Selected livelihood options for disadvantaged regions of India
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Agricultural innovations and diffusion of technologies are the important factors in the country’s quest for food, nutrition, environmental security and enhancement of income and employment. Agriculture research and policy initiatives have led to The ‘green revolution’ in wheat and rice, the ‘white revolution’ in milk, the ‘yellow revolution’ in oilseeds and the ‘blue revolution’ in fisheries which have augmented the food basket of the country. But many technological challenges remain to be solved. A large population is still deprived of the benefits of promising research findings for poverty alleviation and income generation. This is particularly visible in the complex environments and less-favored areas. Under National Agricultural Innovation Project one of the priority has been providing sustainable rural livelihood security to people living in such disadvantaged areas.

National Agricultural Innovation Project, Indian Council of Agricultural Research was initiated with the major objective to facilitate an accelerated and sustainable transformation of the Indian agriculture so that it can support poverty alleviation and income generation through collaborative development and application of agricultural innovations by the public organizations in partnership with farmers’ groups, the private sector and other stakeholders. With this objective, efforts are being made to improve livelihood security of rural people living in the selected disadvantaged regions through technology-led innovation systems, encompassing the wider process of social and economic change covering all stakeholders. This objective is being addressed by 36 consortia consisting of eminent scientists from ICAR Institutes, State Agricultural Universities, Non-Government Organizations etc through Integrated Farming System approach in 97 disadvantaged districts of the country. A viable model for sustainable rural livelihood security for the region is envisaged to be developed. In this endeavor, a number of success stories have emerged from all over the country. Some of these are documented in this publication for cross learning and wider dissemination. Hope this
publication will be fruitful to the planners, researchers and extension workers while formulating policy and implementing in these backward areas.

Dr. Bangali Baboo, National Director and Dr. A. P. Srivastava, National Coordinator, National Agricultural Innovation Project, ICAR deserve appreciation for the this publication.

(S. AYYAPPAN)
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New Delhi-110 001
Preface

A section of our people remained largely bypassed from the impact of green revolution and modern agricultural practices. A large proportion of these people live in less favoured, marginal or more complex environment. Planning Commission, Government of India has identified 150 districts as backward under “Identification of Districts for Wage and Self employment Programmes”. These districts are characterized by inclement weather, poor infrastructure and socio economic backwardness. Many promising technologies and research findings have not reached these farmers, due to either inadequacies in research designs or research results, deficiencies of delivery systems or lack of economic incentives.

Under National Agricultural innovation Project 36 subprojects have been approved for Research on Sustainable Rural Livelihood Security covering 97 backward districts out of 150 backwards districts distributed over 13 agro climatic zones of the country. Several technological interventions suitable for such areas have been developed and successfully demonstrated through these subprojects. Under this publication, an effort has been made to document selected innovative technologies and success stories that have emerged from these subprojects. More technologies are proposed to be included in subsequent publications.

Constant encouragement, support and guidance of Dr. S. Ayyappan, Secretary, DARE and D.G. ICAR has been helpful in achieving the success under the project. Dr. A. P. Srivastava, National Coordinator, Component 3 and his staff deserve special appreciation for bringing out this publication.

(Bangali Baboo)
Acknowledgement

Component 3 (Research on Sustainable Rural Livelihood Security) was designed to improve livelihood of vulnerable group of the society living in the most disadvantaged districts of the country. The study is being conducted through 36 subprojects, 198 consortium partners and more than 1 lakh partners in progress covering 97 districts. This publication is compilation of selected livelihood options for various disadvantaged districts that have emerged from these subprojects.

I, acknowledge with sincere thanks the continuous guidance and encouragement provided by Dr. S. Ayyappan, Secretary DARE and D.G. ICAR. My sincere thanks are due to Dr. P. S. Sidhu and The World Bank team for the support and guidance.

I, gratefully acknowledge the consistent guidance and providing valuable guidance for the publication by Dr Bangali Baboo, National Director, NAIP.

My sincere thanks are due to all the Consortium Leaders, Chairmen CAC, Consortium Principal Investigators, CCPIs for whole heartedly working in these backward regions and providing input for this publication. There are many more success stories reported by various consortia. It is proposed to include them in subsequent publications.

Last but not the least, Dr. Raj Kumar, Dr. Manisha Ashar, R.A., Mr. Himanshu Sehgal and Mrs. Sunaina deserve due acknowledgment for the help provided in preparation of the manuscript.

(A. P. Srivastava)
National Coordinator
### Contents

*Foreword* iii  
*Preface* v  
*Acknowledgement* vii  

1. Rice – Fish - Poultry Farming System - a success story from Tamilnadu 1  
2. Integrated rice – fish – vegetable system for enhanced livelihood in selected backward districts of Assam 2  
3. Integrated fish – vegetable – poultry/pig system 4  
   3.1 Enhanced livelihood through pig-fish-vegetable system in Assam  
   3.2 Enhanced livelihood through fish-livestock- horti system in Dhalai  
   3.3 Fish – duck – pig based farming system in South Garo Hills, Meghalaya  
   3.4 Fish – duck – pig based farming system in Dhemaji, Assam  
   3.5 Integrated poultry- fish – vegetable farming system  
4. Improvement of livelihood through integration of fish with aquatic commercial crops i.e., makhana (Euryale ferox Salisb.) & water chestnut (Trapa bispinosa Natans.) in water bodies in flood prone Ecosystem of Darbhanga (Bihar) 8  
5. Utilization of upland fallows for cultivation of maize for increased income, food and nutritional security in Bastar region 9  
6. Income enhancement through intercropping in maize - Jhabua 10  
7. SRI and ICM method of paddy cultivation-a great success in Dhalai, Tripura and South Garo Hills, Meghalaya 11  
8. Redgram transplanting – success story from Bidar, Karnataka 11  
9. Rice cultivation through community approach in a remote tribal village of Dhule 14  
10. Value chain on linseed for enhanced income and nutritional security 15  
11. Multi-tier horticulture under homestead based production situations 16  
12. Utilization of drying beds of water tanks for growing watermelon in summer 17  
13. Zero tillage in wheat cultivation: a success story from Dakshin Dinajpur 18  
14. Zero tillage in rapeseed mustard (M-27) - A resource Conservation Technology with least monetary inputs at Tamenglong 18  
15. Mushroom Production- a source of livelihood 19
15.1 Introduction of mushroom cultivation at Balaram Village, Dhalai
15.2 Mushroom production for livelihood. A case study from Samastipur
15.3 Production of paddy straw mushroom and oyster mushroom – A success story from Orissa
15.4 Mushroom Production in village Mudiyani of District Champawat

16. Tuber crops – a source of enhanced livelihood
16.1 Introduction of HYV and adoption of improved production technology of potato- a success story from Tamenlong, Manipur
16.2 Tuber crops: A boon to Nuagaon (Dhekanal, Orissa) with barren lands

17. Livelihood generation for marginal and small farmers through integrated interventions of vegetable at Tera village of Raebareli

18. INM and IPDM in the Onion crop- a success in Chitradurga district
19. Conversion of a non vegetable producing area into hub of vegetable production and assuring reasonable livelihood and nutritional security

20. Dahod tribal farmers becomes seed producers – A success story
21. Pig rearing as a source of livelihood
21.1 A study from Dumka and Jamtara, Jharkhand
21.2 Research group helps pig business become bigger business in Northeastern India

22. Sustainable livelihood through Kadaknath production in Jhabua, Madhya Pradesh
23. Goat development – Goat Bank approach
24. Mass infertility control, boost in milk production and establishment of small rural dairy chain in Barabanki district of U.P.

25. Recharging open wells
26. Increasing water storage capacity and improving soil fertility – desilting of minor irrigation tanks

27. Improved productivity of shifting/jhum cultivation lands

29. Community biogas for sustainable rural energy cum organic manure production
30. m-Krishi’ Fisheries Advisory Service (Potential Fishing Zone (PFZ))
31. Tasar Sericulture : A sustainable option for livelihood
<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.</td>
<td>Light traps_ A small innovation for livelihood improvement</td>
<td>41</td>
</tr>
<tr>
<td>34.</td>
<td>Livelihood Security through lac cultivation</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>34.1  Lac Cultivation in Betul district, Madhya Pradesh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>34.2  Lac Cultivation in Jamtara district of Jharkhand</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Pickle making of Jackfruit and other under utilized NTFPs- a source of livelihood</td>
<td>44</td>
</tr>
<tr>
<td>36.</td>
<td>Livelihood improvement through collection, primary processing and marketing of tamarind</td>
<td>45</td>
</tr>
<tr>
<td>37.</td>
<td>Dungaria Agro Producer Company Limited, Mewada Facilitating Innovative Livelihood Solutions to Cotton Seed Producers through an Integrated Farming Mechanism</td>
<td>46</td>
</tr>
<tr>
<td>39.</td>
<td>Vegetable and Fruit Council, Keralam (VFPCK) Model - a success in wayanad</td>
<td>49</td>
</tr>
<tr>
<td>40.</td>
<td>Successful farmers</td>
<td>50</td>
</tr>
<tr>
<td>41.</td>
<td>Awards</td>
<td>52</td>
</tr>
</tbody>
</table>
1. **Rice – Fish - Poultry Farming System - a success story from Tamilnadu**

Paddy is a major crop of three backward districts of Tamilnadu namely Villupuram, Cuddalore and Nagapattinam. The baseline survey of the wetland clusters of these districts indicated that the gross household income is Rs.31,822/= per ha per year. To enhance income of these farmers Integrated Rice–Fish-Poultry Farming System has been successfully demonstrated on 430 farm holdings in 12 villages of these districts. Various parameters of the system viz optimum number of birds, cage size, fish density, trench size were optimized at Annmalai University and demonstrated at field sites. The interventions included transplanted rice in 200 m² area, 20 poultry birds kept in cages of size 180 cm x 120 cm x 90 cm; 100 fingerlings (Rohu, Mrigal, Catla, Common Carp) in trench of 20m² area. The trenches are one metre deep and with a top width of 0.75 m and bottom width of 0.5 m occupying 7.5 per cent of rice area. The cages are installed anywhere in the field using four concrete posts of height 240 cm, of which 120 cm is buried inside the field and 120 cm is protruding above the ground. The bottom of the cages are made of wire mesh (0.5 sq. inch) so as to leave the broiler waste, straight to the rice field where in a 10 cm water column is maintained, allowing the poultry waste to get dissolved and enabling it to serve both as rice manure and fish feed. This excludes the need for collecting the poultry waste and applying it to the rice field, the task of which is laborious besides the scope for some wastage.

![Image of a rice field with fish cages and poultry structures](image)

The results indicated annual increase in net return per household varied from Rs. 14,350/- to Rs. 24,800/- per unit of 200m² for two and three crops annually taken respectively. The
manure output from broiler birds in rice are furnished in Table 1. The results indicated that addition of poultry manure in five cents of rice area has added nutrients more than the quantity that could have been possible through the normally recommended dose of farm yard manure. Higher nutrient addition through poultry manure compared to other organic sources in rice is already observed in institutional and on-farm experiments. Pest incidence in rice as shown in Table 2, is also reduced due to integration of the fish culture and poultry components, because of the feeding habits of fishes that suppresses the egg masses, larvae and alternate weed hosts of pests.

### Table 1: Manure addition from poultry voiding

<table>
<thead>
<tr>
<th>District</th>
<th>Total quantity of voiding added for 200m² of rice/year, (kg)</th>
<th>Nutrients added, (kg) (1.73% N, 0.85% P₂O₅ &amp; 0.38% K₂O)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Cuddalore</td>
<td>228.00</td>
<td>3.94</td>
</tr>
<tr>
<td>Nagapattinam</td>
<td>279.45</td>
<td>4.83</td>
</tr>
<tr>
<td>Villupuram</td>
<td>392.00</td>
<td>6.78</td>
</tr>
</tbody>
</table>

### Table 2: Pest incidence in rice under Rice – Fish – Poultry system

<table>
<thead>
<tr>
<th>Districts</th>
<th>Leaf Damage in % on 40 DAT</th>
<th>N. lugens Population on 7 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rice Alone</td>
<td>Rice -Fish- Poultry</td>
</tr>
<tr>
<td>Cuddalore</td>
<td>23.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Villupuram</td>
<td>21.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Nagapattinam</td>
<td>17.0</td>
<td>14.0</td>
</tr>
</tbody>
</table>

For expansion of the technology, an interaction workshop between farmers and bank officials was organized. The workshop was attended by Senior Officials of National Bank for Agriculture and Rural Development (NABARD), Indian Bank and Indian Overseas Bank. The meeting facilitated in sanctioning of loan to farmers either to initiate this intervention or add to the area under rice – fish – poultry system.

### 2. Integrated rice – fish – vegetable system for enhanced livelihood in selected backward districts of Assam

In major parts of Assam rice is taken as a mono crop. The productivity and income is low. To enhance livelihood of farmers of the area integration of fish with existing rice crop has been successfully demonstrated is by Assam Agricultural University, Jorhat in three backwards districts of Assam namely Lakhimpur, Kokrajhar and Karbianglong. After rice crop, vegetables
were cultivated to utilize residual moisture and enriched nutrients added by activities of fish. This land was traditionally left uncultivated after rice crop. The technology is suitable for the areas where rice crop is flooded with water for major duration of the crop.

The technology involves digging of trench of 0.6m X 0.6m (depth and width) on the sides of rice field. Approximately, 8 to 10 percent of the area is covered by these trenches. It allows the fishes to be in the trenches during reduced water level in the main plot.

Integrated rice fish – vegetable system was demonstrated in an area of 168 ha covering 600 farmers (@0.28 ha/hh). HYV Ranjit, were promoted to replace the traditional varieties. Fish (Rohu, Mrigal, Catla, Common carp and Silver carp) were provided with recommended rate of 400 for 2800 m² area. After rice crop, vegetables (French bean, chilli and knollkhol) were cultivated. The yield of paddy crop increased from base line value of 2.9 t/ha to 4.7 t/ha. The yield of fish and vegetable from 0.28 ha area was 40-42 kg and 1.7 t (6.1 t/ha respectively). The net income per household from 0.28 ha increased from previous income of Rs 11144/- to Rs 42983/-. As further modification to the practice, a small pond was provided in the centre of the plot instead of rectangular trench around the rice field. It minimized the cost required for trench making by 80% and reduced the area under trench by 80%. As reported, 80% farmers adopted and benefited by this practice.

Mr. Diganta Gohain was a beneficiary of Rice-fish-vegetable module in Lakhimpur district. He had earned profit of Rs-22,380/- from rice-fish-vegetable module against the traditional farming of only Rs-3,537/-. A total of 40 mandays had been generated during the entire period compared to 14 mandays generated during traditional system.
3. **Integrated fish – vegetable – poultry/pig system**

3.1 **Enhanced livelihood through pig-fish-vegetable system Assam**

Dhemaji district of Assam is characterized by number of small farm ponds which are poorly managed and results in little or no income. Also, pig and poultry are commonly used commodity in the region. Efforts were made to develop a suitable Integrated Farming system particularly pig-fish-horti and poultry-fish-horti to ensure higher income and employment opportunity. In Dhemaji district, Assam for 235. HH altogether 925 improved breed of pig and 5653 improved poultry birds have been introduced and the first progeny of 900 cross breed pig has already been achieved. This has led to rapid increase of population of improved breed of pig in the project villages. In Pig-fish-horti there is an achievement of enhanced income of Rs. 22,473/- per family where additional income of Rs.13,540/- came from piggery unit, Rs. 3600/- came from fish pond and Rs. 5333/- came from vegetables. The figures on per ha basis is given in following table.

*Table: Economics of pig-fish-vegetable system in Dhemaji, Assam (AFPRO, Guwahati)*

<table>
<thead>
<tr>
<th>Activity</th>
<th>HH No.</th>
<th>Area (ha)/number</th>
<th>Baseline Yield (t/ha)</th>
<th>Achievement (t/ha)</th>
<th>Enhanced Income (Rs/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pig (*wt gain in kg)</td>
<td>188</td>
<td>425 no</td>
<td>25*</td>
<td>33*</td>
<td>13540/-*</td>
</tr>
<tr>
<td>Fish</td>
<td>188</td>
<td>95</td>
<td>1.5</td>
<td>2.1</td>
<td>54,000/-</td>
</tr>
<tr>
<td>Potato</td>
<td>80</td>
<td>8</td>
<td>5</td>
<td>14</td>
<td>45,000/-</td>
</tr>
<tr>
<td>Tomato</td>
<td>60</td>
<td>15</td>
<td>20</td>
<td>30</td>
<td>51,000/-</td>
</tr>
<tr>
<td>Brinjal</td>
<td>48</td>
<td>15</td>
<td>10</td>
<td>15</td>
<td>24,000/-</td>
</tr>
</tbody>
</table>

*Pig weight is given in kg

3.2 **Enhanced livelihood through fish-livestock- horti system in Dhalai (Tripura)**

Evaluation and validation of indigenous and improved fish based farming system models for enhancing production in agro-ecosystem of disadvantageous areas of district of Tripura for sustainability, profitability and competitiveness was conducted. The results indicated that on an average each household owning an area of 0.42 ha and one pig can earn Rs 29392/= (ie
an income upto Rs 48630/= from 1 ha area and one pig can be obtained). The details are given in following table:

**Table: Economics of pig-fish-vegetable system in Dhalai (Tripura)**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Pre- project</th>
<th>Project intervention</th>
<th>Pre project yield</th>
<th>Present yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish species</td>
<td>Rohu, Catla, Mrigal</td>
<td>Rohu, Catla, Mrigal, C. Carp, M. Carp, S. Carp, G. Carp, Prawn</td>
<td>640 kg/ha/day</td>
<td>2600 kg/ha/day</td>
</tr>
<tr>
<td>Fruit Crops</td>
<td>Banana</td>
<td>Banana, Papaya, Pineapple</td>
<td>625 kg/ha/year</td>
<td>1625 kg/ha/year</td>
</tr>
<tr>
<td>Veg. crops</td>
<td>Potato, Brinjal, Chili, Amaranthus</td>
<td>Potato, Cabbage, Cauliflower, Brinjal</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Animal</td>
<td>Nil</td>
<td>Pig (Yorkshire)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Net income, Rs</td>
<td>3167</td>
<td>29392</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

(Area under water body: 0.42 ha, fruits/vegetables: 0.85 ha, number of cases: 3)

3.3 Fish + duck + pig based farming system in South Garo Hills, Meghalaya

Sixty household in 11 villages of Sibbari cluster, South Garo Hills were selected for Fish+duck (Sonali) + pig (Hampshire) based farming system. A total of 10 new ponds were constructed and 30 old small ponds were renovated. Due to this intervention fish productivity has increased by about 1.5 t/ha and individual farmers are earning about Rs.10,000 from their pond (25m x 25m). Ducks give about 150 eggs/annum as compared to 110-120 from local one and villagers are selling egg@ Rs. 6-7/egg.

The improved Hampshire breed is giving two furrowing in a year with 7-8 piglets/furrowing. Farmers are selling the piglets after 3 months @Rs. 1500/piglet. Some farmers are also selling vermis compost @Rs. 6/kg. Altogether the farmers are very happy and they are earning a net income of about Rs. 15000/annum from such integrated farming.

3.4 Fish - duck - pig farming system in Dhemaji, Assam

AFPRO introduced fish + duck + pig farming system in Dhemaji district, Assam. Fish ponds of 500 m² were constructed/renovated. Duck house was built on the pond/embankment...
to allow manures to fall directly into the pond or it is located on the dike and manure is washed in daily. Fingerlings (size 5–10 cm) of katla, rohu, mrigal, silver carp, grass carp and common carp were released in the pond @ 10000 /ha and the available area in and around of fish pond has been covered under banana cultivation. Ducks were stocked in the duck house at the stocking density of 15000/ha. Duck dropping act as feed and fertilizer for cultured fish in the pond. Also, left over feed of duck was used as supplementary feed for fish. The net income and benefit cost ratio were a follows :

<table>
<thead>
<tr>
<th>HH Area (ha)</th>
<th>Area (ha)</th>
<th>Initial Yield (t/ha/yr)</th>
<th>Final Yield (t/ha/yr)</th>
<th>Cost of Cultivation Rs/ha/unit</th>
<th>Net income Rs/ha</th>
<th>B:C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated farming system (Fish + duck + Pig)</td>
<td>25</td>
<td>12.5</td>
<td>0.36 (Fish)</td>
<td>2.1 (Fish)</td>
<td>25500</td>
<td>20500</td>
</tr>
</tbody>
</table>

3.5 Integrated poultry- fish – vegetable farming system

A sample survey was conducted in the target districts namely, Lakhimpur, Kokrajhar and Karbi Anglong covered under the NAIP projects (Component 3) entitled “Livelihood Promotion through Integrated Farming System in Assam” from a group of 750 selected farmers. The results are summarized below:

Table 1: Existing production, productivity and Income in three districts

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Baseline values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable: Area (ha)</td>
<td>44.9</td>
</tr>
<tr>
<td>Yield (q/ha)</td>
<td>242.8</td>
</tr>
<tr>
<td>Poultry (nos.)</td>
<td>2684</td>
</tr>
<tr>
<td>Productivity of poultry (meat in kg/bird)</td>
<td>1.3</td>
</tr>
<tr>
<td>Laying capacity of birds (no. of eggs/ bird)</td>
<td>86</td>
</tr>
<tr>
<td>Pond with fish culture (nos.)</td>
<td>617</td>
</tr>
<tr>
<td>Productivity of pond (t/ha)</td>
<td>3.3</td>
</tr>
<tr>
<td>Area under fish culture (ha)</td>
<td>53.3</td>
</tr>
<tr>
<td>Avg. Income from wages</td>
<td>13,333</td>
</tr>
</tbody>
</table>
Among various livestock and fisheries activities, very little expenditure is made on animal rearing and maintenance. The poultry breeds were only indigenous in all the surveyed villages (2684 numbers in all the clusters). Despite having 617 household ponds (617 no’s), scientific fish rearing is not done and fisheries contribute little to the family income.

Based on the farmers’ situations, sub-modules were implemented. Poultry house was integrated with a homestead fish pond of 450 m² water surface area for recycling of animal wastes. Fertilized pond water enriched with blue-green algae was used for irrigating horticultural crops at marginal area measuring 1000 m² on the bank of the pond. Fish species like catla, rohu, mrigel, grass carp and Silver carp were released in the ponds with proportionate amount. Provisions were made in such a way that poultry excreta can directly go to the pond and this act as feed for fish. Poultry house was constructed for all the beneficiaries under the module. Under poultry-fish-vegetable module, 50 Day Old Chicks (DOC) of Vanaraja/Giriraj breed per beneficiary were distributed among 210 beneficiaries. Okra in Kharif and cabbage in the rabi season were cultivated for additional nutrition and income. An income of Rs 81235/- was obtained under poultry-fish-vegetable farming system with a benefit - cost ratio of 3.7:1 as given in following table:

<table>
<thead>
<tr>
<th>Items</th>
<th>Traditional Practice</th>
<th>IFS with Improved practice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production (Rs)</td>
<td>Income (Rs)</td>
</tr>
<tr>
<td>Eggs</td>
<td>500 nos laid by 6 female birds</td>
<td>1,650.00</td>
</tr>
<tr>
<td>Live birds</td>
<td>2 nos with av body wt 1.5 kg</td>
<td>480.00</td>
</tr>
<tr>
<td>*FFEW(q)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4. **Improvement of livelihood through integration of fish with aquatic commercial crops i.e., makhana (*Euryale ferox* Salisb.) & water chestnut (*Trapa bispinosa* Natans.) in water bodies in flood prone ecosystem of Darbhanga (Bihar)**

Under NAIP sub project “Sustainable Livelihood Improvement through Need Based Integrated Farming System Models in Disadvantaged Districts of Bihar (Lead Centre: ICAR Research Complex for Eastern region, Patna)” efforts were made for integration of fish with aquatic commercial crops i.e., makhana (*Euryale ferox* Salisb.) & water chestnut (*Trapa bispinosa* Natans.) in order to enhance income, generate employment and in turn improve livelihood. The technology was demonstrated in an area of 50 ha with 96 beneficiaries in Darbhanga Sadar Block.

The outcome of the intervention revealed that makhana as a primary crop gave a total net profit of Rs 7,90,636/= with an employment generation of 9437 man days per year. The fish as a secondary crop

<table>
<thead>
<tr>
<th></th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>2.62</th>
<th>2,320.00</th>
<th>26,250.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish (Pond area 450 m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>3.2</th>
<th>1,905.00</th>
<th>4,800.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabbage, q (1000 m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>4.2</th>
<th>1,432.50</th>
<th>9,2400.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Okra, q (1000 m²)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 1,650.00 2,980.00 17,357.50 81,235.00

<table>
<thead>
<tr>
<th>Labour employed, (man days)</th>
<th>15</th>
<th>82</th>
</tr>
</thead>
</table>

Benefit cost ratio: 0.8:1 3.7:1

*FFEW (q): Fish feed equivalent waste*
integrated in makhana ponds showed an additional net income of Rs 4,65,677/= with an employment generation of 889 man days/year, whereas water chestnut taken as tertiary crop generated an additional net income of Rs.25,010/= with an employment generation of 335 man days/year.

5. Utilization of upland fallows for cultivation of maize for increased income, food and nutritional security in Bastar region

The uplands in Bastar region are mostly left fellow or used for cultivation of less remunerative crops like millets, niger or horsegram. The farmers were motivated for cultivation of rainfed maize in upland fallows in project area. Seeds of improved varieties / hybrids (JM 216, Kargil, 30R77) and balanced fertilizer were provided. One women group was also promoted for its cultivation. The crop was sown under the technical supervision of NAIP team along with recommended dose of fertilizer and crop protection measures. In all the clusters 300 farmers were included covering 120 ha area.

Due to adoption of this technology farmers achieved maize yield in the range of 45 to 63 q/ha. It is 3 to 4 times higher than the average productivity of 12-15q/ha in Bastar region. Most of the targeted farmers who used to leave their land uncultivated due to poor economic condition, obtained gross output of Rs 38000 to 53000 /ha and net income of Rs18000 to 33000/ha. After harvesting of such a bumper crop, they were motivated to hire maize thresher for community threshing of maize. Small farming women were provided hand maize shellers to reduce drudgery.

The farmers were very happy by bringing fallow lands under rainfed cultivation and diversification from less remunerative crops. It was taken in those areas which were often left uncultivated by the farmer. This will help in increases the rainfed cultivated area and economic and nutritional security to the tribal farmers. Farmer Nilkanth S/o Shobha, village Bhataguda says that “they have never thought that their unused fallow land can also be so productive”. Another beneficiary Vasudev S/o Sadhuram says that “I am now strongly committed and motivated to have a
large area under maize cultivation from next year”. The farmers of Cluster-Pedawada formed a marketing group on their own to store the produce and sell later on when market prices go up. Sh Chetan says, “this will help them in fetching premium price and more profit and our group is thinking of processing it for poultry feed”.

This technology is suitable for upland farming situation which is 55% of cultivated area in Bastar region. If this technology is up-scaled even up to 20% area it is likely to have very large impact on net income, food and nutritional security of tribal farmers. In Bastar, Narayanpur, Dantewada, Bijapur and Kanker districts of Chhattisgarh where the landscape is undulating and uplands are 55% of total geophysical area of these districts, this technology can be used in upland Badi farming situation which is about 6-8% of cultivated area.

Introduction of hybrid maize in four disadvantaged districts of Rajasthan namely Dungarpur, Banswara, Sirohi and Udaipur has made dent in doubling the productivity of maize. The yield were as follows:

- Baseline yield: 14.67 q/ha,
- Yield by intervention: 16.3-32.4 q/ha

Now, Govt. of Rajasthan has provided hybrid seeds of maize (5 kg to each HH) to all the tribal families (7 lakh) in Rajasthan under Golden Rays Programmes and this has resulted in higher productivity of maize in the area. This intervention is going to sustain due to higher productivity and return.

6. **Income enhancement through Intercropping**

Maize is commonly grown as solo crop in Jhabua district, Madhya Pradesh. To enhance income from maize field, the crop was tested as intercrop with soybean, black gram, green gram, pigeonpea, and cotton under improved production technology during 2009-10. The results of intercropping viz maize + soybean, maize + pigeonpea and maize + cotton were more encouraging hence these intercropping systems were in the repeated 2010-11 for higher return. The average income under maize + cotton and maize + pigeon pea intercropping was increased by Rs. 7,635/- per ha. while in case of maize + soybean intercropping an average increase of Rs. 3,580/- per ha. was recorded. However, maize – soybean was adopted most and as estimated the area under maize – soybean increased from 26 ha to 198 ha during 2010-11.
7. **SRI and ICM method of paddy cultivation- a great success in Dhalai, Tripura and South Garo Hills, Meghalaya.**

To improve the productivity and reduce the chemical inputs for generating more income and improving the livelihood of the people SRI method of paddy cultivation was demonstrated in South Garo Hills and Dhalai. A total of 1103 farmers in Marachera and Balaram cluster under Dhalai district (Tripura), were given seeds of Pusa-44, Samba Mashuri & Naveen @ 1kg/kani (0.16 ha) for SRI cultivation. Similarly, a total of 95 farmers were provided Ranjit variety of paddy in South Garo Hills (Meghalaya). Farmers followed the SRI method of rice cultivation right from raising of nursery. About 90% farmers were satisfied with the SRI method due to the increase in productivity. Average productivity of local variety in South Garo Hills district was 1.5 t/ha and in Dhalai district it was 2.1 t/ha. After introduction of Ranjeet variety through SRI average productivity went up to the 4.8 t/ha in South Garo hills whereas in Dhalai (Tripura) after the introduction of Naveen variety through SRI the productivity went upto 3.7 t/ha. In the two sites (Dhalai & South Garo Hills) the average enhancement in income/ha/yr due to the introduction of HYV rice + SRI technology increased by Rs 6700/ha/yr.

8. **Redgram transplanting – success story from Bidar, Karnataka**

Redgram or Pigeonpea (*Cajanus cajan* S.) is popularly known as Tur or Arhar in India. It is one of the major pulse crop of Northern Karnataka. Nearly 5.14 lakh ha is under redgram in
the state with a production of 2.42 lakh tons (766 kg / ha). Bidar district is considered as pulse bowl of Karnataka where in pulses like blackgram, greengram, redgram & Bengal gram are major crops cultivated in 206717 ha. Among these pulses the share of redgram is to the extent of 65642 ha. Redgram is also one of the most important commercial crop for dry land farmers. The crop requires less water and also improves soil fertility. It fixes nearly 20 kg N / ha from the atmosphere into the soil. As estimated the potential and present yield of redgram in Bidar district are 2700 kg/ha and 829 kg/ha respectively. To bridge this yield gap (1871 kg/ha) KVK, Bidar organized farmers scientists interface meet, wherein progressive farmers and KVK scientists discussed various aspects to boost the yield levels in redgram. The idea of transplanting / dibbling technology finally emerged during these meetings.

**Advantages of transplanting in redgram cultivation**

- Advanced sowing
- Pod borer damage is less due to advance planting
- Drought resistance due to deep rooting
- Saving in seeds
- Easy to take up plant protection measures
- Increased branching envisages 2-3 fold increase in yield levels
- Tailor made technology for small & marginal farmers.

After invention of transplanting / dibbling technology in redgram and constant effort made by KVK, Bidar the area of adoption under this technology in Bidar district and neighbouring districts is increasing year after year, Fig 1 and 2. The area under redgram has increased from 200 ha in 2007-08 to 4000 ha in 2009-10. Total production and estimated value has gone upto 11424 tonnes and Rupees 5483 lakh respectively in during 2009-10, Fig 2. The average productivity of the improved and traditional practices were 29.306 and 13.937 q/ha respectively This gave an additional revenue of Rs 43.96 crore in these three years.

It is one of the best example for transfer of technology in recent years after Bt cotton in northern district of Karnataka, due to break through record of yield levels in redgram ecosystems coinciding with increased market prices in pulses. The economic scenario of the district has completely changed. Lot of new redgram processing units are establishing in Bidar district, simultaneously creating employment opportunities. Recently redgram growing farmers in the district started forming associations. They are planning to export processed dal to neighbouring states as well as abroad. Due to this technology living standard of redgram growing farmers is changing slowly in the pulse bowl of Karnataka.
Fig 1: Spread of area under redgram cultivation

Fig 2: Increase in area, production and value of redgram under transplanted technology
9. Rice cultivation through community approach in a remote tribal village of Dhule, Maharashtra

Under National Agricultural Innovation Project, Laghadwal–Navagaon villages of Sakri taluka in Dhule district of Maharashtra were selected for project activities from April, 2009. Tribal farmers of the area are beset with low productivity rainfed agriculture, high socially and economically backward population, low agriculture wages, and lack of infrastructure and marketing facilities. This cluster comes under moderately high rainfall zone with rice as an important kharif crop. In Sakri taluka, area under rice is about 7000 ha. Processing units of rice are very meager and located at very long distances.

Current practice of seeding in July or waiting till adequate onset of monsoon has its own uncertainties and often results in delayed transplanting and low yield. Establishment of paddy nursery in June was the major intervention introduced to utilize rainwater optimally. Community nursery was raised in each village to overcome challenges thrown by late onset of monsoon. Shortage of water was offset by a community action wherein all the villagers joined together to utilize the only available water resource, a lone tube well in each of the three villages.

The traditional practice of transplanting 10 or more plants per hill was strongly discouraged and only 2-3 seedlings were planted per hill. Thus the seed rate was cut by 60-80% (Rs. 540/=). Recommended doses of chemicals & fertilizers (NPK:100:50:50) were applied. Row to row and plant to plant distance was kept same at 25X25 cm. It is estimated that in seed cost alone, the community saved Rs. 246780/- during 2010 from 457 acre area. The advantages of this system were as follows:

- Seedlings were ready for transplanting at the on-set of monsoon
- Protection from early recession of rains/ moisture shortage
- Greater number of panicles (30-40)
- Timely weeding
- Early kharif harvest & availability of soil moisture for rabi crop

Under crop intervention programme improved technology of rice were demonstrated with variety ‘Phule Radha’ and Urea-DAP briquettes on 20 ha area of 30 small farmers during kharif 2009 and 2010. These interventions increased paddy yield by 31 to 50 per cent.

A Mini Rice Mill of 500 kg per hour processing capacity with polishing facilities and 67 per cent recovery was installed in Laghadwal village in December, 2010. Training on operation and maintenance of the mill was imparted to local youth. A Cluster level Committee was constituted for its management and market linkages. The charges of processing were fixed at Rs. 30 /bag of 60 kg (with retention of husk). From December, 2010 to April, 2011, 40 tons of paddy was processed and an amount of Rs. 20,000/- was collected as processing charges and Rs. 22,000/- from sale of paddy husk to cattle industries. It also generated employment to six rural youths for operating the mill.
10. Value chain on linseed

Value chain of component comprises production of improved varieties of linseed and value addition. Linseed is a stable vegetarian source of Omega 3 fatty acids deficiency of which in modern diet has led to degenerative diseases. Therefore the effort is to bring back omega 3 in the diet through linseed processing and realization of good price to linseed growing farmers. Use of improved varieties (NL-97 and PKV-NL-260) and adoption of recommended package of production and protection resulted into increase in yield from 235 kg /ha to 820 kg/ ha and income increased to Rs. 31,160/ha from Rs. 8,930/ha . Over 600 farmers have been benefitted by this intervention.

**Comparative Performance**

<table>
<thead>
<tr>
<th>Practice</th>
<th>Baseline</th>
<th>Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use of old varieties with no input like fertilizer, irrigation, plant protection etc</td>
<td>Use of improved varieties (NL-97 and PKV-NL-260) and Adoption of recommended package of production and protection</td>
</tr>
<tr>
<td>Yield</td>
<td>235 kg /ha</td>
<td>820 kg/ha</td>
</tr>
<tr>
<td>Income</td>
<td>Rs. 8,930/ha</td>
<td>Rs. 31,160/ha</td>
</tr>
</tbody>
</table>

A linseed processing unit to extract omega 3 oil and omega-3 enriched poultry feed has been established at Sangamner under the subproject. The unit produces Omega-3 oil, enriched feed mix and linseed cake powder. It is then further processed to produce **Omega 3 eggs**, **Aplha lite oil**, and **Soft gel – nutrition suppliment etc.**
11. Multi-tier horticulture under homestead based production situations

The technology is to enhance household nutritional security of the participating community partners, having poor land base, by way of providing enhanced availability of seasonal vegetables for daily family diet round the year and through effective utilization of cultural space under backyard/courtyard/pond dyke situations. It was demonstrated in Malda, Murshidabad and South Dinajpur districts of West Bengal. The technology has two core components: i. A low cost three tier scaffolds for better...
utilization of vertical space. ii. Cultivation of seasonal vegetables. At the base of tier (i.e. on the ground), crops like chilli/hybrid tomato/veg. coriander/ green fenugreek/ red amaranthus etc. were placed. At the tier-1 (i.e. over 4’ wide scaffold) broad leaved cucurbitaceous crops like bottle gourd/ cucumber/ash gourd/ridge gourd/snake gourd/ pointed gourd etc. were grown. At the tier-2 (i.e. over 2’ wide roof of the scaffold), short leaved vine crops like bitter gourd/ basella etc. were placed as per seasonal fitment. The technology was demonstrated in northern districts of West Bengal.

For standardization of the scaffold structure, prototype development and its due refinement was done by the project scientists by way of taking inputs from the selected village level resource persons so as to ensure availability of adequate and uninterrupted sunshine at all the tiers.

The technology in reference is basically triggered at ensuring the household nutritional security through greater incorporation of home produced vegetables in the family diet. While the base line statistics concerning average per caput rate of vegetable consumption in daily diet at the identified clusters was estimated to be a meager 131gm., it shot up to 256.76gm./caput/day to suggest a commendable 96% increase in that respect.

12. Utilization of drying beds of water tanks for growing watermelon in summer

The innovation involved utilization of residual moisture in tank beds for successfully growing the watermelon. A group of 36 farmers from Asalpani (Tanda) Village in Goregaon cluster of Gondia district, belonging to the tribal community were selected for cultivation of watermelon (Var. Black Sugar). Gravity irrigation system was developed for irrigation as the drip irrigation system was too costly for the farmers to purchase. Hence, a simple system with 1000 lit tank was installed on elevation and the laterals were gravity fed. The water tank was filled up by the farmers manually by rotation of labour. One tank irrigated 0.22 acre area. Innovative method of nursery preparation was used. Instead of broadcasting the seeds on nursery beds, single seed was sown in a plastic bags reducing seed requirement and hence the cost of seed. Transplanting was done 15 days after sowing. During 2009-10, with an yield of 50 tonnes an additional income of Rs 2.0 lakhs was obtained with 33 farmers participating in it.

Farmers of selected villages of Tapan Block practiced the cultivation of wheat with the help of conventional method. But after a successful demonstration of wheat cultivation in a small plot by using the new technology of zero tillage by U.B.K.V. Coochbehar through NAIP project in 2008-09, beneficiaries of this cluster understood that it is possible to get more yield and thereby return of an average Rs. 18000 ha⁻¹ in zero tillage method as sowing of seeds can be done timely without land preparation i.e. immediately after the harvesting of the preceding crop (paddy) that helps in efficient utilization of residual moisture which reduce a significant cost of wheat cultivation. As a consequence of positive effect of the trial, more than 50 farmers showed interest in wheat production through zero tillage technology in the following year. This method has shown promise for horizontal expansion.

![a. Zero tillage wheat](image1)
![b. Conventional tillage](image2)
![c. Zero tillage wheat plot](image3)

Table: Cost and return analysis of zero tillage wheat cultivation

<table>
<thead>
<tr>
<th>Year</th>
<th>Conventional method</th>
<th>Zero tillage method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost</td>
<td>Net Return</td>
</tr>
<tr>
<td>2009-10</td>
<td>Rs. 22778.37</td>
<td>Rs. 9880.18</td>
</tr>
<tr>
<td>2010-11</td>
<td>Rs. 24175.25</td>
<td>Rs. 9324.75</td>
</tr>
</tbody>
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14. Zero tillage in rapeseed mustard (M-27) - A resource conservation technology with least monetary inputs at Tamenglong.

Also known as conservation tillage, zero tillage was successfully demonstrated for cultivation of rapeseed mustard. It involves planting seeds into the soil that hasn’t been tilled after harvest of the previous crop. The advantage of the system are as follows;

![Rapeseed- mustard M-27](image4)
Advantage of zero tillage in mustard

- Timely Sowing is possible (October-November).
- Conserve soils moisture and less irrigation water volume and more convenient.
- Saves tillage cost and the soil is protected from erosion due to the retention of surface residues.
- Organic matter depletion can be slowed through reductions in tillage operations

The cultivation practice included the following:

- Seed rate 6-7 kg/ha (sow the seeds after soaking 24 hours) and spacing row to row 6-8 inches
- Fertilizers NPK 60:30:30. Apply half dose urea as basal and remaining half dose at 45 and 60 DAS
- Irrigation 45 DAS and 60 DAS and for aphids spray Monocrotophos (1ml/lit water)
- Harvest when more than 75% of the pods mature

The results on demonstrations conducted indicated an average increase in productivity by 60% from an initial yield of 0.54 t/ha to 0.86 t/ha. In all 116.8 ha area under 322 demonstrations were covered. The overall performance was determined as follows:

<table>
<thead>
<tr>
<th>HH</th>
<th>Area (ha)</th>
<th>Initial yield (t/ha)</th>
<th>Final yield (t/ha)</th>
<th>Cost of cultivation, Rs/ha</th>
<th>Net income Rs./ha</th>
<th>B:C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>322</td>
<td>116.8</td>
<td>0.54</td>
<td>0.86</td>
<td>13000</td>
<td>21000</td>
<td>2.62</td>
</tr>
</tbody>
</table>

15. Mushroom Production- a source of livelihood

15.1 Introduction of mushroom cultivation at Balaram Village, Dhalai

Edible mushrooms are generally considered good source of protein, vitamins and minerals in addition to their flavour and condiment value. About 3.5-4% protein with 71-90% digestibility of fresh mushrooms is nearly twice as that in most of the vegetables. Vitamins, especially those of B complex group like thiamine (B1), riboflavin (B2), niacin and biotin and minerals like potassium, phosphorus, sodium, magnesium and calcium are present in adequate quantities. Apart from this they have certain important medicinal values, such as, the effects of antitumor, hypolipidemic, hypocholesterolemic, antibacterial, antifungal and antiviral.

Successful introduction of mushroom cultivation has been made in Balaram Village of Dhalai district in Tripura. They are selling fresh mushroom in local markets @ Rs. 80/ per kg. Two farmers of Balaram, namely, Mr. Bimal Debnath and Mrs. Rebika Sangma, have started large scale production of mushroom, preparing separate mushroom house, substrate soaking tank and disinfecting unit, racks, etc. Many more farmers are now interested and coming
forward to produce mushroom in large scale for generating more income. In the month of May, 2008 mushroom cultivation was first introduced there giving *in situ* training and demonstration at the farmers’ houses. In all six SHGs (Abachanga, Khabaksha, Sharda, Pohor, Bokri Bodol and Loknath) and fifty beneficiaries were imparted training programme. Later on several training and demonstration were conducted on mushroom cultivation with use of different agricultural wastes in different methods. The farmers successfully learned the techniques. Later on mushroom cultivation has been fully adopted by several farmers of Balaram village.

In all 139 farmers cultivated mushroom during the period starting from June, 2008 to January, 2009. They used 750 mushroom spawns (each 150g) and produced 362kg of fresh oyster mushroom. There expenditure was calculated as Rs. 9000/- @ Rs. 12 for a poly bag filling. The farmers sold their produce @ Rs. 80/- per kg fresh mushroom to the local markets and earned Rs. 28952/-, which resulted in Rs. 19952/- as net profit.

Table: Mushroom production and profit observed in Balaram village, Dhalai

<table>
<thead>
<tr>
<th>No. of Farmers</th>
<th>No. Spawn bag used (150g each)</th>
<th>Expenditure, Rs.</th>
<th>Production mushroom (kg)</th>
<th>Amount received on selling (Rs.)</th>
<th>Profit (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>139</td>
<td>750</td>
<td>9000</td>
<td>361.9</td>
<td>28952</td>
<td>19952</td>
</tr>
</tbody>
</table>

15.2 Mushroom Production for livelihood: A case study from Samastipur

Malpur is a tola of Morsand village under Pusa block of Samastipur. Major population in Malpur is SC landless labours. They have insufficient employment opportunities, poor skills and out migration of rural youth are among major issues to be addressed in this tola. Scientists of R.A.U., Sameshpur visit this village several times to form FIG for Mushroom production/apiculture/vermicompost as they were landless labors. During their visit in day time either forenoon or afternoon between 8pm to 4pm they could meet only women members of this
village. On enquiry it was informed that being landless labours all the men had gone to work outside villages. Then they convinced women of the village to form women group of 20 for mushroom production. They given training initially for oyster mushroom production at their door step. Mrs. Anita Devi was elected group leader of the FIG. When the first flash of oyster was produced they were exposed for its cooking preparation of pakaura. Gradually they started selling it within and nearby villages at the rate of Rs.70/kg. In second step Anita Devi along with her group is giving consultancy for mushroom production. Now, the women FIG of mushroom production is producing button mushroom. Today Mrs. Anita Devi’s name is known in village, block and KVK due to her consultancy on mushroom production.

15.3 Production of paddy straw mushroom and oyster mushroom – success from Orissa

Rice is the staple food of people in Orissa. Enough straw is available for mushroom production. The climate is also congenial for growing paddy straw mushroom during kharif (8 months) and Oyster (Dhingri) mushroom during rabi(4 months). Across all the 6 clusters of Dhenkanal, Kandhmal and Kalahandi, the technology can be scaled up. Within a short period, farmers get return with high benefit cost ratio.

Under NAIP-3, 18 mushroom sheds have been constructed. Each shed has 60 beds. A farm family can get gross return of Rs.1,04,580/-, net return of Rs.62,580 and benefits : cost ratio of 1.49 : 1 with investment of Rs.42,000/- per annum. So 104 no of small and marginal farm families have been involved in the mushroom production activity. The mushroom spent straw can be utilized for preparing vermi-compost.

For regular supply of quality spawn materials for sustainable mushroom production, one spawn production unit per cluster has been established. One person from each cluster has been given entrepreneurship training on spawn production. SHG groups have been mobilized to take up the activity and training on mushroom production has been imparted.
15.4 Mushroom production in village Mudiyani of District Champawat

Nirmal Kumar Vishwakarma is a 31 year old progressive farmer of Mudiyani village of District Champawat. He owns 50 nali (1 ha) land under rainfed condition and supports livelihood of other three elder and four younger members of his family. He grew potato, rice, soybean, wheat and chilli on his farm and earned an income of Rs. 20,000 approximately. He was always curious to raise his agricultural income and used to keep himself in touch with T.V., radio, newspapers etc. He got an opportunity in the year 2007, when his village was selected under NAIP. He was among four mushroom grower of his village. Now, he is famous as mushroom man in his locality. He was the first person who came forward to attend a three day training programme on mushroom production at VPKAS, Almora. Experimental Farm, Hawalbagh. After that, he was provided with five quintal synthetic compost with spawn of button mushroom in the month of December. He started it in a room of 3mX4mX2m adjacent to his house. He was provided technical assistance by the concerned specialist. He did not encounter any disease problem. By the end of April month he was able to harvest 94 kg of button mushroom. He earned an income of rupees of seven thousand (approximately) by selling the produce @ Rs. 75/kg. He spent his earning on purchase of stationary, books, paying of school fee of his children and medical treatment of his family members. He visited nearby district headquarter town, Champawat eight km away from his village for selling the mushroom to vegetable retailers. Initially, he faced the problem of marketing because of less demand of mushroom in the town, and also being a new vegetable crop. People were unfamiliar with the taste. He decided to visit door to door for selling of his produce. In this way he established direct linkage with more than 20 consumers of Champawat town. These consumers directly placed their orders over cell phone to him. He observed that it was a low risk crop (not dependent on outside weather of open field) and needed less water in comparison of green vegetables like tomato, cauliflower etc. It could not be damaged by wild animals like other vegetables grown in open field. He was so much motivated that he had decided to expand the production level in the next year. In the year 2008, he has put ten quintal
compost of button mushroom. He has also learned the techniques of pickles making from mushroom to deal with the problems of marketing. He has decided to go for pickle making, if fresh mushroom is left with him. In this way, he has set up a new example in his village that a person can raise his agricultural income by diversifying the farm activity by lowering the risk and generating the self employment.

16. Tuber crops – a source of enhanced livelihood

16.1 Introduction of HYV and adoption of improved production technology of potato- a success story from Tamenglong, Manipur

Tamenglong district, is the most backward district of the Manipur. The district is not only historically important but also possesses high potential for horticultural development. The project site is restricted to three villages viz. Joujangtek, Luwanglon Khullel, and Dolang situated along the stretch of Old Cacchar Road. Hilly topography with a plain area as low as 395 m MSL (Leimatak bridge) and upland as high as 1156 m MSL truly indicate inaccessibility of the area and hence resulted in poor transport and communication system. Due to rugged topography, transport and communication system are very poor and hence the district remained backward in spite of its high potential for exploration of commercial horticulture industry. Transportation of goods become very difficult due to poor road condition and communication system, therefore the area appear to be inaccessible and remain untouched by most of the developmental programme. Most of the land remains uncultivated due to lack of infrastructures and financial problems. Potato var. Kufri Jyoti was first introduced at Joujangtek village, Tamenglong District under NAIP during 2009 and later it was introduced at Dolang and Luwanglon Khullel during 2011. The variety is a medium maturing with yielding potential of 20MT/ha and a high degree of field resistance to late blight and wart disease. The disease free seed had been collected from Regional Research Farm, Mao (2030 m MSL) Manipur which is under Department of Horticulture, Manipur. Twenty MT of potato seed of Kufri Jyoti was distributed to 24 farm families and an area of 7 hectare was carried during February 2009. The potato had been harvested during 2009. Total yield was about 200 tonnes from 7 hectares during 2009.
In 2011 potato var. Kufri Jyoti was introduced at Dolang and Luwanglon Khullel, under NAIP programme. Around 50 MT potato was produced from 2.5 hectare. The knowledge of grading, curing and cottage storage methods were imparted to the farmers. Out of total production during 2011 about 8 MT of “B” Grade tuber of 30 gm average wt. have been stored for next year plantation. The graded tubers were cured by spreading thinly over a well prepared floor made of wood with free air circulation from ventilation. However exposure to direct sunlight should be avoided. The potatoes were stored on racks (3m height 0.6m width, 0.4m rack to rack).

Large and small tubers had been sold at market @ of Rs.12/kg, earned about Rs. 20 Lakhs & Rs.15/kg earned about Rs. 5.5 lakhs during 2009&2011 respectively, as stated by village chiefs, Dolang, Luwanglon Khullel, and Joujangtek villages of Tamenglong. These have been a very encouraging sign for the farmers of these villages and were excited on the potato cultivation.

16.2 Tuber crops: A boon to Nuagaon (Dhekanal, Orissa) with barren lands

Nuagaon is one of the villages in Sadar cluster in Dhenkanal district adopted by NAIP project. This village has large area of uncultivated uplands. Due to low yield of rice and increased cost of cultivation, farmers abandoned cultivation in these lands for many years. Tuber crops can be grown in poor and marginal soils. A group of farmers comprising Sridhara Bhuian, Purushotama Swain, Dinabandhu Pradhan, Kamakshya Pradhan and Kamakshya Bhuian agreed to grow sweet potato and yam bean together in such lands. Accordingly, sweet potato and yam bean were cultivated in 1200m² and 300m² area, respectively, during kharif, 2010. They realised sweet potato yield of 1569 kg and yam bean yield 590 kg respectively and got gross return of Rs 11, 995/- and net return of Rs 6,955/-. The farmers shared the benefit among themselves.

Further, the harvested vines of sweet potato were replanted in 3 acres of land by the same five farmers during rabi season in rice fallow system.

17. Livelihood generation for marginal and small farmers through integrated interventions of vegetable at Tera village of Raebareli

Tera village located in the Harichanderpur block of Raebareli district of Uttar Pradesh is one of the poorest villages in the state and was reported by the Times of India issue on 5.9.2009 as on the verge of famine. Till date none of the development programmes of the state and centre has reached the village except the present NAIP-III project. The village was constrained with regular floods and drought in lowlands and poor productivity in the uplands. The average income of the marginal farmer in the village was Rs.21000/-. Most of the farmers were resistant to change from rice-wheat system and expressed that already they were at the verge of poverty and hence they don’t want to take any risk. However, a handful of them came to adopt the innovative low cost income generating interventions of off season vegetable cultivation. Sh.Ram Bahadur is a typical representative of such farmer who earned their livelihood through
cultivation of rice-wheat-mustard in 0.35 - 0.6 ha and one or two bovines. An annual income of Rs.23,700/- was being obtained from agriculture which comprised of Rs.15,400 from rice-wheat, Rs.3600/- from vegetables (potato, tomato and cucumber) and Rs.4700/- from milk. His land was partitioned as 0.15 ha for wheat with varietal change and the other 0.15 ha was used for winter hybrid vegetable (tomato and cabbage) cultivation supplemented with vermicomposting and Trichoderma and Psuedomonads based liquid and farm manures. He earned about Rs.13,000 from vegetables in winter and Rs.5600 from wheat. From this technological backup he also went for summer vegetable cultivation with cucumber, muskmelon and bhindi with elite varieties, mulching and compost supplementation in 0.25 ha. Banana with moong gram as intercrop in about 0.075 ha was taken up with the income generated from initial winter vegetables. An income of Rs.13,450 was generated with the summer vegetables and moong gram.

Apart from this the milk yielding potential of the cow was increased from 2 liters/ day to 4 liters/day with mineral mixture supplementation, deworming and fodder which earned him Rs.9000/- . His total income from winter and summer season was Rs.41,050/- . The standing banana crops which have started to throw bunch will be ready to harvest by December or January which will fetch him another 56,000 rupees as income @ of Rs.7.00/kg. Hence his total income will certainly be around Rs.97,050/- . His investment apart from planting materials was Rs.15,500/- under variable cost. Only family labour was utilized for cultivation. About 200 mandays were
used for the above purpose. He is happy that he will be able to get his daughter married this year. Like him many farmers namely Sh.Sant Ram, Sh.Ram Kilavan, Sh.Sambhu, Sh.Basharat, Sh.Ayodyhya Prasad and others earned an average income of Rs.25000/- from vegetable cultivation in their half acre land and went for banana cultivation in the current season. Shri sambhu harvested Rs. 36000/- from off season cauliflower and Rs. 26500/- from tomato. Now, as per their version, due to ICAR/NAIP guidance and support they are out of poverty cycle and will guide farmers of nearby villages for coming out of poverty trap. These small modules of integration would be a stepping stone in the lives of poor farmers who are poorer than the marginal farmer criteria of less than a ha.

18. **INM and IPDM in the Onion crop- a success in Chitradurga district**

In the project area of Chitradurga distict, the farmers are not in the habit of growing latest improved varieties of crops as well as applying micronutrients and onion is no exception. Under the project, 62 households were selected for INM demo (1 acre) in Onion. The farmers were accordingly provided improved seeds of Arka Kalyan variety of onion and based on soil test, they were recommended to apply micronutrients such as Sulphur (Gypsum @ 500 kg/ha), Zn (ZnSO4 @ 12.5 kg/ha) and Boron @ 2.5 kg/ha. Upon analyzing the overall impact of Arka Kalyan variety and micro nutrient application, the results indicated that productivity of onion increased by 15%. Towards this the expenditure of Rs.1100/acre was incurred and the net returns generated were Rs. 28110/acre. Thus, the new variety Arka Kalyan and micro nutrient application technologies are not only technically feasible but also economically viable. It also generated an additional employment of 15 man days/ha.

![Farmers are convinced about the significance of improved variety of onion along with the role of micro nutrients Zn, Boron with gypsum application. In the control plot, leaf twisting and poor growth were observed. In the demonstration plot no such disorders were observed](image)

19. **Conversion of a non vegetable producing area into hub of vegetable production and assuring reasonable livelihood and nutritional security**

In the Rauni and surrounding villages comprising more than 250 families, the major livelihood source was cultivation of paddy and wheat and the resultant net income was nearly Rs. 30000-35000/= per ha. The other agricultural activities like commercial vegetable, floriculture, livestock units etc. were either absent / negligible or uneconomical (livestock). The population comprises about 25% landless and nearly 70% small land holders (marginal
and small farmers). Various interventions from the NAIP-3 project (ICAR) was done to diversify the livelihood as per their choice and enhancing the net family income to a reasonable level.

Out of these families, 24 landless families opted for river bed vegetable cultivation. These families now improved the practices further by dividing the bank into hybrid bhindi on lower bank, hybrid tomato in middle portion along with cucurbitaceous vegetables from the earlier practice of cucurbits alone by a family. Thus, the net return jumped many fold. The earlier irrigation by bucket is changed into community based portable engine irrigation.

The major shift has been in vegetable cultivation and its horizontal expansion. Now besides above landless families, 52 families, mainly comprising youth who have never gone for vegetable cultivation (except 2 families), have opted for off season vegetable cultivation mainly targeting summer bhindi, summer and rainy season tomato and integrating it with floriculture, banana, rural poultry, cucurbits etc. This has assured nutritional security to these poor families also. The net income per ha has been enhanced to Rs. 1.5-4.0 lakhs/ha.

The shift of the area from non-vegetable producer to hub of seasonal/off season vegetable production is the real impact of NAIP/ICAR and in coming years it will also be hub of flowers, honey, guava, milk, meat and banana.

20. Dahod tribal farmers becomes seed producers-A success story

National Agricultural Innovation Project (NAIP) is operational in Jadakheriya cluster of Dahod District in Eastern Gujarat since 2008-09. In Jadakheriya cluster, Jadakheriya, Kamboi and Polisimal villages were identified for undertaking the various developmental activities through the project. The population of these villages is predominantly of tribal nature. The topography of the Jadakheriya cluster is undulated and 90 per cent of the area is covered under hilly terrain. Agriculture is the main occupation of the tribal community in this cluster. Before the initiation of the project, farmers were cultivating the old varieties of the different crops with improper use of existing natural resources. Due to this reason, farmers were getting poor output from their land. It directly impacts the food security of the farmers coupled with low socio economic status. After the inception of the NAIP in this cluster, GVT initiated various crop based activities viz., dissemination of high yielding crops varieties, crop diversification, and seed production. The awareness amongst farmers was created about the importance of improved seed of different crops. GVT always believes in participatory approaches in field activities. The tribal farmers of Jadakheriya cluster were motivated by organizing various seed production related training programmes at village as well as office level. Farmers gained the knowledge on techniques like selection of field for seed production, production technology, seed plot registration, fee requirements by the seed certification agency, isolation distance, rouging, processing, bagging, tagging, transportation, marketing and interaction with seed enterprises especially the KRIBHCO Seed Unit (KSU) at Himmatnagar, District Banaskantha, Gujarat. The farmers were also exposed to the breeder/foundation seed production farm of Anand Agriculture University at Main Maize Research Station, AAU, Godhra in Panchmahal district.
The selection of farmers for seed production was based on the following aspects:

a. Total land holding with the farmers
b. Status of irrigation facility
c. Risk bearing capacity
d. Education standard
e. Knowledge of seed vis-à-vis grain.

Initially the interest of farmers towards cultivating soybean in the cluster was evidenced in the preliminary interactions held with them. Accordingly, to make seed available of most popular soybean variety JS-335, the seed production programme was started with 52 farmers in an area of 20.80 hectares during 2009-10 Kharif season. Farmers took extra care of seed production fields and produced 207.75 quintals seed. This seed yield of 998 kg/ha obtained by farmers was better as against 810 kg/ha of the normal soybean crop. The seed produced by the farmers was processed at the KRIBHCO Seed Unit (KSU), Himmatnagar and brought back for seed supply to the farmers in the Jadakheria cluster as well as the neighboring villages. The maize seed production by the farmers was 136.25 quintals during post rainy season. The average maize seed yield was 983 kg/ha as against 870 kg grain yield per hectare. The better maize seed yield productivity was due to cultivating the crop during post rainy season. The benefit cost ratio realized by farmers from soybean seed production was 5.82 as against 5.20 from non-seed crop. In case of maize, the B/C ratio was 5.54 from seed crop as compared to 4.37 from non- seed maize crop. This situation has prompted the farmers to go for maize seed production on a larger scale during post rainy season only. The soybean and maize seed produced by farmers was lifted by KSU, Himmatnagar for processing and packing. The soybean and maize seed requirement of the farmers was met in the project villages from this source.

Farmers have realized the monetary benefits as well as timely availability of seed at the time of sowing from this seed production activity. Other farmers who were not involved in
Selected livelihood options for disadvantaged regions of India

seed production programme but observed the entire process of the seed production programme at the neighboring farmers’ fields/villages and the benefit derived from that are also willing to undertake seed production activity. This has been a success activity where for the first time 79 tribal farmers now have become the registered seed producers of the KSU and capable of undertaking the activity on their own.

21. Pig rearing as a source of livelihood

21.1 A study from Dumaka and Jamtara, Jharkhand

Pig rearing with proper management practices as a source of enhanced income has been successfully introduced by Birsa Agricultural University, Ranchi. T&D breed of pig were provided to 35 farmers of Narayanpur, Jamtara, Jama & Dumka block of Jamtara and Dumka districts, Jharkhand. The farmers were trained on pig rearing. These pigs can be fed the waste collected from the nearby hotels or agricultural by-products available in the villages. The pigs grew to about 75-80 kg in 8 months as compared to desi breed which grows only 40 kg. About 18 piglets are received from one female in a year. As observed, the farmer has additional income of Rs. 35,000 /annum through pig farming.

21.2 Research group helps pig business become bigger business in Northeastern India

Small-scale pig production is the basis of livelihoods of many poor tribal people living in India’s remote northeast corner. Pigs could provide a pathway out of poverty for many people if they were able to transform their subsistence production into market-oriented systems. Very few people in Nagaland are vegetarian and pork is the most preferred meat (50% of all pork consumed in India is consumed in the northeast). Although only about a quarter of all a pigs in India are in the northeastern states, some 80% of tribal families keep at least 2 to 3 pigs. Pig meat is so in demand that these states import pigs from northern Indian states and Myanmar. Nagaland alone imports about 10,000 pigs per month.

The international Livestock Research Institute (ILRI) undertook the first comprehensive assessment of the whole pig value chain in northeast India in 2006-2007. Reports were published for the state of Assam as well as Nagaland and set out the role of pig production in people’s livelihoods and the current state of pig production here, identifying some of the sector’s technical, economic, social and institutional constraints and opportunities.
As part of a National Agricultural Innovation Project (NAIP) funded by the World Bank, the Government of India and the International Funded for Agricultural Research (IFAD), ILRI is implementing a project with other local partners in Mon District of Nagaland to improve livelihoods through development of the pig sector. With few good roads or other infrastructure, most people here are very poor, and their pig farming remains very traditional. The small, local pig breeds raised here are fed forages harvested from the jungle and kitchen waste. Pig production in these villages remains very traditional and largely unprofitable. While most of the farmers produce one mature pig, of 70-80 kg, in a span of 3-4 years, the same sized pig can be produced within 8-10 months through adoption of a few relatively simple improved practices.

In the pilot project in Mon, ILRI and members of the community together identified a package of integrated, locally appropriate interventions: (a) improvement of the local pig genotype through distribution of higher-producing pig breeds, (b) development of community-based veterinary first aid services, (c) cultivation of dual-purpose crops that can feed pigs as well as people, (d) better pig housing, sanitation and quarantine measures (e) closer links among stakeholders in the value chain, from input suppliers to pork sellers, (f) creation of business development services and (g) building the capacity of target groups using local resource persons and influential groups.

ILRI's initiatives raised the level of interest of community members in pig keeping, especially for breeding. The ILRI project promoted the adoption of clean and hygienic practices in the pig sty and encouraged the cultivation of food-feed crops. Two trained paravets in each village became sufficiently confident to provide veterinary first aid and business development services. Household income from pigs increased from by 133-457 percent.

With funding from the Navajbai Ratan Tata Trust under their North East Initiative and in collaboration with several local non-government organizations, this successful model will be extended to other parts of Nagaland and into Arunachal Pradesh and Mizoram. Several government and non-government organizations in northeast India are interested in replicating this model and have sought not only ILRI’s technical support but also its help in framing a people-centric policy for development of the pig sub-sector initiated by the government’s North East Council.

22. Sustainable livelihood through Kadaknath production in Jhabua, Madhya Pradesh

An Indian high value poultry breed, Kadaknath is native of Jhabua, famous for its black and tasty meat. The bird is known for its meat quality, texture, flavour and special medicinal value. It is reared mainly by the tribal community of Bhil and Bhilala in the districts Jhabua and Dhar in Madhya Pradesh. Due to its high market demand, the population of this bird is declining rapidly and it is under threat of extinction and genetic
erosion. An attempt was therefore made for conservation and promotion of this high value Indian poultry race *Kadaknath* under National Agriculture Innovation Project Component-3 sub project entitled, “Integrate farming system for sustainable rural lively in undulating and rainfed areas of Jhabua and Dhar districts of Madhya Pradesh”.

During interaction with farmers of Jhayda cluster, Jhabua, it was observed that slow growth on natural feeding (186 days sexual maturity) and more than 50% mortality before maturity are major factors which affect the survival, growth and productivity of this breed. Accordingly, the intervention made under the project were construction of low cost poultry sheds, trainings on advanced technologies of poultry production, optimum feed and balance diet, vaccination for protection from diseases and exploring the marketing avenues. Ten tribal farmers were selected for this programme and one hundred poultry chicks of ten days old were made available to each beneficiary. The farmers were advocated on technologies for scientific poultry production, balance feeding, health management and marketing. Now the beneficiaries have been trained in managing the production of *Kadaknath* in proper way.

This new *Kadaknath* production technology has reduced the mortality rate from higher than 50% to 10-12% and thus enhanced the survival percentage. The bird is gaining the body weight in faster way and is attaining saleable weight of 1.10 kg in 105-120 days. The producers are selling this body weight poultry @ Rs 300 to 350/kg body weight. In this way, an individual beneficiary is getting the net income of Rs 90 to 105 thousands /beneficiary/ year. There are also developing sustainability fund. The tribal farmers are very happy with the technology and now numbers of tribal are constructing the low cost poultry sheds from their own resources and adopting the technology for rearing of poultry birds. It is also helpful in reducing the job oriented migration as many of the farmers are engaged in poultry farming.

This sustainable livelihood through *Kadaknath rearing* has been well recognized by the district administration of Jhabua. The *Kadaknath Murgi Palan Samooh, Jhayda* has been awarded by a certificate of appreciation with a cash prize of Rs 20,000/- on the occasion of Independence Day i.e. August 15, 2010 by district administration, Jhabua for excellent work on *Kadaknath* rearing. The excitement and devotion of successful poultry growers may create a revolution in *Kadaknath* poultry rearing in Jhabua and Dhar district of Madhya Pradesh.


BAIF, Pune introduced a concept of Goat Bank in selected disadvantaged districts of Maharashtra. Breed improvement of base population of goat is major objective of this intervention. Osmanabadi goats were given to selective participants with an understanding that they will give one female kid born to each goat they received to the other non recipient family and these new recipients will continue the same practice so that over a period of time large number of participants
in the project area will own purebred goats. Families having goat herds get benefit of breeding services of the bucks. Total 1683 kids were born and 2400 families benefitted through adoption of breed improvement technologies and improved feeding practices. Induction of standard management practices like vaccination, de-worming, improvement in feeding standards, weight monitoring and record keeping benefitted the goat rearing families. The approach which resulted into weight gain of 15-18 kg at 12-15 month as against 10-12 kg of local breed at same age and also selling price increased from Rs. 90 to 100/kg live weight. The chain thus resulted in increase the number of beneficiaries by 213 as given in following table.

<table>
<thead>
<tr>
<th>Achievements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Families benefitted – induction of small animals (initial)</td>
<td>100</td>
</tr>
<tr>
<td>Total graded kids born</td>
<td>1863</td>
</tr>
<tr>
<td>No. of families received graded kids</td>
<td>213</td>
</tr>
<tr>
<td>No of families availing breeding services of Osmanabadi Bucks</td>
<td>2460</td>
</tr>
</tbody>
</table>

24. Mass infertility control, boost in milk production and establishment of small rural dairy chain in Barabanki district of U.P.

Dairying is a venture equally liked by all the communities in rural areas and is backbone of agriculture by providing valuable dung and urine for soil health improvement, besides milk for nutritional security and subsidiary income/sole employment to youth. There are 3 major deterrent factors in establishment of dairy units by resource poor youth/farmers viz. initial capital cost for purchase of animals and construction of shed, the infertility resulting due to lack of balance feeding and metritis causing repeat breeding conditions. The practices and technologies for feeding, breeding, disease control and management etc. are being developed in continuous stream but the above basic problems are generally ignored.

The NAIP-3 project of Indian Council of Agricultural Research, “Holistic approach for sustainable livelihood security through livestock based farming system in Barabanki & Raebareli districts of U.P.” is operational covering 4 clusters in the above districts. The project through its research and validation addressed the problem. A mineral based infertility control technology was developed and linked with estrous synchronization to assure pre-decided month and date of pregnancy.

In base line survey the area has very poor milk producing germplasm with inter calving period of 23.8 months. The infertility control technology was intervened in the bovine population with the aim of increasing improved calf production, bringing inter-calving period to around 13-14 months and increasing the number of lactation and thus, total milk production with these improved calves born the dairy units can be established with reasonable level of milk production and thus, a major source of livelihood is created.
The farmers are using the technology in continuous stream. Out of 1491 animals monitored, 68.7% animals conceived within 4 months of calving and calving interval was reduced from 23.8 months to 14.6 months. This has increased the lactation number by 163% which means 63% more milk was produced. The bottle neck of pregnancy through A.I. is being addressed by training the youth selected strategically and linking them with improved semen, A.I. kit supply, LN₂ etc. This will address the low conception rate (34.22%) through A.I. than natural service (75.78%) in the present monitoring.

The present project has resulted in establishing chain of small rural dairies which will be continuously re-strengthened with reasonably high producing animals by the farmers using the infertility control technology under use.

Simultaneously, a new concept based on systematic introduction of animals (SIA) is under operation where dairy as major source of reasonably well livelihood at negligible cost to non-animal rearing youth is being created.

25. Recharging open wells

It is observed that many open wells especially in the rainfed regions of Andhara Pradesh have been abandoned for want of water. These are a very significant resource that can be brought back to use by reviving them. Efforts were made in this direction by Consortium led by Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad. In Dupahad cluster of Nalgonda district alone there are over 50 abandoned open wells. Every village is likely to have several dry open wells which represent sunk private investment. If a systematic programme is carried out to identify the open wells and bring them back to use, the rainwater harvesting potential can be significantly tapped. Besides, the silt traps will also arrest significant quantity of top soil being eroded.

A survey was conducted to identify abandoned open wells and the surrounding topography. Adjoining runoff streams, if any, were also identified. The technique involved diverting the runoff from a nearby water way
into a silt trap and then leading the clear water into the open well through a PVC duct. The water thus collected can be impounded in the open well and used for taking up short duration vegetable crops.

Cost of technology package ranges between Rs.800/- to Rs.1200/- based on the distance between the runoff stream and the defunct well. The water collected is sufficient to grow up to ¼ acre of vegetables in the post rainy season. Depending on the type and market value of the vegetable, the farmer can earn anywhere between Rs.2000/- to Rs.4500/-. This technology is widely accepted by farmers as they are able to harvest runoff from the high intensity showers occurring during the end of the rainy season and use it for cultivating high value vegetables. Currently, over 24 farmers are using harvested runoff for obtaining additional income in the post rainy season in Dupahad cluster of Nalgonda, one of the most drought prone regions of Andhra Pradesh.

26. Increasing water storage capacity and improving soil fertility - desilting of minor irrigation tanks

It is observed that water holding capacity of the tanks are considerably reduced due to excess deposit of silts. Desilting of such tanks is necessary to increase the water holding capacity of the tanks and also apply the dug silt on the farms to improve soil fertility.

Seven tanks were desilted in B.Y.Gudi cluster of Kadapa district. A total of 202 farmers participated in this programme by contributing to lifting of the tank silt and applying the same to their fields. About 18800 tons of silt material dug out from the 7 tanks was transported in 9374 tractor loads to the farmers’ fields. Many of the farmers used the silt to level their undulated fields while some of them have added almost one foot of additional soil in their fields. They are expecting good harvest for the next 3 consecutive years.

Desilting was organized tank-wise with sufficient advance information to the farmers of the villages served by the respective tanks. Farmers were advised to arrange to lift the silt by making their own transport.
arrangements. Though application of tank silt is an age old practice this is not practiced regularly in the recent times. This has also broken the chain of bringing back the eroded soil to the cultivated fields. The innovation was in terms of the process adopted for organizing the farmers for improving resource use efficiency at the village level.

27. Improved productivity of shifting/jhum cultivation lands – Godda district

Shifting or Jhum cultivation, a primitive type of cultivation technique, is a transition from food gathering to food production. Under this, part of forest area is cleared for agriculture, and then agriculture is done for about 3 to 4 years. After that farmers shift to some other area due to low productivity in due course of time. After a cycle of about 20 years, farmer will come again to the same area when the area is regenerated and improved its fertility. Shifting cultivation is popularly known as ‘jhuming’ in north east and ‘khallu’ in Jharkhand. In Godda district, it is practiced in Sunderpahari range on the top of the hills where lands are flat and rich in forests. The soils contain very high percentage of nutrients and are acidic in nature because organic matter content is more than 0.75%. In two villages namely Telodhoni and Palamdumar, where this type of cultivation is common, but the yield of crops grown was low. Through NAIP project high yielding varieties of crop like maize, barbatti (lobia) and pigeon pea have been introduced for up-scaling their livelihood. The improved variety (Dutta) of maize (Zea Maize) in the area has recorded average yield of 89.20 qtls/ha compared to 44.84 qtls/ha of the traditional variety. The B:C ratio is recorded as 2.19 against 1.68 of the traditional. Also the improved variety is insect, pest and disease resistant. Similarly, pigeon pea (Cajanus cajan) improved variety from U.P. (NDA-1) was introduced in the area and 19.76 qtls/ha against 13.03 qtls/ha of the traditional variety. The B:C ratio is recorded as 2.41 against 1.68 of the traditional. Also it is more resistant to wilt, sterility mosaic disease and phytopthora blight. Likewise, improved variety of cow pea, locally known as Barsatii, was also introduced in the area that has recorded yield of 9.79 qtls/ha against 6.38 qtls/ha of the traditional variety. The B:C ratio is recorded 2.44 against 1.59 of the traditional. With this introduction of improved seeds people dwelling in Jhum cultivation area get good returns of the produce and are getting prosperity. This way total 26 HHs have been benefited so far covering about 4.50 ha.


Due to backward geographical position and highly flood-prone nature of the selected
villages under NAIP programme, most of the households maintain their livelihood with a very marginal income and also the villagers are unemployed, landless labour and marginal farmers. Prior to the launching of the project NAIP, a majority of villagers destroyed the waste or residuals of the crops, vegetables and manure (cow dung) in a heap form. But after the introduction of NAIP – 3 project sufficient training were provided by the scientists of UBKV, Coochbehar and BCKV, Kalyani on the methods of production of vermicompost and its beneficial effects in increasing the fertility of land and thereby productivity of crop and also reduce the harmful effect of using Traditional method of composting Improved method of composting has been implemented with successful field trials at two household named Ashok Mondol and Sitaram Mondol in a group approach of five members per unit of vermi-pit of this cluster. More than 50 rural youths took the idea that vermicomposting by the using of crop and farmyard residues could be a source of supplementary income to them and they started the production of vermicompost with the input supply from the project in 2009-10. By encouraging with this intervention of item of earning additional or supplementary sources of income another 95 beneficiaries of this cluster took up this promising activity and is earning a additional average income of Rs 581.91/beneficiary/month. Furthermore, rural poor from surrounding villages of this cluster has shown interest in training of vermicomposting to start this activity with their own investment. The cost and return analysis is presented in the following table:

Table: Improved method of production of Vermicompost using FYM and crop residues

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of beneficiaries</th>
<th>Cost of production/kg Vermicompost</th>
<th>Production kg/month</th>
<th>Gross Return /Unit Rs / month</th>
<th>Net return/unit Rs / month</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>10</td>
<td>Rs. 2.10</td>
<td>86.10</td>
<td>430.50</td>
<td>249.69</td>
</tr>
<tr>
<td>2009-10</td>
<td>50</td>
<td>Rs. 2.25</td>
<td>229.00</td>
<td>1145.00</td>
<td>629.75</td>
</tr>
<tr>
<td>2010-11</td>
<td>95</td>
<td>Rs. 2.33</td>
<td>328.95</td>
<td>1644.75</td>
<td>878.30</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>Rs. 2.23</td>
<td>214.68</td>
<td>1073.42</td>
<td>585.91</td>
</tr>
</tbody>
</table>
29. Community Biogas for Sustainable Rural Energy cum Organic Manure Production

Under National Agricultural Innovation Project (NAIP) funded sub project “Sustainable Rural Livelihoods through Enhanced Farming Systems Productivity and Efficient Support Systems in Rainfed Areas” a community biogas cum vermi compost unit was developed as a model for offering solution to the rural energy problems. This interventions was taken up at Dupahad, Nalgonda District (Andhra Pradesh) through convergence with the Non Conventional Energy Development Corporation of Andhra Pradesh (NEDCAP). This is a unique intervention and can be replicated in any other village which has the willingness to adopt it on a community basis.

The community biogas unit was set up at Jalamalakunta in Dupahad cluster of Penpahad mandal, Nalgonda district. It is of 85 cu m capacity. This was constructed with an expense of Rs.11.00 lakhs of which Rs.3.00 lakh was availed as NEDCAP assistance while the remaining was shared by the community and the project. It requires about 950 kg of dung every day with which it can produce about 50 cu m of gas. A family of 4-5 members requires approximately 1.4 cu m gas per day for meeting its domestic cooking needs. Currently, 32 households have been connected with biogas unit for which about 45 cu m gas is used. The remaining gas is used for running a 15 kva generator for two hours a day. The power thus generated is used to energize pumps for storing and supplying drinking water to the community. This arrangement is helpful to draw water from bore wells when electrical power is unavailable. The slurry coming out of the biogas unit is used as input to a large scale vermi composting unit in which weed biomass and crop residue is turned into useful manure. Every week, around 5 tons of slurry comes out of the biogas unit which is fed to the vermi compost unit. After 40-45 days, this slurry turns into about 3 t of excellent vermi compost. This is sold to vegetable cultivators of this area forming another source of revenue for the unit.

A system has been put in place to collect about 35 kg of dung/family every day and feed it to the biogas unit. Besides, each household is being encouraged to pay a minimum monthly contribution towards maintenance and repair of the unit and pipe line connections. A user group has been formed to take care of the operation and maintenance of the entire unit. Two persons are engaged on wage basis for assisting the user group in collecting the dung from households, feeding the biogas unit with dung and vermi compost unit with slurry. They are being paid from the revenue generated from the unit.

The model that has been created has a great potential for recycling the waste into useful manure and save fuel wood which otherwise have been consumed by the households for cooking purposes. Thus, it can contribute to saving carbon emissions by efficiently using local resources and improving rural livelihoods. This unit was inaugurated on 22nd October, 2011 by Dr.A.K.Singh, Deputy Director General (NRM), ICAR. Dr.B.Venkateswarlu, Director, CRIDA was present. Also present were the officers of the district agriculture, horticulture and sericulture departments of Govt. of Andhra Pradesh. The representatives of Non Conventional Energy Development Corporation of Andhra Pradesh (NEDCAP) also participated in the event.
30. ‘m-Krishi’ Fisheries Advisory Service (Potential Fishing Zone (PFZ) ) - a tool for enhanced fish catch with reduced time and fuel

In climatically challenged districts where marine fishers are loosing livelihoods due to distribution shift of pelagic fishes, submergence of their low lying fish drying platforms, unseasonal and extreme rains where dried fish on bamboo platforms are spoiled some technological interventions are necessary to prepare them to look for alternative, eco-friendly and remunerative technology. Potential Fishing Zone (PFZ) forecasting is one such technology that has been validated by CMFRI, NRSA, SAC, FSI and other organizations in past. As shown in figure sub-sea surface temperature & ocean colour are detected in the form of electromagnetic energy which are redirected to earth station to give composite picture of those areas where there is more likelihood of marine pelagic fishes. Data generated by NOAA-AVHRR and OCM is integrated in PFZ advisories.

INCOIS (MoES) now generate regular advisories of the PFZ areas during cloud free months for stakeholders.

However, during the preliminary survey in Raigad district it was found that many fisher-men are not aware of this service and those having awareness are unable to utilize benefits of the service because during frequent electricity shut downs digital boards / FAX machines etc. are not in a position to receive advisories. An innovative service called m-Krishi-Fisheries have been developed by NAIP subproject title “Strategies to enhance adaptive capacity to climate change in vulnerable regions” (Lead Centre: IARI, New Delhi) in collaboration with TCS innovation lab and is being demonstrated. This is likely to fill critical gaps in dissemination of this technology as provided in power point presentation. The technology is being patented and is capable of providing immediate, short term and long term solutions to the beneficiaries in identified clusters at selected villages through Self Help Groups. This is more appropriate as preliminary survey of the area reveals that:

- There is unawareness about PFZ & wind advisories in most of the fishers in Raighar district.
- Difficulty in disseminating PFZ & Wind advisories due to unavailability of INCOIS digital boards in most of the fishing villages except one in Fishermen co-operative society at Murud.
- Frequent electricity shutdowns in Maharashtra further impedes dissemination of PFZ & wind advisories through FAX.
• There is need for an alternative which can help to disseminate PFZ & wind advisories to fishers.
• PFZ advisories can help fisher-men to reduce their search for fish catch and to save fuel and time that will indirectly help to reduce carbon emission.

Solution: ‘m-Krishi Fisheries Advisory Service’

- m-Krishi Fisheries Advisory Service launched by TCS innovation lab in Collaboration with CMFRI to disseminate PFZ and wind advisories to fishers.
- Though m-Krishi Fisheries Service integrates technologies such as Wireless Sensors, Camera phone and script technology, it is much more than an IT tool. It ensures business benefits to the stakeholders by enabling them to connect them to fishers directly.
- Image. Text, Voice, Query, Feedback & other services are integrated in the facility and it is available in local Marathi and English languages.

The intervention has been successfully implemented in 11 villages of Raigad district. As a case study a saving of 70,000 litres of diesel per month has been estimated from one village (Ekdara) of Raigad, Maharashtra. Thus, a huge savings of diesel, enhanced income besides reduced pollution could be achieved by this technology.

31. Tasar Sericulture: A sustainable option for livelihood

Gadchiroli is one of the backward districts of Maharashtra under intervention in BAIF led NAIP subproject “Sustainable Rural Livelihood Security in Backward Districts of Maharashtra”. The programme is being implemented in Etapalli block of Gadchiroli, a remote place. The residents of the area mainly belong to scheduled tribes; Madiya and Gond. It is difficult for landless and marginal landholders to work on wages locally as agriculture activity is very limited. With more than 75% land having forests rich in *Terminallia tomentosa*, forest based intervention of tasar was planned here with the consent of forest department. This programme on tasar was initiated as there is growing market demand of organic or wild silk namely tropical tasar *Antheraea mylitta*.

This programme has shown the path for 131 families to generate additional income through Tasar egg production, silkworm rearing and post cocoon processing activities. Eight youths could take up grainage work to ensure timely supply of basic input materials of eggs, 65
persons participated in silkworm rearers and 25 are reelers cum spinners converting cocoon into value added product of yarn silk. This is further linked with weaver group (11) for weaving thereby creating marketing chain in symbiotic way. The ultimate fabric is sold through project supported exhibitions and BAIF supported outlet. Success of this composite activity in the area has inspired other people and more than 80 families are willing to undertake it.

During the year (2009-10) total cocoons produced were 406060 worth Rs 396060/- as compared to Rs 60,000 cocoons produced in first year (2008-09). Fifteen groups having 65 participants took up silkworm rearing during September to October, 2009. The groups have earned average Rs 7000/person as compared to previous year of Rs1500/person. Village Jivangatta of Etapalli has become Tasar village as nearly 40 families of this village have taken up grainage, rearing and reeling. One of the group of 4 members in Jivangatta have produced 152832 cocoons worth Rs 116490; average income earned per participant is Rs 29125/- in 45 days of silkworm rearing.

Eight youth involved in grainage showed their capacities to use microscopes to segregate diseased eggs; thus ensuring production of good cocoons for other participants. At present each family involved has potential to earn Rs 4000 to 25000 per year depending on the activity they involve. The programme has protected the trees on 250 ha of land. With this success, Directorate of Sericulture and Central Silk Board has agreed to provide funds to cover 50% cost of infrastructure development and support for machinery. This intervention has enabled local people to have their livelihood by conserving forest. At present, landless, marginal landholder, educated youth and women all are finding an alternative vocation in this activity.

32. Income generation through rope making machine

NAIP sub project “Development of Sustainable Livestock Farming System for Livelihood Security in Hoshiarpur District of Punjab” lead by Guru Angad Dev University of Veterinary and Animal Sciences (GADVASU), Ludhiana is operational in four blocks of Hoshiarpur district of Punjab. Fathepur village (Talwara block) is one of the ten adopted villages in the district under this programme. Various new interventions were started in this village, out of which introduction of rope making machine is one which gave very enthusiastic results.

Smt. Mehngo Devi w/o Sh Hans Raj was identified as beneficiary farmer who used to make ropes manually to lack of money, machine & technology. Rope making was a mammoth work for her. Interaction with Smt. Mehngo Devi resulted into her involvement in the project.
A manually operated rope making machine was provided to her. This machine was easy to operate and facilitated her work. Now, she is making 7-8 kg of superior quality rope daily within a time span of 2-3 hours instead of 2-3 kg of ropes in a day with a maximum production of 50 kg of rope per month. The quality of handmade ropes was also very much inferior and the market price for the same was at the maximum of Rs.20 per kg. Hence, in spite of hard work, she was earning just Rs.1000 per month.

At present she is selling the ropes @ Rs.25-30 per kg which is Rs. 5-10 per kg more than the handmade rope. With the help of new rope making machine, Smt. Mehngo Devi is able to produce upto 200 kg of rope per month. Thus, she is earning Rs.5000 per month on an average by selling machine made rope which is nearly four time of her earlier income. She is a source of inspiration for all the villagers due to her courage and dogged perseverance.

At present, a total of 29 beneficiary families have access to these machines. With the installation of these machines, the beneficiary farmers are making 7-8 kg of superior quality rope in one day by using same quantum of time or 210-240 kg of rope per month. This innovation generated net income of Rs 4200-4800 per month per family. For all the 29 beneficiary families, the net income comes out to be Rs 14,61,600 per annum. This amount is not small considering that these farmers run the machine only when they feel free during mornings and evenings. Should they entirely focus themselves to run it as a commercial enterprise, their income will undoubtedly be increased.

Rope making enterprise can be initiated in any area where raw material like Munj/Bhabbar Grass/Lemon Grass is easily available. Poor/landless farmers can easily increase their family income by adopting this rope making enterprise. A total of 200 sq. feet of land is sufficient for storing of various grasses and for operating the machine. The grasses grow wildly in mostly fallow land in sub-mountainous areas during rainy season and are mostly harvested in the months of November and December. Lemon grass can be purchased as left-out from the Lemon-grass oil extraction plant.

33. Light traps_ A small Innovation for Livelihood Improvement

White grub is major insect pest of the area. Its management so far was big challenge and required high quantity of insecticide to be incorporated in soil which was a great threat to the ecosystem in Uttarakhand area. VPKAS, Almora, under NAIP subproject Enhancement of Livelihood Security through Sustainable Farming Systems and Related Farm Enterprises in North-West Himalaya have successfully shown that with the help of light trap and bacterial
Selected livelihood options for disadvantaged regions of India

formation the white grub problem can be effectively managed.

A unit of light trap is made of 5 kg of Galvanised iron sheet (22 gauge), electric cables and bulb fitting and a CFL tube (18 watt). The total cost of unit comes to around Rs. 900/-. The one unit of machine is priced at Rs. 1200/- that results in minimum earning of Rs. 300 to 400/- per day.

To promote light traps 13 rural artisans were trained on its production technology. Earlier these artisans were producing limited quantity of farm tools which too were not easily sold in the local market. This was because they were not aware of the improved farm tools and had no facility except their traditional tools. With income from this trade they were not able to support his family properly. Under NAIP such families were identified and were imparted training at the workshop of VPKAS, Almora. They were also provided training on making other farm equipment. After the training they got lot of confidence and started making the light-trap and other farm tools. Light traps are in a great demand by the state department and the institute for control of the insects, particularly the white-grub beetles. Today each family is able to earn minimum Rs. 200/- per day.

34. Livelihood Security through Lac Cultivation

There are number of backward districts covered under component 3 with a large area under forests and where forest trees are available in plenty. Lac cultivation was considered a viable option for livelihood improvement in such areas. Two success stories from Betul (MP) and Jamtara are presented herewith:

34.1 Lac Cultivation in Betul district, Madhya Pradesh

Betul district is one of the disadvantaged district of Madhya Pradesh where forest trees are available in plenty. Lac cultivation was considered a viable option for livelihood improvement in the area. The activity was initiated with 92 tribal farmers on palas, ber and kusum trees. Proper trainings were provided to these farmers. Initially, 4490 trees were inoculated. With successful inoculation, 13470 kg of brood lac was produced during November and December 2010. This lac was sold for Rs. 6.73,500/- (@ Rs. 50/-kg) to neighboring market and others farmers. Thus, an additional average income of Rs 7320 per farmer was obtained from lac cultivation. Initial annual average income of these farmers from agriculture was 15,000/- and after adoption of lac cultivation practice the total annual average income went to Rs 22,320 per farmer. After looking at the progress of NAIP farmers in the village, other
farmers are also aware about lac cultivation now. They are looking to these progressive farmers as their role model.

34.2 Preventing deforestation through lac cultivation – a case study in Jamtara district of Jharkhand

Jamtara is one of the disadvantage district of Jharkhand state in India. The district is also blessed with forest of Butea monosperma, commonly called the ‘flame of forest’. Normally palas trees were being utilized for fuel wood and other basic requirements of village. Many farmers cut these trees as these are of no economic value. An intervention under NAIP programme was envisaged on creating awareness to tap livelihood from available natural resources. The villagers of Baramajhadih village of Narayanpur block; Dahartola, Charedih, Rupaidih, Sarumundu and Sinjotola of Jamtara block have successfully produce and marketed broodlac from their palas tree within one year of its introduction as a part of intervention by NAIP, ICAR. Ten farmers of village Baramajhadih (block Narayanpur) who were earlier not even aware of lac produced 399 kg broodlac from their palas tree and earned Rs. 20,000 for the first time. Shri Baladeo Marandi and Shri Nirmal Marandi earned Rs. 7000 each from summer season lac crop, raised during October 2008 and harvested in July 2009. Now these ten farmers formed a FIG named “Lah Utpadan Samooh, Baramjhladih”. Besides, these group members also preserved broodlac
(lac seed) for their own requirement to produce next crop.

Twelve farmers of village Dahartola, Charedih, Rupaidih, Saurumundu and Sinjotola have also successfully produced 354 kg broodlac and earned Rs. 17,700 in the same way. Shri Subodh Hembrom of village Charedih and Shri Bodi Nath of Saurimundu are the farmers who earned Rs 3600 and 3500 respectively. These groups of farmers now formed FIG named “Khusiali lakh Utpadan Samooh, Rupaidih”. First time intervention of NAIP in these villages resulted in enhanced income from palas trees by introducing lac production. Now farmers are able to produce their own broodlac for further propagating this venture, utilizing their own trees, set example for other farmers to follow it and utilize other unexploited trees. The farmers of this village stopped cutting of naturally available palas, rather preserving these, for better environment and exploiting it rationally for income enhancement without any adverse effect on trees for lac production. The villagers pledged for preservation of all their palas trees as it also generate employment and income.

35. Pickle making of Jackfruit and other underutilized NTFPs- a source of livelihood

The jackfruit (Artocarpus heterophyllus or A. heterophylla) is nutritious, rich in vitamins A, B and C, potassium, calcium, iron, proteins and high in carbohydrates. In Sunderpahari and Godda ranges several Jackfruit trees are found in abundance in and around the forest areas of the villages selected under NAIP in Godda district. Each year a tree of jackfruit yields about 70 to 90 kgs. of fruits and people either consume it or sell it in the market at throw away prices. Under the NAIP sub project in Godda, the areas with high concentration of jackfruit
were identified and their value addition was introduced by making pickle for commercialization of this product. This way the product, which was underutilized in the area, has been commercialized and added livelihood of the rural poor. Under NAIP total 117 members of 9 SHGs were linked with pickle making of jackfruit and other fruits available in the forest areas. The SHG members were first provided with training on processing and preservation of the jackfruit and other NTFPs for pickle making. Thereafter, the groups actually prepared the product and did packaging for sale in the market. Marketing tie-ups were explored. The promoted brand for sale of the product is ‘Yogini’.

36. Livelihood improvement through collection, primary processing and marketing of tamarind

Tamarind is an important forest produce in Bastar with an annual turnover of about Rs. 200 Crores. Tribal people collect raw pods & sell it to middlemen who earn major share of profit by primary processing and marketing. In order to handle the entire processes of collection, processing and marketing and to exclude the middleman, six groups (60 families) were organized and trained for procurement, dehulling, deseeding, packaging and marketing in Cluster Pedawada, District Bastar. Groups involved 92 more families for processing. By this intervention the profit in this trade is increased by 50% in the following table:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Before</th>
<th>After Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income to Collectors</td>
<td>Rs. 700/q</td>
<td>Rs. 800/q</td>
</tr>
<tr>
<td>Income to Procurement group</td>
<td>Nil</td>
<td>Rs. 48000/ group</td>
</tr>
<tr>
<td>Income to Processing group</td>
<td>Nil</td>
<td>Rs. 27000/ group</td>
</tr>
<tr>
<td>Income to family (152 Nos.)</td>
<td>Variable</td>
<td>Rs. 8200/ family</td>
</tr>
<tr>
<td>Tamarind collected</td>
<td>Variable</td>
<td>2000 q</td>
</tr>
<tr>
<td>Processed</td>
<td>Variable</td>
<td>1700 q</td>
</tr>
<tr>
<td>Amount distributed to Collectors</td>
<td>Variable</td>
<td>14.0 Lakhs</td>
</tr>
<tr>
<td>Amount distributed to Processors</td>
<td>Nil</td>
<td>3.4 Lakhs</td>
</tr>
<tr>
<td>Employment generated (mandays)</td>
<td>variable</td>
<td>8500 (Feb-June)</td>
</tr>
</tbody>
</table>
37. Dungaria Agro Producer Company Limited, Mewada: Facilitating Innovative Livelihood Solutions to Cotton Seed Producers through an Integrated Farming Mechanism

The Dungaria Agro Producer Company Limited (DAPCL) came to existence under National Agriculture Innovation Project (NAIP) program entitled Livelihood and Nutritional Security of Tribal Dominated Areas through Integrated Farming System and Technology Models. With the guidance and support of organizations including Maharana Pratap University of Agriculture and Technology (MPUAT), Krishi Vigyan Kendra (KVK), and ACCESS Development Services (ADS), DAPCL has taken great strides towards becoming a self-sustaining organization capable of empowering small and marginal farmers. The use of self-help principles to create 25 Farmer Business Groups (FBGs), comprised of 328 members, has helped facilitate savings, enhance the aggregation of farmer surpluses to generate more marketing power, and allowed for training and capacity building sessions throughout 10 villages of the Dungarpur District.

Cotton Seed Production in South Rajasthan

The Government of Rajasthan recently took initiative to stifle child migration to Gujarat for cotton related labor. Seed companies are now investing heavily in south Rajasthan through intermediary agents who provide credit and technical advice to farmers. Unfortunately, these agents are proving to be highly exploitative, charging drastically high interest rates, dismissing the need for price transparency and failing to disseminate proper technical knowledge.

Cotton seed production is a labor intensive industry requiring on average ten workers per acre. Furthermore, cotton production requires substantial investment and it takes nearly ten months for any cash realization of the crops, a substantial lag for returns relative to other cash crops of the region. These circumstances suggest a proper intervention will be highly advantageous for cotton seed producers and has thus prompted DAPCL to act.

Partnership with Patidar Agro Company

DAPCL has reached an agreement with Patidar Agro Company in an effort to enhance the overall security and productivity of cotton seed production for the farmers of Dungarpur. This agreement ensures cost transparency, defines a payment schedule, promises regular technical support and uses a collective approach for reducing overall input costs. Due to the partnership farmers no longer lose their gunny bags to unruly agents each harvest, a savings of Rs 60 – 80
each. Also, ginning costs are covered by the Producer Company rather than the farmer, a savings of Rs 300 – 400 each harvest. In the current fiscal year 42 DAPCL members generated a gross income of Rs 7.6 lakh, translating to a net gain of Rs. 12,700 per farmer using just 0.5 bigha of land each.

**Member Beneficiary- A Case Study**

Harilal, age 52 of the Vatada village and member of a 12 person household, has been involved with cotton production for three years. Each year he has used a different agent in hopes of better treatment, but finally settled with DAPCL. He has benefited from increased transparency of numerous transactions; furthermore, several of the costs he was previously subjected to are now being borne by DAPCL. Major gains include fixed payment terms, burdensome transportation and ginning costs and extensive monitoring of cotton plots. Through the Patidar Agro Company partnership farmers are able to save 10% - 20% on inputs required for cotton production. These direct economic benefits along with the increased transparency and security provided are essential for marginal farmers input.

**38. Jhambukhand Kisan Agro Producer Company Limited (JKAPCL) - a way forward through contract farming**

Jhambukhand Kisan Agro Producer Co. Ltd., Banswara is a social enterprise promoted under National Agricultural Innovation Project (NAIP) for Livelihood and Nutritional Security of Tribal Dominated Areas through Integrated Farming System and Technology Models. Since its inception, JKAPCL has strived at its best under the guidance of Maharana Pratap University of Agriculture & Technology, Udaipur (MUAT), Krishi Vigyan Kendra, Banswara (KVK) and ACCESS Development Services, Udaipur. Major activities of JKAPCL include agriculture based input supply of quality hybrid seeds, fertilizers and pesticides recommended by MPUAT, Udaipur. The other business include output marketing of its member’s produce from grains such as maize, wheat and vegetables. Grading is one area where JKAPCL is focusing on to brand itself as a quality grain supplier in the local area. However, to sustain in the long run, the Producer Company is trying to intervene in seed production and take up seed production at a larger scale.

**Wheat seed production at JKAPCL**

In an effort to increase the agri based livelihood, Jhambukhand Kisan Agro Producer Co. Ltd. tiedup with Rajasthan State Seeds Corporation Ltd (RSSC), Banswara for seed production.
RSSC came forward to associate with JKAPCL on a buyback agreement for wheat seed production. JKAPCL selected 23 farmers from its project area and took over 75 acres of irrigated fertile land in lease from its share holders. At every step, JKAPCL team put its best to aware farmers regarding seed production technology among the identified 23 selected farmers. At regular interval, the certification agency has sent its inspection team to the field for supervision. RSSC Ltd. conducted a stakeholders meet and training activity on seed production. JKAPCL also organized a farmer interaction for wheat production, a fully sponsored event with RSSC Ltd, Banswara. Representatives from MPUAT, Department of Agriculture, Banswara also participated in the event.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sl. No.</td>
<td>Stakeholder</td>
</tr>
<tr>
<td>1.</td>
<td>Farmer</td>
</tr>
<tr>
<td>2.</td>
<td>KVK</td>
</tr>
<tr>
<td>3.</td>
<td>Certification Agency</td>
</tr>
<tr>
<td>4.</td>
<td>RSSC</td>
</tr>
<tr>
<td>5.</td>
<td>JKAPCL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financial Benefits</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sl. No.</td>
<td>Activity</td>
</tr>
<tr>
<td>1.</td>
<td>Farmers covered under cotton seed production</td>
</tr>
<tr>
<td>2.</td>
<td>Total land under wheat seed production (acre)</td>
</tr>
<tr>
<td>3.</td>
<td>Land under cultivation by per farmers (acre)</td>
</tr>
<tr>
<td>4.</td>
<td>Gross additional (due to seed production) income by per farmer</td>
</tr>
<tr>
<td>5.</td>
<td>Net additional income by per farmers</td>
</tr>
<tr>
<td>6.</td>
<td>Turnover JKAPCL (in INR)</td>
</tr>
<tr>
<td>7.</td>
<td>Net Profit to producer Company (in INR)</td>
</tr>
</tbody>
</table>
39. Vegetable and Fruit Council, Keralam (VFPCK) Model - a success in Wayanad

To maximize income to the participating farmers of Wayanad district Vegetable and Fruit Council, Keralam (VFPCK) Model was adopted under the NAIP subproject. The model is characterized by farmer owned markets. In all 13 collection points and one retail outlet for the collection and marketing of farm produce were established. Fourteen persons were working at these collection points and the retail outlet. Transportation facilities for diversion of excess agricultural produce were provided. Through these units 1612 tons of vegetables and fruits with value of Rs. 2.995 crores were traded upto September 2011. Year wise performance was as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Achievement 0n 30.9.2010</th>
<th>Achievement 0n 31.3.2011</th>
<th>Achievement 0n 30.9.2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural produce handled, tonnes</td>
<td>704</td>
<td>1273</td>
<td>1612</td>
</tr>
<tr>
<td>Agricultural produce handled, Rs in crores</td>
<td>1.42</td>
<td>1.92</td>
<td>2.995</td>
</tr>
</tbody>
</table>
Some successful NAIP partners in progress

Sh. Isak Ali, Vill: Kachaoli, distt. Sirohi, (Rajasthan)

Sh. Isak Ali got prestigious National Level Jagjiivan Ram Award for the year 2010-11 and also selected for SharadKrishi Award. He was honoured by the District Administration and University.

Sri KharadiJeenabhaiFatabhai
Vagadadi (Banaskantha)

Sri KharadiJeenabhaiFatabhai was awarded by H.E. the Governor of Gujarat, Gandhinagar (2008-09) for progressive farming. He was also awarded in the coffee table conference by Hon’ble Central Agril. Minister, New Delhi (2009-10) for Horticultural farming (Papaya). He is the first tribal farmer of the area who traveled by the air.
BubadiaBabubhaiRavtabhai, Mandalia
(Banaskantha)

BubadiaBabubhaiRavtabhai was awarded by H.E. the Governor of Gujarat, Gandhinagar (2008-09) for scientific vegetable cultivation

Smt. GendiBai - a successful farm women,
Village Golabadi, Jhabua (M.P.)

Smt. GendiBai started vermiculture from one pit. During last two years she earned Rs.1.00 lakh from worms & vermi compost. Now a day she has four pits and she has become a successful vermiculture producer in the district.
Kadaknath poultry rearing Group Jhayada, Jhabua was awarded a cash prize of Rs. 20,000 along with a certificate on independence day i.e. 15th Aug. 2010 by the district administration, Jhabua (MP) for excellent work on poultry rearing.

**AWARDS**

1. The Kadaknath Murgi Palan Samooh, Jhayada Jhabua has been awarded by a certificate of appreciation with a cash prize of Rs 20,000/- on August 15, 2010 by district administration, Jhabua for excellent work on Kadaknath rearing (RVSKVV, Gwalior).
2. Kadaknathrearing group "Sri Kadaknathpalan Samooh" awarded as best SHGs for poultry.
3. The Vermicomposting group Santoshi Swa Shayata Samuh Jhayda has been awarded by a certificate of appreciation with cash prize Rs. 20,000/- by District collector, Jhabua.
4. CRIDA, Hyderabad received Best Public Choice Award for ICT enabled agriculture initiative at the E-world forum.
5. BAIF Pune received TOI award for its work "Preserving nature and helping farmers in one go" in NAIP target areas of Ahmednagar and Garchirolly, (2011).
6. CRIDA, Hyderabad received Vasantrao Naik Award for Research application in dryland agriculture – 2009.
7. IGKV developed strong synergy with Jila Panchayat on SWC Models and provided Technological backstopping to NREGP. It helped in getting Award to Bastar for best Performing district in country for 09-10. This is a credit to NAIP program in this region.