि में महिलाओं पर राष्ट्रीय अनुसंधान केन्द्र : भारतीय कृषि अनुसंधान परिषद भुवनेश्वर उड़िसा ।
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Congress/Conference/Seminar/Workshop Papers:

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- Agarwal, S. (2005). Land rights and women's participation in Agriculture. Paper presented in the 'Regional Workshop on Social and Institutional Framework for Female participation in Agriculture'. Organized by the National Institute of Public Cooperation and Child Development, New Delhi at Centre for Youth and Social Development, Bhubaneswar, from 16-17 February, 2005.
- Agarwal, S. and Sahoo, L.P. (2005). Entrepreneurship Development among Farmwomen through Self-Help Groups. Abstract 7th Agricultural Science Congress on "Entrepreneurship Development in Agriculture, held at College of Agriculture (M.K.P. vidhyappet, Rahuri), Pune, February, 16-18, 2005. P. 237.238.
- Arya, M.P.S., Pandey, Hema, Reddey, Y.V.R. and Shaik, Haffis (2004). Participation of women in different farming systems under varying levels of awareness. Paper presented at Second National Symposium on "Alternate Farming Systems: Enhanced Income and Employment Generation Options for Small and Marginal Farmers" held at PDCSR, Modipuram Meerut on September 16-18,2004.
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- Attri, B.L. 2004. Low cost technology for storage of fruits and vegetables. Paper presented in the workshop as "*Crop post-harvest options and market potential for sustainable livelihood of small farmers*" held at Bhubaneswar on 8th October, 2004.
- Attri, B.L., Pandey, H., Singh, A. and Killadi, B. 2004. Technological gaps in post harvest management of vegetables in Orissa. Paper presented in "*First Indian Horticulture Congress – 2004*" held at New Delhi from 6 – 9th November, 2004.
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- Sadangi, B.N. and Pati, J.K. (2005). Cultural problems of farm women and attitude towards mechanized farming, Proceedings of the National Workshop on Role of Women in Mechanized Farming, NCW and NRCWA : 40-43.
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- Singh, A and Pandey, H. (2004): Potentiality of sweet potato as weaning mix in combating the Vitamin 'A' deficiency in Coastal Orissa. National Seminar on Roots and Tuber Crops, organized by Regional Centre of CTCRI. Bhubaneswar, October 29th – 31st, 2004 : 54.
- Singh, A. and Pandey, H. (2004) Rice based traditional products and their consumption pattern in Coastal Orissa. Paper presented at "National Symposium on Recent Advances in Rice based Farming Systems" held at CRRRI, Cuttack, November 17th – 19th, 2004 : 117.
- Singh, S. P., L. P. Gite and N. Agrawal. 2005. Ergonomical assessment of two manually operated seed drills for their suitability to farm women. Proceedings (in C. D) of 39th Annual Convention of ISAE (March 9-11) held at ANGRAU, Hyderabad.
- Singh, S. P., Gite, L. P. and Agrawal, N.. 2005. Physiological work load Farm Women in the Operation of CIAE Hanging Type Cleaner. Presented in International Conference on 'Emerging Technologies in Agricultural and Food Engineering' held at IIT, Kharagpur from December 14-17. Published as Book Chapter entitled "Power Machinery Systems and Ergonomics, Safety and Health" Amanya Publication, New Delhi : 343-347.
- Singh, S. P., Kumar Nirmal and Agrawal, N. 2005. Involvement of Farm Women and Their Training Needs in Agricultural Operations in Vindhya Plateau Agro-climatic Zone of Madhya Pradesh. Proceedings (in CD) of 39th Annual Convention of ISAE (March 9-11) held at ANGRAU, Hyderabad.
- Srivastava, S.K., Attri, B.L. and Pandey, H. 2005. Vermicomposting as an Enterprise for Rural women. Paper presented in "7th Agricultural Science Congress" held at MPKV, Pune from 16 – 18th February, 2005 : 233 – 234.
- Srivastava, S.K., Attri, B.L. and Pandey, Hema. 2005. Technological gaps in pest management among rural women in coastal agro eco-system of Orissa. Paper presented in "International conference on sustainable crop production in Stress Environments: Management and Genetic options" held at JNKVV, Jabalpur from 9 – 12th February, 2005 : 344 – 345.
- Srivastava, S. K. and Pandey, Hema. (2004). Use of ancient wisdom for sustainable pest management in Rice (in) Abstracts of the "National Symposium on Recent Advances in Rice-based Farming Systems", held from November 17th -19th 2004 at Central rice research institute ICAR Cuttack, Orissa : 68.

Mishra, S. Sadangi, B.N. & Pandey. H., (2004), "Gender Issues in Rice Farming Systems", Poster presentation in National Symposium on "recent Advances in Rice-based Farming Systems" organized by ARRW, CRRI, Cuttack, 17-19, Nov. 04.

Pandey, H. & Mishra, S. (2005), "Role of Women in Family food Security", Oral presentation in International Conference on "Sustainable crop Production on Stress Conditions & Management and Genetic Options" at JNKVV, Jabalpur, 9-12, Feb.05.

Satpathy, C. & Mishra, S. (2005), "Impact Assessment of Rural Development Programme", Lead paper presentation in National Seminar on Extension Methodological Issues in Impact Assessment of Agricultural & Rural Development Progress At UAS, Bangalore, 21-23, Jan.05.

Books/Proceedings Published:

Proceedings of National Seminar on "Drudgery Reduction for Women in Rice Farming" published by NRCWA collaboration with Central Rice Research institute, Cuttack.

Proceedings of National Workshop on "Role of Women in Mechanized Farming" published by Director, National Research Centre for Women in Agriculture, Bhubaneswar.

Training/Education Material:

Two CDs on nursery rearing in English & Oriya were developed under project "involving women in aquaculture a step towards economic and nutritional security".

Radio Talks:

Sl No.	Name and Designation	Title of the Topic	Date of broadcast	Language
1.	Dr.B.N.Sadangi Pr. Scientist (AE)	Women Empowerment through Self help Groups	20th November 2004	Oriya
2.	Dr. P.K. Sahoo Scientist (F & F) Sr. Scale	Machha Chasa Kshetrare Mahila (Women in Pisciculture)	8th December 2004	Oriya
3.	Mrs. L.P.Sahoo, Scientist (S.T.)	Deshiya Padhatire Bihan Saita (Seed storage using indigenous methods)	27 th December, 2004	Oriya

5. RESEARCH PROJECTS

Sl No	Name of the project	Date of launching	Investigators
PROJECTS CONCLUDED (2004-05)			
MAIN CENTRE			
1	Survey on post-harvest handling of vegetables in rural areas	December, 2002	Dr.B.L.Attri, Mrs. Abha Singh
NATP			
2.	Empowerment of women in agriculture	October, 2001	Dr.Suman Agarwal & Mrs.L.P.Sahoo
ON-GOING PROJECTS			
3.	Popularization of eco-friendly pest management technologies for vegetables among farm women in homestead lands	December, 2002	Dr.S.K.Srivastava, Dr.B.L.Attri, Mrs.Laxmi Priya Sahoo
4.	Approaches to engendering agricultural research and extension – on networking mode	February, 2004	Dr.Hema Pandey, Dr.Indu Grover, Dr.P.S. Geethakutty, Dr.B.N.Sadangi
5.	Standardization of weaning mix using different proportions of sweet potato	December, 2003	Mrs.Abha Singh, Dr.Archana Mukherjee
6.	Studies on eco-friendly weed management	January, 2004	Dr.M.P.S. Arya
7.	Micro propagation of pointed gourd (<i>Trichosanthes dioica</i> Roxb) for empowerment of Women	January, 2004	Dr. Bharati Killadi, Dr.Archana Mukherjee
8.	Efficient resource management of women agricultural labourers	December, 2003	Dr.Sabita Mishra
9.	Development of modules for mobilization of rural women for sustainable livelihood through Women Self Help groups	January,2004	Dr.Suman Agarwal
10.	Database on gender in Agriculture	February, 2004	Dr.H.K.Dash, Dr.P.K.Sahoo, Dr. B.L.Attri
11	Studies on sustainable aquaculture packages for empowering rural women	April, 2004	Dr.P.K.Sahoo & Dr.B.N.Sadangi
12.	Refinement of invigoration techniques as suitable to farm women for enhancing planting value of finger millet (<i>Eluesine coracana</i>) seeds	October, 2004	Mrs.Laxmi Priya Sahoo
13.	Empowerment of Farmwomen in post harvest handling of vegetables	October, 2004	Dr.B.L.Attri & Mrs.Abha Singh
SUB-CENTRE			
14.	Involvement of farm women in agriculture and allied activities in the state of Madhya Pradesh		Er. S.P. Singh Er. Nirmal Kumar
15.	Ergonomical evaluation of manually operated Cleaner Grader, Seed Drill, Fertilizer Broadcaster and Ridger with women workers.		Er. S.P. Singh
DBT FUNDED PROJECTS			
16	Involving women in aquaculture – A step towards economic and nutritional security	March, 2003	Dr.P.K.Sahoo & Dr.H.K.Dash
17.	Family based economic security of backward communities through ornamental and integrated fish farming	May, 2004	Dr.P.K.Sahoo, Dr.B.L.Attri & Dr.H.K.Dash

6. PARTICIPATION IN SEMINARS/ WORKSHOPS/ CONFERENCES

- Dr.Hema Pandey, Director & Dr. M.P.S. Arya, Principal Scientist (Agronomy) , (2004) attended Second National Symposium on “Alternate Farming Systems: Enhanced Income and Employment Generation Options for Small and Marginal Farmers” held at PDCSR, Modipuram Meerut on September 16-18, 2004.
- Dr.B.N. Sadangi, Principal Scientist (AE), Dr. M.P.S. Arya, Principal Scientist (Agronomy) & Dr. Suman Agarwal, Principal Scientist (HDRM) (2004) attended a National Seminar on “Drudgery Reduction for Women in Rice Farming”, jointly organized by CRRRI Cuttack & NRCWA, Bhubaneswar at N.R.C. for Women in Agriculture, Bhubaneswar on October 29, 2004.
- Dr. S.K.Srivastava, Senior Scientist, (Entomology), Dr.Sabita Mishra, Senior Scientist (AE) & Mrs. Abha Singh, Scientist (F & N) attended National Symposium on Recent Advances in Rice-based Farming Systems, at Central rice research institute Cuttack, Orissa, from November 17th -19th 2004
- Er. S. P. Singh, Senior Scientist (FMP) attended International Conference on “Emerging Technologies in Agricultural and Food Engineering” at IIT, Kharagpur during from Dec, 14-17, 2004.
- Dr.B.N. Sadangi, Principal Scientist (AE), Dr. M.P.S. Arya, Principal Scientist (Agronomy), Dr. Suman Agarwal, Principal Scientist (HDRM), Dr.B.L.Attri, Senior Scientist, (Hort.), Dr. S.K.Srivastava, Senior Scientist, (Entomology), Dr.Sabita Mishra, Senior Scientist (AE) Dr. P.K.Sahoo, Scientist, Senior Scale, (F&F), Dr.Hemanta Kumar Dash, Scientist (Agril.Eco), Dr.Bharati Killadi, Scientist, (Hort.), Mrs.L.P.Sahoo, Scientist (ST). & Mrs.Abha Singh, Scientist (F&N) attended National Workshop on Role of women in mechanized farming at NRCWA, Bhubaneswar, on 8th January, 2005.
- Dr. B.L.Attri, Senior Scientist (Hort.) attended state level seminar on “Recent development and future strategies for cultivation of medicinal and aromatic plants in Orissa” at OUAT, Bhubaneswar from 11-12th January, 2005.
- Dr.S.K. Srivastava, Senior Scientist (Ent.) & Dr.Sabita Mishra, Senior Scientist (AE), .(2005) attended International Conference on Sustainable Crop Production In Stress Environments : Management and Genetic Options, at Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur (M.P.), from February 9th -12th 2005.
- Dr. M.P.S. Arya, Principal Scientist (Agronomy) (2005) attended 7th Agricultural Science Congress held at College of Agriculture, Pune from February 16-18, 2005.
- Er. S. P. Singh, Senior Scientist (FMP) attended 39th Annual ISAE Convention of Indian Society of Engineers (ISAE) at ANGRAU, Rajindernagar, Hyderabad from March 10-11, 2005:

Participation in Regional Exhibitions

1. NRCWA participated in the Regional Kisan Mela for the States of Eastern India from 21st - 24th March, 2005 at OUAT, Bhubaneswar and put one stall for exhibiting women friendly technologies and processes.
2. NRCWA Sub Centre at Bhopal participated in exhibition on “Horticultural Tools and Equipment” at CIAE Bhopal on April 16-17, 2004, November 10, 2004 and December 3-4, 2004. A stall was arranged in the exhibition where farm tools/equipments suitable for farm women were exhibited.

7. OTHER ACTIVITIES

Celebration of 'Hindi Chetna Diwas

Hindi Chetna Diwas was celebrated on 14th September, 2004 in the Centre. On this occasion, two competitions like, debate in Hindi and Hindi dictation were organized. Director, NRCWA, in her inaugural address appealed to all the staff to use Hindi language as much as possible for promotion of Rajbhasa.



National Seminar

National Seminar on "Drudgery reduction for women in rice farming" was held on 29th October, 2004 at National Research Centre for Women in Agriculture, Bhubaneswar in collaboration with Central Rice Research Institute (ICAR), Cuttack, Orissa on the eve of international year of Rice, 2004. Useful recommendations emerged for reduction of drudgery for farm women.

Scientists-farm women interface

Hon'ble Union Minister for Agriculture Shri Sharad Pawar accompanied by Dr. Mangala Rai, DG, ICAR and Secretary, DARE, visited the newly constructed administrative cum Lab building and participated in the scientist-farmer interface.



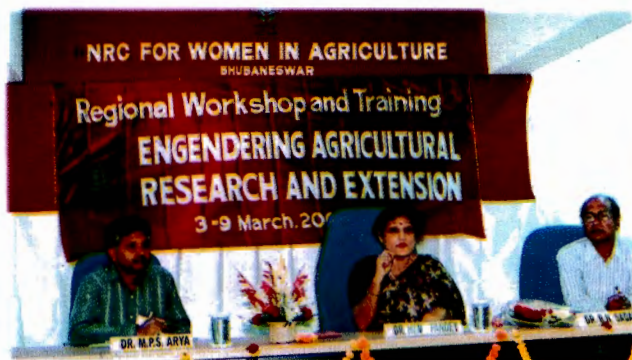
National Workshop:

National Workshop sponsored by National Commission for Women, New Delhi was organized on "Role of women in Mechanized farming" on 8th January, 2005 at National Research Centre for Women in Agriculture. Shri Naveen Pattanaik Hon'ble Chief Minister of Orissa inaugurated the workshop in presence of Mrs. Poornima Advani, Chairperson, National Commission for Women. Deliberations were made by Scientists from different organizations. Interactions were made between farmwomen and scientists for getting feedback on uses of existing farm implements. Useful recommendation emerged from the workshop.



Regional Workshop

Regional Workshop on "Engendering Agricultural Research and Extension" was organized from 3rd to 9th March, 2005 at National Research Centre for Women in Agriculture under the project "Engendering Agriculture Research and Extension: on networking mode.



8. IMPORTANT MEETINGS

- Scientific Research Council Meeting was held on 10th September, 2004, and reviewed research progress and approved two new research projects.
- Sixth Research Advisory Committee meeting was held on 17th-18 March, 2005. It was specially convened to discuss the draft document of Vision 2020. Progress of ongoing research projects were also reviewed.
- Sixth Institute management Committee Meeting of Centre was held on 5th April, 2005.

9. DISTINGUISHED VISITORS

- **Shri Sharad Pawar**, Hon'ble Union Minister for Agriculture & Consumer Affairs, Food and Public Distribution
- **Shri Naveen Pattanaik**, Hon'ble Chief Minister, Govt. of Orissa
- **Mrs. Poornima Advani**, Chairperson , National Commission for Women, New Delhi
- **Dr. Mangala Rai**, DG, ICAR & Secretary, DARE
- **Dr. P. Das**, DDG (AE) ICAR, New Delhi
- **Dr. Bhagirathi Senapati**, Vice-Chancellor, OUAT, Bhubaneswar
- **Dr. B. S. Hansra**, ADG(AE) ICAR, New Delhi
- **Mrs. Alka Panda**, IAS, Commissioner-cum-Secretary Tribal Welfare, Govt. of Orissa
- **Mrs. Aparajita Sarangi**, Director, Mission Shakti, Govt. of Orissa, Bhubaneswar
- **Ms. Anusuiya Ulke**, Member, National Commission for Women New Delhi
- **Mrs. Namita Panda**, Chairperson, State Commission for Women, Orissa
- **Dr. Tej Verma**, ADG, ICAR, New Delhi
- **Dr. Nawab Ali**, Director, Central Institute of Agricultural Engineering, Bhopal
- **Dr. N. Sarangi**, Director, Central Institute of Freshwater Aquaculture, Bhubaneswar
- **Dr. B. K. James**, Director, Water Technology Centre for Eastern Region, Bhubaneswar
- **Dr. S. G. Sharma**, Director, Central Rice Research Institute, Cuttack

10. HUMAN RESOURCE DEVELOPMENT

1. Dr H.K. Dash Scientist (Ag. Eco) attended the training programme on " *Multivariate statistical methods in Fisheries research*" held at CMFRI Kochi from 18th March to 08th April, 2004.
2. Mrs. L. P. Sahoo & Dr. Bharati Killadi, attended workshop on Meaningful learning as a communication process held at National Academy of Agricultural Research Management. Hyderabad during 24 – 27th August, 2004.
3. Dr. B. N. Sadangi, Dr. Sabita Misra, Dr. P. K. Sahoo and Mrs. Abha Singh, attended a Training-cum-Workshop on "Socio-Economic and Gender Analysis in Agriculture Research and Development" at Kerala Agricultural University, Vellanikkara from 20 – 29 September, 2004.
4. Dr. B. N. Sadangi, Pr. Scientist (AE), Dr. M. P. S. Arya, Pr. Scientist (Agro.), Dr. Suman Agarwal, Pr. Scientist (HDRM) attended the Training Programme on " *Agri-tourism: Concepts, Approaches, Opportunities and Entrepreneurial Development*", organized by MANAGE at ICAR Research Complex, Ela, Old Goa, from 17-21 January, 2005.
5. Dr. B. L. Attri, Sr. Scientist (Hort.), Dr. M. P. S. Arya, Pr. Scientist (Agro.), Dr. S. K. Srivastava, Sr. Scientist (Ento.), Dr. H. K. Dash, Scientist (Ag. Economics), Dr. Bharati Killadi, Scientist (Hort.) attended trainers' training and workshop on " *Engendering Agricultural Research and Extension*" from 03.03.2005 to 09.03.2005 at NRCWA, Bhubaneswar.
6. Dr. B. L. Attri, Sr. Scientist (Hort.), Dr. P. K. Sahoo, Scientist, Sr. Scale (Fish & Fishery) and Mrs. Abha Singh, Scientist (Food & Nutrition) attended a training on " *Fish processing and production of value added fish products*" from 14.03.2005 to 19.03.2005 at CIFT, Cochin, Kerala.
7. Er. S. P. Singh, Senior Scientist (FMP) attended training on " *Engendering Agricultural Research and Extension*" at NRCWA, Bhubaneswar from March 3-9, 2005.

11. PERSONNEL

As on 31.3.2005

Sl.No.	Name	Designation
1.	Dr Hema Pandey	Director
2.	Dr B.N. Sadangi	Principal Scientist (Agril Extn.)
3.	Dr M.P.S Arya	Principal Scientist (Agronomy)
4.	Dr Suman Agarwal	Principal Scientist (HDRM)
5.	Dr S.K. Srivastava	Senior Scientist (Entomology)
6.	Dr B.L. Attri	Senior Scientist (Horticulture)
7.	Er.S.P.Singh	Senior Scientist (FMP) *
8.	Dr Sabita Mishra	Senior Scientist (Agril Extn.)
9.	Dr P.K. Sahoo	Scientist (Fish & Fishery)
10.	Dr H.K. Dash	Scientist (Agril. Economics)
11.	Mrs.L.P. Sahoo	Scientist (Seed Technology)
12.	Mrs. Abha Singh	Scientist (Food & Nutrition)
13.	Mrs. Geeta Saha	Technical Officer (T-5)
14.	Ms. Nidhi Agarwal	T-II-3*
15.	Shri B.C. Sahu	T-2
16.	Shri Mata Prasad	Asstt. Administrative Officer
17.	Shri V. Ganesh Kumar	Personal Assistant
18.	Mr. M. Radhakrishnan	Sr. Clerk
19.	Ms. Rina Das	Stenographer Gr-III
20.	Mrs. Parisima Sen	Stenographer Gr-III
21.	Mrs. Bishnupriya Moharana	Jr. Clerk
22.	Mr. Biswanath Biswala	S.S.G.1

* Working at sub centre of NRCWA located at CIAE, Bhopal

FAREWELL

Sl.No.	Name & Designation		Relieved on
1.	Dr Bharati Killadi, Scientist (Horticulture)	Transferred to CISH, Lucknow	24.3.2005
2.	Shri Babu R.K., Sr.Clerk	Transferred to ICAR RCER, Patna on Promotion as Jr. Accts. Officer	27.9.2004





National Research Centre for Women in Agriculture

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