Annual Progress Report
2009–10

COMPONENT 2

May 2010

Project Implementation Unit
National Agricultural Innovation Project
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan II
Pusa Campus, New Delhi 110 012
Foreword

Realization of complexities affecting sustainable food production about a decade back, started attracting attention towards profitability, rural employment, poverty alleviation, marketing, policy issues etc. Research and research investment were not considered continuing linear relationship with enhanced production. It is with this realization at global level that brought into focus the agricultural innovations aiming to achieve same goals that were being achieved till end of 20th century. In India National Agricultural Innovation Project is one such largest national initiative of ICAR in collaboration with the World Bank. Key objective of this project is “to contribute to the sustainable transformation of Indian agricultural sector from primarily a food self-sufficiency to more of a market orientation in support of poverty alleviation and income generation”. This is to be achieved through collaborative development and application of agricultural innovations by all stakeholders. The project sanctioned on 8 April, 2006 became effective on 18 September, 2006. Phase I of the project is over on 31 March, 2010 and we are in Phase II of project implementation.

The project is addressing its objective through four components. These are (1) ICAR as the catalyzing agent for management of change in the Indian NARS, (2) Research on production to consumption systems (Value Chains), (3) Research on sustainable rural livelihood security, (4) Basic and strategic research in frontier areas of agricultural sciences. The objective of component-2 is to establish market oriented collaborative research alliances for sustainable improvement of selected agricultural production to consumption systems (value chains).

Good results have started emerging from sub-projects sanctioned under this component. Efforts of Dr R.K. Goyal, National Coordinator (Component-2) for coordinating, monitoring and guidance to CPIs and CCPIs in project implementation are praiseworthy. Administrative and financial support provided by Shri Kumar Rajesh, Under Secretary and his team and Shri Devendra Kumar, Director (Finance) and his team are appreciable. Keen interest, guidance, monitoring and direction of Dr S. Ayyappan, Secretary DARE and Director General, ICAR, Chairman, PMC and NSC deserve special acknowledgement and thanks.

May 2010

(Bangali Baboo)
National Director
Preface

The component aims at promoting the value chains in priority areas to enhance agricultural productivity, profitability, income, employment and nutritional security; and contribute to optimum utilization of the limited resources, deriving maximum coordination benefits, and enhancing synergies among participating institutions. Component-2 is enormously diverse in terms of products, technology, approach and likely impact which would be visualized in due course of time. It addresses the value chain approach in cereals, oilseeds, by products, livestock, fisheries, fruits and vegetable, natural dye, agro forestry etc. Considering the importance of this component 51 sub-projects were approved and implemented. These sub-projects have started giving results which have been compiled and presented before you in the form of Annual Report 2009–10.

Notable technologies have been generated in some of the consortia which have shown positive impact on income and employment generation. Consortia have been sensitized to generate commercial data for their technology and create competitive demand to ensure that potential investors / entrepreneurs have access to such technologies.

The continued guidance and support received from Dr. Bangali Baboo, National Director, NAIP is gratefully acknowledged. The support and cooperation received from Dr N.T. Yaduraju, National Coordinator (Component-1), Dr A.P. Srivastava, National Coordinator (Component-3), Dr A. Bandyopadhyay, National Coordinator (Component-4), Mr Devendra Kumar, Director Finance and Mr Kumar Rajesh, Under Secretary (Procurement) in streamlining of technical, financial, procurement and other fiduciary related aspects is appreciated. Timely direction and monitoring of Dr S. Ayyappan, Secretary DARE and Director General, ICAR deserve special acknowledgement and thanks.

I would like to thank all the Consortia Principal Investigators and their partners along with their host organizations in implementing this unique project.

The guidance and support received from Dr Paul S. Sidhu, Task Team Leader and his team at the World Bank is greatly appreciated.

It is my earnest hope that the time lag of 16 months in implementation of this project will soon get bridged as the project implementation is being fast tracked.

I appreciate the efforts of the Consulting Engineering Services, M&E Consultants in preparing of this report. Last but not the least my sincere thanks are due to Ms Vandana Verma, Research Associate and staff of PIU-NAIP for their untiring efforts in bringing out this report.

(R.K. Goyal)
National Coordinator
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Abbreviations

APMC  Agricultural Produce Market Committee
CAC   Consortium Advisory Committee
CeRA  Consortium for e-Resources in Agriculture
CGIAR Consultative Group of International Agricultural Research
CIC   Consortium Implementation Committee
CICR  Central Institute for Cotton Research
CIHT  Central Institute for Fisheries Technology
CIMMYT International Maize and Wheat Improvement Centre
CIRCOT Central Institute for Research on Cotton Technology
CL    Consortia Leader
CMFRI Central Marine Fisheries Research Institute
CMU   Consortium Monitoring Unit
CNs   Concept Notes
CPCRI Central Plantation Crops Research Institute
CPI   Consortia Principal Investigator
CSIR  Council of Scientific and Industrial Research
DARE  Department of Agricultural Research and Education
DECIKE Digitally Enabled Customization of Information for Decision and Empowerment
DFID  Department for International Development
DMAT  Digital Multimedia for Agri-Innovation Transfer
GEF   Global Environmental Funding Agency
IASRI Indian Agricultural Statistical Research Institute
ICAR  Indian Council of Agricultural Research
ICRISAT International Crop Research Institute for Semi Arid Tropics
ICT   Information and Communication Technology
IIM   Indian Institute of Management
IIML  Indian Institute of Management, Lucknow
IIT   Indian Institute of Technology
ILRI  International Livestock Research Institute
IPM   Integrated Pest Management
IRRI  International Rice Research Institute
IWM   International Water Management Institute
M&E  Monitoring and Evaluation
NAARM National Academy of Agricultural Research Management
NAIP  National Agricultural Innovation Project
NARS  National Agricultural Research System
<table>
<thead>
<tr>
<th>abbreviation</th>
<th>full form</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDDB</td>
<td>National Dairy Development Board</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non-Governmental Organisations</td>
</tr>
<tr>
<td>NICM</td>
<td>National Institute of Cooperative Management</td>
</tr>
<tr>
<td>NIRD</td>
<td>National Institute of Rural Development</td>
</tr>
<tr>
<td>NSC</td>
<td>National Steering Committee</td>
</tr>
<tr>
<td>O&amp;MAG</td>
<td>Organization and Management Advisory Group</td>
</tr>
<tr>
<td>O&amp;MPC</td>
<td>Organization and Management Programme Committee</td>
</tr>
<tr>
<td>OCB</td>
<td>Organizational Citizenship Behaviour</td>
</tr>
<tr>
<td>PAD</td>
<td>Project Appraisal Document</td>
</tr>
<tr>
<td>PCS</td>
<td>Production to Consumption Systems</td>
</tr>
<tr>
<td>PIP</td>
<td>Project Implementation Plan</td>
</tr>
<tr>
<td>PIU</td>
<td>Project Implementation Unit</td>
</tr>
<tr>
<td>PMTS</td>
<td>Project Monitoring and Tracking System</td>
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<tr>
<td>PPP</td>
<td>Public–Private Partnership</td>
</tr>
<tr>
<td>PPPP</td>
<td>Public–Private Peoples Partnership</td>
</tr>
<tr>
<td>PRA</td>
<td>Participatory Rural Appraisal</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RPC</td>
<td>Research Programme Committee</td>
</tr>
<tr>
<td>SAUs</td>
<td>State Agricultural Universities</td>
</tr>
<tr>
<td>TAG</td>
<td>Technical Advisory Group</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>TQM</td>
<td>Total quality management</td>
</tr>
<tr>
<td>TTC</td>
<td>Technology Transfer Clubs</td>
</tr>
<tr>
<td>WASSAN</td>
<td>Watershed Support Services and Activities Network</td>
</tr>
<tr>
<td>WEKA</td>
<td>Waikato Environment for Knowledge Analysis</td>
</tr>
</tbody>
</table>
Executive Summary

This annual report (April 2009 to March 2010) presents salient achievements of sub-projects addressing Production to Consumption System aspects of cultivation, harvesting, transforming it into high value products and then marketing. Fifty one consortia under eight thematic areas as shown in the following Table are fully involved in this endeavor including 28 from Call-1 & Call-2, and remaining 23 from Call-3.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Call 1</th>
<th>Call 2</th>
<th>Call 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Security and Income Augmentation</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Resource Use Efficiency</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Income Augmentation and Employment Generation</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Income Augmentation and Employment Generation/Resource Use Efficiency</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Agro Processing</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Export Promotion</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Income Augmentation and Employment Generation/Processing</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Food Security and Income Augmentation/Agro-Processing</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>18</td>
<td>23</td>
<td>51</td>
</tr>
</tbody>
</table>

These consortia include value chain on cereals, millets, fruits and vegetables, milk, meat on one hand and flowers, cotton seed and fibre, coconut fibre, banana pseudostem fibre, lac, agro forestry, livestock, natural dyes, cashew, aromatic plants, neutraceuticals, spices, castor, saffron, milling byproducts, sea-buckthorn on the other hand. Besides from this, component includes 8 sub-projects on fisheries sector.

During this period most of the sub-project have made good beginning and have developed technologies, processes, product and protocol in their respective area of research. This includes production technologies in which various treatments were optimized to get high quality yield. Similarly, most of the crops and commodities were characterized for physio-thermo, biochemical and processing attributes and protocol developed. Besides, value-added products have been developed from the main produce as well as from by products and waste of milling industry for human and animal consumption. Under the production technologies, varieties have been screened and identified for their intended use in Production to Consumption System of research. Products and process parameters have been optimized to develop novel and innovative value-added products at lab scales and tested analytically and organoleptically. Farmers, Self Help Groups, processors and entrepreneurs have been encouraged to adopt newer approaches and were involved in the research activities right from the beginning.

The kind of response NAIP products are getting, has further strengthened our belief that
value-added output will be converted to outcome which in turn help enhancing income and employment generation with cost and energy effective techniques means sustainability. Though the research achievements have been reported under each sub-projects, a glimpse of some major innovations are summarized below:

- Hydrophil/WMD virus isolated, characterized and initiated production of Monoclonal antibody (MAbs) for diagnostic. The total plate count of the Indian Major Carp (IMC) species is nearer to 5 log count /g and presence of pathogens and fecal coli forms is not found.
- Mass culture of Ceriodaphnia, Moina, Daphnia, Thermocyclops and Mesocyclops live food organism for fishes has been standardized. A value-added product ‘Murrel Pickle’ is developed and tie is established for its marketing.
- Cobia fish has generated interest among fish farmers not only from Tamil Nadu but also other Coastal states as well. Methods of collection of brooders of cobia, its transportation and quarantine protocols have been developed. The cobia fishes fed with squids showed the highest weight gain of 84.62% whereas best food conversion ratio is found in fish fed with sardine fish.
- For Biomass Based Decentralized Power Generation, briquettes of pigeon pea stalk, soybean stalk and cotton stalk have been evaluated for their physical and thermo-chemical properties such as particle size, density and calorific value, etc.
- Ten formulations for botanicals and Trichoderma (Biopesticides) have been developed for testing, selection and recommendation for commercial production.
- Few species for pulp and two species for match wood have been characterized. Melia dubia has been tested positive for pulpwood and recorded a pulp yield of 50.3% along with kappa number of 19.60. Anthocephalus cadamba and Ailanthus triphysa species have been identified as alternate match wood with a match stick recovery of 16,000 to 18,000 sticks/kg of wood.
- More than 1,200 shades on cotton yarn, banana fibre, and fabrics of cotton, chiffon, georgette and silk dye shades have been developed from 10 natural sources. Also developed 10 shades of surface paints and 10 shades of Eco-powders from natural sources.
- A decentralized crushing unit of sweet sorghum has been established for syrup production and supply chain management using a combination of centralized and decentralized models. Public-private-peoples partnership (PPPP) for forward and backward linkages and knowledge sharing and training the stakeholders in sweet sorghum cultivation, and processing has been established.
- Methods for production of Virgin Coconut Oil (VCO) using hot processing method has been standardized whereas production of VCO through cold process indicated that fermentation time could be reduced by adding starter culture to the coconut milk.
- For long time storage of French Fries, processing and biochemical attributes indicated that French fries made from Chipsona varities have lowest acrylamides content.
- Millet based commercially viable value-added products such as dosa mix, diabetic mix, and cookies for vulnerable groups have been developed.
Production techniques for tomato, capsicum, cucumber, gerbera and chrysanthemum under protected cultivation including IPM, grafting of vegetable seedlings have been standardized.

Five Pablo boats have been modified and converted into tuna long liners at Agatti. Designed and fabricated 6 numbers of stainless steel manually operated tuna long line winch and other gear materials for the tuna long line and distributed to the fishermen of Agatti. Three value-added products developed from tuna and improved the traditional Masmin product. SILO Fish feed was developed from Tuna silage by using Tuna Processing Waste.

Post-harvest treatments have been standardized for shelf life extension of Jasminum sambac flowers:
- Long distance transport (gel ice cold condition): Thermocole packaging + Aluminium foil lining + Boric acid 4%
- Short distance transport (ambient conditions): Polypropylene packing 60 m + Boric acid 4% + CFB packaging
- Long term storage (Cold room conditions at 7°C): Polypropylene packing 60 m + Boric acid 4% + CFB packaging

Two oyster farms have been developed in Tamilnadu and 1,500 seed collection units have been placed. Five oyster products, viz. Individual Quick Freeze (IQF) half shell oyster, IQR single oyster, oyster curry, oyster pickle and oyster soup have been prepared and tested.

Ready to eat (RTE) products from P. juliflora / P. palida have been developed from pod flour such as coffee, confectionary items, squash etc. for commercialization. Prosopis coffee contains 70% coffee beans and 30% prosopis pod mesocarp.

Performance indicators

Key performance indicators and targets by the end of the project are given below:

### Performance indicators under Component 2 for the period till 31st March 2010

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Baseline values</th>
<th>Performance as on March 2010</th>
<th>Target by the end of the Project (as per PAD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of production technologies released and adopted</td>
<td>0</td>
<td>69</td>
<td>75</td>
</tr>
<tr>
<td>No. of processing technologies released and adopted</td>
<td>0</td>
<td>56</td>
<td>95</td>
</tr>
<tr>
<td>No. of new rural industries established</td>
<td>0</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>No. of product groups for which quality grades have been agreed</td>
<td>0</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>Total no. of private sector organizations (including NGOs) participating in consortia</td>
<td>0</td>
<td>140</td>
<td>170</td>
</tr>
<tr>
<td>No. of farmers involved in consortia activities</td>
<td>0</td>
<td>11,179</td>
<td>12,750</td>
</tr>
</tbody>
</table>

(Contd...)
The performance indicators are satisfactory and it is expected that all the PAD targets would be achieved. It has, however, been observed that still there is a need for more clarity in reporting the production and processing technologies released and adopted. Technologies are not merely technical processes to produce certain products; they should also be financially viable from the point of view of the entrepreneurs.
The importance of marketing in agriculture has been realized increasingly for the past few years. It has been recognized that to achieve success in agri-marketing, the earlier fragmented approach covering research mostly on production aspects will have to be changed to a holistic approach, addressing production to consumption systems with a higher priority among others, to post-harvest processing, quality management, nutrition issues, etc. Such a system will also have backward linkages with the input-supply system and forward linkages with food-chain aspects, covering consumption by human beings as well as animals. Such a systems approach, particularly to cater to small and marginal farmers and contribute to the efficient use of scarce resources, has to harness synergies among R&D actors through a consortium or collaborative mode. The public sector, largely working alone, has not been able to generate a visible impact on enhancing income, employment, profitability and competitiveness in the agriculture sector dominated by small and marginal/poor farmers. The involvement of the private sector assures greater efficiency, cost effectiveness and timeliness whereas the involvement of the public sector assures relevance and trust. It is now being realized that only collective action of all the stakeholders will have the desired results.

Therefore, the Consortium concept is being regarded central to facilitating the flow of knowledge, experimentation and value-addition in the agriculture sector. The value-addition in one or more components of the value chain depends on the client-driven identification of the most critical missing links and bridging them through research-driven interventions. It must be clear that in the value chains, the product is as important as the process. There are clear coordination benefits for many high-value and perishable products as well as for quality control and reliability in material supply. Accordingly, in Component 2, the NAIP will help enhance the potential value of agri-products, mobilize partnerships, contribute to optimum utilization of the limited resources and enhance synergies among the participating institutions.

1.1 Objectives of the Component 2

The specific objectives of the Component are:

(i) To promote PCS ("value chains") in priority areas to enhance agricultural productivity, profitability, income, employment and nutritional security;

(ii) To contribute to optimum utilization of the limited resources, deriving maximum coordination benefits, and enhancing synergies among participating institutions; and,

(iii) To build a national system of innovation, integrating the wider processes of social and economic changes involving all the stakeholders.
1.2 Approved projects call wise

The 51 consortia were approved in the three calls (C1, C2 & C3). The details of these approved consortia under the eight identified themes in all three calls are mentioned below:

<table>
<thead>
<tr>
<th>Theme</th>
<th>Call 1</th>
<th>Call 2</th>
<th>Call 3</th>
<th>Total</th>
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<td>2</td>
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<td>2</td>
<td>3</td>
<td>-</td>
<td>5</td>
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<tr>
<td>Income Augmentation and Employment Generation/Resource Use Efficiency</td>
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</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>18</td>
<td>23</td>
<td>51</td>
</tr>
</tbody>
</table>

1.3 Budget Allocation – Planned and Actual

Under this component 51 consortia were approved in which there were in total 51 Consortia Leaders and 150 Consortia Partners. The latest budget sanctioned for the whole component was ₹ 2,413.33 million. Hence, the average amount sanctioned per consortia was ₹ 47.32 million. Details are given below:

Number of consortia and amount sanctioned

<table>
<thead>
<tr>
<th>Allocated Budget ( ₹ in million)</th>
<th>No. of Consortia</th>
<th>Number of Participating Institutes</th>
<th>Amount Sanctioned ( ₹ in million)</th>
<th>Amount Sanctioned per consortia ( ₹ in million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,573.3</td>
<td>51</td>
<td>51</td>
<td>150</td>
<td>2,413.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.32</td>
</tr>
</tbody>
</table>

Budget Utilization

The details of the sanctioned budget and fund utilized are given below:

Statement on Budget Utilization ( ₹ in lakhs)

<table>
<thead>
<tr>
<th>Total sanctioned budget for project period</th>
<th>Total sanctioned budget for year the 2009–10</th>
<th>Fund Utilized for year the 2009–10</th>
<th>Cumulative fund utilized upto 31 March 2010</th>
<th>Fund Utilized of the total sanctioned budget (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,413.33</td>
<td>814.1</td>
<td>608.0</td>
<td>870.3</td>
<td>36.06</td>
</tr>
</tbody>
</table>

It can be seen from above data that the total sanctioned budget for the year 2009–10 was ₹ 814.1 million. The fund utilized in the year 2009–10 was ₹ 608 million. While, the cumulative fund utilized till March 2010 was ₹ 870.3 million (making an utilization of fund to the order of 36.06% of the total sanctioned budget).
1.4 M & E System at Consortia level

The schematic of M&E system for various sub-projects approved under component 2 is given below:

**Internal M&E**

<table>
<thead>
<tr>
<th>At Consortia level</th>
<th>At PIU level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consortia Advisory Committee</td>
<td>Component and Project level review by PMC, RPC, TAG and respective NCs</td>
</tr>
<tr>
<td>Consortia Monitoring Units</td>
<td>Component level workshops/National workshop</td>
</tr>
<tr>
<td>Consortia Implementation Committee</td>
<td>Region/State level meetings</td>
</tr>
</tbody>
</table>

**Monitoring and Evaluation System for NAIP**

<table>
<thead>
<tr>
<th>Audit</th>
<th>External M&amp;E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Audit—Ernest &amp; Young</td>
<td>Activities undertaken by CES</td>
</tr>
<tr>
<td>External Audit</td>
<td></td>
</tr>
<tr>
<td>Post-Review Procurement</td>
<td></td>
</tr>
</tbody>
</table>

It can be seen that at consortia level, the monitoring and evaluation will be done by Consortia Monitoring Unit (CMU) setup for each approved consortia. The report of these units will be considered by Consortia Implementation Committee (CIC) and the Consortia Advisory Committee (CAC) for the particular consortia will adopt the report with or without making any modification. These report will further be considered by Technical Advisory Group (TAG), Research Programme Committee (RPC) and by Project Monitoring Committee (PMC).

There is also an external monitoring and evaluation system in which the internal audit will be done by M/s Ernst & Young and the external audit empowered by statutory audit partners.

There will be also post-review procurement. The external M&E activities will be undertaken by M/s Consulting Engineering Services (I) Pvt. Ltd, New Delhi.

CAC, CIC and CMUs are operating at the consortia level. Numbers of CAC, CICs and CMUs meetings held are 80, 73 and 65 respectively.

In addition to the consortia level, PIU has been actively involved in M&E activities and organized Annual Workshop on April 15–16 at TNAU, Coimbatore to review the work of 51 consortia. M&E consultant has also visited 14 consortia under component 2 during the year 2009–10 and all the consortia under component 2 have been facilitated and assisted to complete the baseline survey.

M & E consultant have also reuqested the consortia to complete the results framework so that PMTS could be operationalized at all the 51 consortia. This work is under progress.
CHAPTER 2

Sub-projects wise Research Progress

The progress report of each sub-project grouped under 8 approved themes are given below:

Theme 1: Food Security and Income Augmentation

Under this theme following 3 sub-projects are summarized as follows:

1. Sub-project: A value chain in production and utilization of Indian major carps and prawn from aquaculture system

   (i) Project Code : 20014
   (ii) Sanctioned date : 09.06.2008
       Completion date : 30.06.2012
       Budget (₹ in lakh) : 320.33
   (iii) Consortia P.I. and Lead Institute : Dr K.M. Shankar
       (Name, designation and full address) FCM, Nanddinagar
       08482-245264, 09480571370
       alkulishankar@gmail.com
   (iv) Partners:
       ● Central Institute of Freshwater Aquaculture, Bhubaneswar
       ● College of Fishery Science, Muthkur, Nellore
       ● Karnataka Cooperative Fisheries Federation Ltd, Mysore
       ● Tetragon Chemical Pvt. Ltd, Bangalore
       ● M/S Millennium Exports, Chennai
       ● Sarojini Institute for Community Development, Chitradurga
   (v) Website: www.cofmcarpvc.org
   (vi) Objectives:
       1. Further standardization of the low cost technology of promotion of microbial biofilm (MB) on artificial plant waste substrates for improving carp and prawn production.
       2. Development of farmer level diagnostic kits and appropriate oral commercial vaccines against common pathogens and parasites of carps.
       3. Development of appropriate post harvest technology for handling, packaging, transport, value-addition and utilization of waste of carps.
       4. Evaluation of the technical and economic efficiencies of the improved strategies for production, health management and post harvest technology.
       5. Dissemination of the technology to stake holders through involvement, demonstration, and training.
(vii) Research Progress:

- Monoclonal antibody (MAbs) based immunofluorescence/Immunoperoxidase/Immunodot developed for detection of WMD virus of *M. rosenbergii* in hatchery—a significant contribution for management of virus in hatcheries/grow out system.
- Production technology of gelatin from air bladder of IMC with increased yield was transferred to industry (M/s Millenium Exports Pvt Ltd., Chennai).
- The protein Hydrolysate (bioactive peptides) from *Catla catla* showed higher ACE inhibitory activity and antioxidant properties.

Innovations/Success Stories

(a) White muscle disease virus (WMDV) causes mortality of prawn in hatcheries and early grown out. Avoidance of the virus through screening is best solution. And the MAb based Immunodot could be further simplified to a farmer level field kit as a simple, cost effective gadget for screening of prawn seed.
(b) There is great demand for fish gelatin after declining demand for bovine and porcine gelatin. Production of gelatin from waste of carp (gas bladder) in this direction has a great advantage.

(c) Neutraceuticals bioactive peptide prepared by enzymatic action on carp meat is an added value to carp utilization. The peptides have high ACE inhibition activity ideal for treating cardiac cases.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCM, Nandinagar</td>
<td>189.11</td>
<td>101.60</td>
<td>99.30</td>
<td>98</td>
</tr>
<tr>
<td>CIFA, Bubaneshwar</td>
<td>52.06</td>
<td>18.14</td>
<td>15.92</td>
<td>88</td>
</tr>
<tr>
<td>NFC, Nellore</td>
<td>45.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KCFF, Mysore</td>
<td>8.13</td>
<td>1.64</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Tetragon Chemical, Bangalore</td>
<td>9.09</td>
<td>0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millenium Exp., Chennai</td>
<td>9.09</td>
<td>1.73</td>
<td>1.71</td>
<td>99</td>
</tr>
<tr>
<td>SICD, Chitradurga</td>
<td>7.35</td>
<td>0.11</td>
<td>0.03</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>320.33</strong></td>
<td><strong>152.31</strong></td>
<td><strong>140.91</strong></td>
<td><strong>93</strong></td>
</tr>
</tbody>
</table>

2. Sub-project: A Value Chain on Murrel Production in Tamil Nadu and Orissa

(i) Project Code: 20022
(ii) Sanctioned date: 22.08.2008
(iii) Completion date: 30.06.2012
(iv) Budget (₹ in lakh): 302.23
(v) Consortia P.I. and Lead Institute: Dr M.A. Haniffa
   Name, designation and full address: CSIR Emeritus Scientist and Director
   Centre for Aquaculture Research and Extension (CARE)
   St. Xavier’s College
   Palayamkottai-627 002, Tamilnadu
   0462-2560670, 09443157415
   Fax: 0462-2561765
   haniffacare@gmail.com, sxccare@gmail.com

(iv) Partners:
   - Central Institute of Freshwater Aquaculture, (CIFA), Bhubaneshwar, Orissa
   - The New College (TNC), Chennai

(v) Website: www.caresxc.org

(vi) Objectives:
   1. To refine and replicate mass seed production techniques under research and development to increase survival and upscaling of murrel seed production at farmer’s level.
2. To standardize the procedure and process of producing mass culture of live food organisms and formulation of microencapsulated diet and semi moist feed using agro waste and medicinal herbs and probiotics (R&D) for grow out culture of murrels.

3. To enhance the knowledge, skills and attitude of target communities in sustainable use of stakeholders ponds for murrel farming for their socio economic upliftment.

4. Strengthening of weaker chains (eg, disease management) and rectification of missing links (eg, seed production, larviculture, grow out culture and transport as frozen/ chilled flesh) in PCS through R&D and Marketing by Government and Private Partners.

(vii) Research Progress:
- Three cladoceran species and two copepod species were selected for live food culture and mass culture in ponds and bigger tanks was also carried out and significant results were obtained.
- Different organic manures were used to fertilize the medium for mass culture of cladocerans (Daphnia, Miona, and Ceriodaphnia) and Copepods (Thermocyclops and Mesocyclops) and good results were obtained.
- Livefood Cladoceran sp. and Copepod sp. were successfully used for larval rearing of Channa striatus. Prey size and density has a prominent role to play in the successful rearing of the larvae of this fish, cannibalism can be reduced by providing suitable live food both in terms of its size, nutritional quality and density of the prey.
- Mass culture of Cladocerans was carried out in pond at SXC, CARE Aquafarm, Tirunelveli.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre for Aquaculture Research and Extension (CARE), St. Xavier’s College, Palayamkottai</td>
<td>204.10</td>
<td>138.60</td>
<td>132.64</td>
<td>96</td>
</tr>
<tr>
<td>CIFA</td>
<td>82.24</td>
<td>44.69</td>
<td>38.12</td>
<td>85</td>
</tr>
<tr>
<td>TNC</td>
<td>15.89</td>
<td>11.81</td>
<td>11.99</td>
<td>102</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>302.23</strong></td>
<td><strong>195.10</strong></td>
<td><strong>182.76</strong></td>
<td><strong>94</strong></td>
</tr>
</tbody>
</table>

3. Sub-project: Export oriented Marine Value Chain for Farmed-Seafood Production using Cobia (Rachycentron canadum) through Rural Entrepreneurship

(i) Project Code : 20024
(ii) Sanctioned date : 22.08.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 266.90
(iii) Consortia P.I. and Lead Institute : Dr N. Felix  
(Name, designation and full address) FC&RI (TANUVAS, Chennai)  
044-25551574, 09443688174  
nathanfelix@yahoo.com  

(iv) Partners:  
- Fisheries College and Research institute  
- Tamilnadu Veterinary and Animal Sciences University, Thoothukudi  
- Central Institute of Brackishwater Aquaculture (CIBA), Chennai  
- Central Marine Fisheries Research Institute (CMFRI), Mandapam  

(v) Website: www.tfcc.cobia.in  

(vi) Objectives:  
1. Standardization of breeding protocol to produce quality seeds under controlled  
condition.  
2. Developing appropriate farming methods for fish production in raceways, marine  
floating cages and coastal ponds.  
3. Developing “ready to cook” and “ready to eat” cobia products and evaluating the  
marketing strategies for fresh and value-added processed fish products.  
4. Dissemination of technologies on cobia seed production, farming and processed fish  
products for rural entrepreneurs.  

(vii) Research Progress:  
- Base line report reveals that the availability of cobia is scarce in coastal districts  
and the annual catch is less than 1% of total fish catch.  
- Protocols for feeding captive broodstock with appropriate rationing and time schedule  
- Cannulation methods were standardised and maturity condition of the fishes were  
assessed  
- Quarantine protocols for live cobia was standardized  
- Two Cobia fish products, viz. canned cobia in TFS cans and hot filled cobia curry,  
were developed and their nutritional quality was studied.  
- The technology for cobia seed production has been standardized.  

Innovations/Success Stories  
- Two values added Ready to Eat cobia fish products, viz. canned cobia curry and hot filled  
cobia curry with prolonged shelf life of 4 months at 2–3°C and two Snack foods have been  
developed. It is giving employment in rural coastal areas for fisherwomen which are earning  
approximately Rs 10,000–12,000 per women as monthly income.  
- Cobia (Rachycentron canadum), a marine fin fish of high quality white meat and  
fastest growth potential. The farming of Cobia is currently being undertaken in many  
parts of the world including China, Taiwan, Vietnam, Australia and USA and witnessing
boom due to its faster growth rate (8–10 kg in 14–16 months), export potential, taste and flavor quality. Cobia fish has generated interest among fish farmers not only from Tamilnadu but also other coastal states as well. Methods of collection of brooders of cobia, its transportation and quarantine protocols have been developed. The cobia fishes fed with squids showed the highest weight gain of 84.62% whereas best food conversion ratio is found in fish fed with sardine fish.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

### Cobia products

Two values added ready to eat cobia fish products, viz., canned cobia curry and hot filled cobia curry with prolonged shelf-life of 4 months at 2° to 3°C and two snack foods have been developed. It is giving employment in rural coastal areas for fisherwomen which are earning approximately Rs 10,000 to 12,000 per women as monthly income.

### Statement Budgetary Position as on 31 March 2010

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC&amp;RI (TANUVAS Chennai)</td>
<td>152.91</td>
<td>79.13</td>
<td>61.63</td>
<td>78</td>
</tr>
<tr>
<td>CIBA, Chennai</td>
<td>66.89</td>
<td>20.30</td>
<td>17.49</td>
<td>86</td>
</tr>
<tr>
<td>CMFRI, Mandapam</td>
<td>45.10</td>
<td>18.20</td>
<td>17.91</td>
<td>98</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>266.90</strong></td>
<td><strong>117.13</strong></td>
<td><strong>97.02</strong></td>
<td><strong>82</strong></td>
</tr>
</tbody>
</table>

### Theme 2: Resource Use Efficiency

Under this theme following 2 sub-projects are summarized as follows:

#### 4. Sub-project: Value Chain on Biomass Based Decentralized Power Generation for Agro Enterprises—Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh

(i) Project Code : 20016  
(ii) Sanctioned date : 26.05.2008  
Completion date : 30.06.2010  
Budget (₹ in lakh) : 599.069  
(iii) Consortia P.I. and Lead Institute : Er. Anil Kumar Dubey CIAE, Bhopal 0755-2521122, 09993287302 dubey@ciae.res.in  
(iv) Partners:  
  ● Sardar Patel Renewable Energy Research Institute (SPRERI), VV Nagar, Gujarat  
  ● Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu  
(v) Website: http://www.ciae.nic.in/NAIP/naip_biomass.htm
(vi) Objectives:
1. Standardization of technology package for collection, densification, transportation, and storage of agro residues at utilization center
2. Standardization of technology package for feedstock preparation for biomass gasification
3. Development and adoption of efficient biomass gasification system for power generation
4. Integration of biomass based power generation system with agro enterprises

(vii) Research Progress:
- Database/know-how for use of lantana as fuel including its harvesting, transportation and briquetting
- Use of charcoal for waste water treatment and quality improvement in charcoal capability through activation
- Developed of briquette based gasifier (100 kW capacity)
- Developed of cooling, cleaning unit (indirect cooling) for 100 kW power plant
- Developed of cook stove exclusively for briquetting

Innovations/success stories
- The biomass gas stove was developed for small-scale thermal applications in agriculture and allied industries. These stoves widen the market for briquettes and make possible a higher efficiency and reduce the time and investment as compared to conventional stoves. Briquettes can be used in the biomass gas stove which is made from agricultural residues such as cotton stalk, pigeon pea stalk, jatropha husk, etc. The conventional wood burning stoves give a thermal efficiency of 8–15 per cent and the temperature of the flame obtained by direct combustion of biomass in the stove is in the range of 400–500°C. In the biomass gas stove, the efficiency is around 25–30 per cent and the temperature of the flame obtained is in range of 600–700°C. The saving in fuel and time over the conventional wood stoves are 10 and 40 per cent respectively. It consumes 6–10 kg briquettes per hour. The biomass gas stove can be used for thermal applications in farm households, tea shops, jaggery manufacturing, small-scale paddy, parboiling, arecanut boiling, mushroom production. For Biomass Based Decentralized Power Generation, briquettes of pigeon pea stalk, soybean stalk and cotton stalk have been evaluated for their physical and thermo-chemical properties such as particle size, density and calorific value etc.
**Collection, transportation and briquetting of lantana**

- A system for harvesting/uprooting of lantana, shredding, transportation and its briquetting has been developed. The briquettes produced from lantana were found to be superior to the briquettes of pigeon pea stalk and soybean straw. The employment opportunity for use of lantana to produce 125 tons of briquettes has been assessed based on the experiment and total of 750 man days could be generated for processing the lantana for making briquettes as fuel.

(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIAE, Bhopal</td>
<td>369.69</td>
<td>213.94</td>
<td>87.12</td>
<td>41</td>
</tr>
<tr>
<td>SPRERI, Gujarat</td>
<td>145.60</td>
<td>87.75</td>
<td>64.13</td>
<td>73</td>
</tr>
<tr>
<td>TNAU, Coimbatore</td>
<td>83.78</td>
<td>68.18</td>
<td>76.23</td>
<td>112</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>599.07</strong></td>
<td><strong>369.87</strong></td>
<td><strong>227.47</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>

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5. Sub-project: Bio-pesticide Mediated Value Chain for Clean Vegetables—CSKHPKV, Palampur, Himachal Pradesh, India

(i) Project Code : 20021
(ii) Sanctioned date : 19.08.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 526.10998
(iii) Consortia P.I. and Lead Institute: Dr D.C. Sharma  
(Name, designation and full address) CSKHPKV, Palampur  
01894-230521, 09418478958  
sharmadc3@rediffmail.com

(iv) Partners:  
- Indian Agricultural Research Institute (IARI), New Delhi  
- Society for Technology and Development (STD), Malori, Tikkar, Mandi (Himachal Pradesh)  
- Western Himalayan Society for Awareness and Upliftment (WHSAU), Palampur (Himachal Pradesh)

(v) Website: hillagric.ernet.in/naip/biopest

(vi) Objectives:  
1. Development of value-added indigenous biopesticides  
2. Development of biopesticides based good agricultural practices for the production of ‘clean’ vegetable crops  
3. Market driven production of value-added products of ‘clean’ vegetables  
4. Entrepreneurship development for biopesticides, ‘clean’ vegetables and their value-added products  
5. Assessing socio-economic and marketing aspects of the value chain

(vii) Research Progress:  
- Twenty five formulations of botanicals (Melia and Eupatorium) and six formulations of Trichoderma (Biopesticides) were prepared for preliminary testing. Eight upcaled botanical formulations and five Trichoderma have been prepared for selecting the most potent one for commercial production.

<table>
<thead>
<tr>
<th>Innovations</th>
<th>Biopesticides for clean vegetables</th>
</tr>
</thead>
</table>
| • Twenty five formulations of botanicals (Melia and Eupatorium) and six formulations of Trichoderma (Bio-pesticides) were prepared for preliminary testing. Eight upcaled botanical formulations and five Trichoderma have been prepared for selecting the most potent one for commercial production. Awareness created among 375 farmers about the biopesticides, ‘clean’ vegetables and their value added products was created through 8 training programmes. | • Bioactive component from the drupes of Melia azadarach and leaves of Eupatorium adenophorum were extracted, thirty one formulations of botanicals (Melia: 14, Eupatorium: 17) and six formulations of Trichoderma (Bio-agent) were prepared. Laboratory bioassay of different biopesticide formulatins was done against seven insect species namely, Drosophila melanogaster, Hieroglyphus sp., Nipaecoccus sp, Lipaphis erysimi, Brevicoryne brassicae, Pieris brassicae, and Plutella xylostella; and five plant pathogens namely, Alternaria brassica, Sclerotinia sclerotiorum, Rhizoctonia solani, Fusarium oxysporumf sp pisi, Erysiphe pisi. Eight upcased botanical formulations have been prepared for selecting the most potent one for commercial production.  
• Value added products of cabbage (frozen) and pea (frozen and canned) were prepared and their quality analysis is being carried out.  
• Process started for filing patent on “Botanical formulation for controlling insect pests and fungal pathogens and process for preparation thereof”. |
● Evaluated biopesticides formulations against insect-pests, viz. diamond back moth (*Plutella xylostella*), *Corcyra, Drosophila* etc. and pathogens namely, *Alternaria brassicae, Sclerotinia sclerotiorum Rhizoctonia solani, Fusarium oxysporum pisi, Erysiphe pisi* in laboratory/fields for selection of potent one and recommendation for commercial production.

● Value-added processed products of cabbage (frozen) and pea (frozen and canned) were prepared and evaluated for quality analysis.

● Awareness among 375 farmers about the biopesticides, ‘clean’ vegetables and their value-added products was created through 8 training programmes.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSKHPKV, Palampur</td>
<td>416.70</td>
<td>238.53</td>
<td>303.60</td>
<td>127</td>
</tr>
<tr>
<td>IARI, New Delhi</td>
<td>92.58</td>
<td>69.92</td>
<td>64.61</td>
<td>92</td>
</tr>
<tr>
<td>STD, Mandi</td>
<td>8.41</td>
<td>2.78</td>
<td>11.65</td>
<td>418</td>
</tr>
<tr>
<td>WHASU, Palampur</td>
<td>8.41</td>
<td>3.01</td>
<td>2.60</td>
<td>86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>526.10</strong></td>
<td><strong>314.26</strong></td>
<td><strong>382.46</strong></td>
<td><strong>122</strong></td>
</tr>
</tbody>
</table>

**Theme 3: Income Augmentation and Employment Generation**

Under this theme following 5 sub-projects are summarized as follows:

6. Sub-project: **Responsible Harvesting and Utilization of selected Small Pelagics and Fresh Water Fishes**

   (i) Project Code : 20001
   (ii) Sanctioned date : 01.01.2008
       Completion date : 30.06.2012
       Budget (₹ in lakh) : 971.10
   (iii) Consortia P.I. and Lead Institute : Dr M. Nasser
        (Name, designation and full address) CIFT, Kochi
        0484-2666845, 09447597508
        naipcift@gmail.com; nasser.cift@gmail.com
   (iv) Partners:
        ● Chellanam Kandakadavu Fishermen Welfare Development Cooperative Society, Chellanam
        ● Karnataka Fisheries Development Corporation Mangalore.
        ● Chellanam Panchayath SC/ST Service Co-operative society, Ltd
   (v) Website: www.smallpelagics.com
   (vi) Objectives:
        1. **Production:** Optimization of fishing Crafts and Gear for cost effective and responsible harvesting of Marine small pelagics and fresh water fishes
2. **Processing**: Development of a model processing system for total utilization, product development, value-addition, Food safety and Waste management for small pelagics and freshwater fishes.

3. **Marketing**: Development of Marketing systems and Strategies for small pelagics and freshwater fishes

(vii) Research Progress:
- Optimised net systems: (1) 2 optimised ring seine designs of 600 x 60 m with 22 mm mesh size (2) Optimised gillnet designs for 3 major species.
- Highly successful urban marketing outlet designed under the project and run by Karnataka Fisheries Development Corporation in Mangalore city.
- A new safe and durable FRP boat design introduced in Malampuzha reservoir.
- Four processing technologies for value-added products from fresh water and pelagic fishes.
- Community based processing unit managed by fisherwomen achieved break-even status within two months.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

**Statement Budgetary Position as on 31 March 2010**

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIFT, Kochi</td>
<td>963.10</td>
<td>478.66</td>
<td>299.95</td>
<td>63</td>
</tr>
<tr>
<td>CKFWDC, Cochin</td>
<td>0.75</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>KFDC, Mangalore</td>
<td>6.50</td>
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<td></td>
</tr>
<tr>
<td>Karnataka and Chellanam Panchayath SC/ST Cooperative Society Ltd., Kochi</td>
<td>0.75</td>
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<td></td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>971.10</strong></td>
<td><strong>478.66</strong></td>
<td><strong>299.95</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

7. **Sub-project**: A Value Chain for Cotton Fibre, Seed and Stalks: An Innovation for Higher Economic Returns to Farmers and Allied Stake Holders—CIRCOT, Mumbai

(i) Project Code : 20003
(ii) Sanctioned date : 15.12.2007
Completion date : 30.06.2010
Budget (₹ in lakh) : 903.11
(iii) Consortia P.I. and Lead Institute: Dr Rajan P. Nachane  
(Name, designation and full address) 
022-24127273, 09820680579  
drrpnachane@hotmail.com

(iv) Partners:  
● Central Institute for Cotton Research, Nagpur  
● M/s Super Spinning Mill, Coimbatore

(v) Website: 

(vi) Objectives:  
1. To grow established cotton genotypes in the adopted villages with integrated production technology practices.  
2. To reduce the level of contaminants in cotton by adopting appropriate on-farm and off farm management practices and to label cotton bales with fibre attributes after appropriate ginning.  
3. To prepare yarn, fabrics and garments in the modern mill and marketing and to manufacture eco-friendly textiles in handloom sector by employing CIRCOT technology for bio-scouring, followed by dyeing with natural dyes.  
4. To enable farmers earn additional income and to make alternate raw material available to industry by establishing cotton stalks supply chain to board industries/briquetting industries.  
5. To demonstrate innovative scientific processing of cotton seed for oil extraction and value-addition to its by-products

(vii) Research Progress:  
● Bale tagging of individual bales with fibre properties.  
● Enzymatic treatment of ginned seed for higher linter recovery standerised.  
● Enzymatic treatment of kernel for higher oil recovery optimized.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCOT, Mumbai</td>
<td>704.00</td>
<td>433.06</td>
<td>302.83</td>
<td>70</td>
</tr>
<tr>
<td>CICR, Nagpur</td>
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<td>62.13</td>
<td>53.72</td>
<td>86</td>
</tr>
<tr>
<td>SSM, Coimbatore</td>
<td>45.46</td>
<td>11.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>903.11</strong></td>
<td><strong>507.00</strong></td>
<td><strong>356.54</strong></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

8. Sub-project: A Value Chain on Industrial Agroforestry in Tamil Nadu

(i) Project Code: 20011
(ii) Sanctioned date: 08.06.2008  
Completion date: 30.06.2012  
Budget (₹ in lakh): 307.905
(iii) Consortia P.I. and Lead Institute : Dr K.T. Parthiban
(Name, designation and full address) TNAU, Coimbatore
04254-222010, 09443505844
kparthi2001@yahoo.com

(iv) Partners:
- Institute of Forest Genetics and Tree Breeding (ICFRE), Coimbatore, Tamil Nadu
- M/s. Tamil Nadu Newsprints and Papers Limited, Karur, Tamil Nadu
- M/s. Seshasayee Paper Boards Ltd., Erode, Tamil Nadu
- M/s. Vasan Match Works, Gudiyatham, Tamil Nadu

(v) Website: www.fcrinaip.org

(vi) Objectives:
1. Establishment of lucrative industrial wood plantation with improved short rotation clones through contract farming.
2. Wood technological characterization and development of suitable alternate genetic resources for pulp and match wood.
3. Optimizing precision Silvicultural technologies for productivity improvement of industrial wood species.
4. Development and concurrent dissemination of suitable post harvest technologies and value-addition of plantation and industrial residues through multi stakeholder partnership.
5. Augmenting the existing supply chain system and facilitating marketing of industrial wood through market outlook information system.

(vii) Research Progress:
- Established lucrative industrial wood plantation with improved short rotation clones through contract farming
- Wood technological characterization and development of suitable alternate genetic resources for pulp and match wood.
- Optimised precision silvicultural technologies for productivity improvement of industrial wood species.
- Established Market Intelligence Center (MIC) and dissemination of market information:
  More than 4,010 visitors/stakeholders benefited through the Market Intelligence Center (MIC) established as a part of NAIP which has evolved market information system
- Promotion of Quad-partite model contract farming system in an area of 220 acres with 98 beneficiaries through the project and 1,771 beneficiaries through horizontal expansion in an area of 11,000 acres outside the project site.
- Horizontal expansion took place in 25,000 acres, 3,764 farmers as against 500 acres, and 207 farmers as envisaged in the sub-project
- Development of Melia dubia, Dalbergia sissoo and Leucaena leucocephala as alternate pulpwood species with a pulp recovery of more than 46%.
- Casuarina needle based value-addition through briquetting technology developed and demonstrated.
Dissemination of price information through web and 4,010 visitors benefited through the site
Capacity building of 1,425 farmers in 10 trainings

Innovations/Success Stories

Contract Farming of Short Duration clone plantation—A Value-addition

- Three species for pulp and two species for match wood have been characterized. *Melia dubia* has been tested positive for pulpwood and recorded a pulp yield of 50.3% along with kappa number of 19.60.
- *Anthocephalus cadamba* and *Ailanthus triphysa* species have been identified as alternate match wood with a match stick recovery of 16,000 to 18,000 sticks/kg of wood.

Alternate pulp and match wood species

*Melia dubia* has been identified as one of the alternate pulp wood species with the pulp recovery of 49% and a kappa number of 19%.

Promotion of quad-partite contract tree farming

A Quad-Partite model contact tree farming has been designed and introduced in 10 clusters of 5 districts using short rotation clones wherein 500 acres directly and 22,000 acres (16 Districts) through horizontal expansion have been established which benefited 207 farmers directly and 3,764 farmers through horizontal expansion. This includes R&D organization, Banking Sector, Industry & farmers. Bank provides loan to the industry based on technology generated by R&D institute and then industry provide actual input to farming community for large-scale cultivation of agroforestry tree for pulp and match wood purpose.

Value-addition of plantation and industrial residues

The plantation residues of Casuarina and match wood residues promoted through industrial agroforestry have been successfully value added through Briquetting technology. A new supply chain has been developed which linked the growers with value addition industries. Economic analysis indicated that a net profit of ₹ 1,750 per ton of briquette using casuarina residues is realized.
(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

**Statement Budgetary Position as on 31 March 2010**

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget (₹ in lakh)</th>
<th>Fund Released up to March 2010 (₹ in lakh)</th>
<th>Fund Utilized up to March 2010 (₹ in lakh)</th>
<th>Fund Utilized (% of Released)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNAU, Coimbatore</td>
<td>230.59</td>
<td>107.82</td>
<td>114.88</td>
<td>107</td>
</tr>
<tr>
<td>IFGTB, Coimbatore</td>
<td>37.64</td>
<td>16.92</td>
<td>11.71</td>
<td>69</td>
</tr>
<tr>
<td>TNNPL, Karur</td>
<td>15.86</td>
<td>9.99</td>
<td>6.29</td>
<td>63</td>
</tr>
<tr>
<td>SPBL, Erode</td>
<td>14.00</td>
<td>10.61</td>
<td>10.67</td>
<td>101</td>
</tr>
<tr>
<td>Vasan Match Works, Vellore</td>
<td>9.81</td>
<td>5.72</td>
<td>1.15</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>307.90</strong></td>
<td><strong>151.06</strong></td>
<td><strong>144.70</strong></td>
<td><strong>96</strong></td>
</tr>
</tbody>
</table>

9. Sub-project: “Value Chain in Natural Dyes”—Acharya N.G. Ranga Agricultural University (ANGRAU), Hyderabad

(i) Project Code : 20015
(ii) Sanctioned date : 10.06.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 344.24
(iii) Consortia P.I. and Lead Institute : Dr A. Sharada Devi
(Name, designation and full address) ANGRAU, Hyderabad
040-240150, 09866293289
sharadadevi_2000@yahoo.com
(iv) Partners:
- M/s Shyamal Handlooms, Chirala, Prakasam Dist
(v) Website: www.angrau.net
(vi) Objectives:
1. To standardise eco-friendly cost effective natural dye production and processing technologies.
2. To develop entrepreneurial skills of stakeholders in natural dye value chain.
3. To establish small-scale pilot plants to promote natural dye value chain.
4. To ensure additional employment and income through national and international market networking in the field of textiles, handicrafts and surface paints.
5. To develop quality parameters for natural dye induced products for international market.
(vii) Research Progress:
- Installed banana extraction unit and trained 10 women in extraction, dyeing and production of handicrafts.
- Installed sisal extraction unit and trained tribal farmers in extraction of sisal fibre
- Ganesh idols—Developed required spectrum of colours for painting idols.
- Released 9 eco-colours for holi, conducted training programme for 20 artisans and 26 school children and created awareness among consumers through mass media.
Innovations/Success Stories

Banana Fibre Handicraft Unit
- Two women of Muchintal village in Ranga Reddy district of Andhra Pradesh which is situated closer to the NAIP workplace were trained in making natural dyed banana handicrafts and became master trainers. After that they trained 20 other women in making different types of handicrafts and helped them in acquiring skills and building confidence. Out of those 15 women came forward to start a unit in Muchintal which is running successfully in the village. GMR, Marketing group (International Airport) has given their support in marketing these products in their outlets.

Adoption of Natural dye technology by Silk Weavers of Dharmavaram
- Five silk weavers of Dharmavaram were trained in dyeing with natural dyes. These weavers are presently engaged in weaving of silk sarees. After acquiring skill in natural dyes, they have started producing woven items such as scarf, dress materials, sarees etc. They are able to send few samples to M/s Fab India Ltd.

Painting Ganesh idols with natural dyes
- Surface paints with natural dyes are produced by NAIP-VCND group. The paints are organic in nature and contain all natural material. This technology was adopted in painting Ganesh idols as these idols are immersed in water after the festival. To avoid water pollution, it was proposed to use natural dye paints for painting Ganesh idols. Pollution Control Board of AP has brought out ordinance to abolish synthetic dye usage for Ganesh idols and use of natural dyes.

Eco-powders for Holi festival
- Eco-powders with nine different shades were developed incorporating the essential colors as required were rated as excellent by the consumers. NAIP-VCND group has witnessed increased demand for these colours after a news item appeared in popular news papers. The Governor of Andhra Pradesh has invited NAIP-VCND group to play Holi with the safe natural dye colours at Rajbhavan along with His Excellency and family and the elite groups in Hyderabad.

More than 1,200 shades on cotton yarn, banana fibre, and fabrics of cotton, chiffon, georgette and silk dye shades have been developed from 10 natural sources. Also developed 10 shades of surface paints and 10 shades of eco-powders from natural sources.

(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized up to March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGRAU, Hyderabad</td>
<td>302.01</td>
<td>191.67</td>
<td>185.16</td>
<td>97</td>
</tr>
<tr>
<td>M/s. Shyamal Handlooms, Chirala</td>
<td>42.23</td>
<td>26.72</td>
<td>32.24</td>
<td>121</td>
</tr>
<tr>
<td>Total</td>
<td>344.24</td>
<td>222.95</td>
<td>155.10</td>
<td>69</td>
</tr>
</tbody>
</table>
10. Sub-project: A Value Chain on Coconut Fibre and its by-products: Manufacture of Diversified Products of Higher Value and Better Marketability to Enhance the Economic Returns of Farmers–NIRJAFT, Kolkata

(i) Project Code : 20027
(ii) Sanctioned date : 5.12.2008
   Completion date : 30.06.2012
   Budget (₹ in lakh) : 501.75
(iii) Consortia P.I. and Lead Institute : Dr G. K. Bhattacharya
    (Name, designation and full address) NIRJAFT, Kolkata
    033-24711807, 09432228336
    gkb51in@yahoo.co.in
(iv) Partners:
    ● Central Institute for Research on Cotton Technology, Mumbai
    ● Indian Rubber Manufacturers’ Research Association, Thane
    ● T.M. Natural Resources Research and Development Centre, Trivandrum, Kerala
    ● Rubber Park India (P) Ltd, Ernakulum, Kerala
(v) Website: www.nirjaft.res.in/naip
(vi) Objectives:
1. Technology refinement and upgradation in graded and segregated coconut fibre processing to enhance productivity and quality of products
2. To develop technology for manufacture of innovative and biodegradable products from Coconut pith through value-addition for better utilization of by-products and preservation of environment.
3. To promote production of diversified value-added products from Coconut fibre to ensure better returns for the farmers.
(vii) Research Progress:
    ● For the first time grading of fibre lone coconut variety (ecotype) wise initiated.
    ● Coconut ecotypes are identified suitable for quality nut and fibre (at present coconut is grown only for nut and not for the fibre).
    ● Value-added diversified ornamental cloth has been successfully developed in hand-weaving machine fitted with jacquard design system. The cloth is much suitable for furnishing materials.
    ● Geotextiles of composite structure for protection of river-bank from erosion—suitable for much hazardous soil, water, and weather conditions. The composite geotextiles suitable for river-bank protection is possible to produce using indigenously available and commercially viable production technology.
    ● Basic and scientific investigation of raw coconut fibre (Scanning Electron Microscopy, Fourier Transform Infrared Spectroscopy, Thermo-gravimetric Analysis) has been carried out.
(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:
Theme 4: Income Augmentation and Employment Generation/Resource Use Efficiency

Under this theme following 5 sub-projects are summarized as follows:

11. Sub-project: Value Chain Model for Bioethanol Production from Sweet Sorghum in Rainfed Areas through Collective Action and Partnership–ICRISAT, Hyderabad

(i) Project Code: 20004
(ii) Sanctioned date: 20.12.2007
Completion date: 30.06.2012
Budget (₹ in lakh): 946.6442

(iii) Consortia P.I. and Lead Institute:
Dr Belum V S Reddy
ICRISAT, Hyderabad
040-30713487, 09989057535
b.reddy@cgiar.org

(iv) Partners:
- National Research Centre for Sorghum (NRCS), Hyderabad, DSR (formerly NRCS),
- Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad
- Indian Institute of Chemical Technology (IICT), Hyderabad
- International Livestock Research Institute (ILRI), Hyderabad
- Sri Venkateswara Veterinary University (SVVU), Hyderabad
- RUSNI Distilleries, Hyderabad

(v) Website: www.ssvc-icar-naip.icrisat.org

Objectives:
1. Assess economic and environmental viability, enabling policies and institutions for promoting cultivation of sweet sorghum for bioethanol production and its impact on environment, rural incomes, livelihoods and social capital development.
2. Develop and establish pilot-scale Public Private People Partnership (PPPPs) value chain bioethanol enterprise models through “Seed-to-Tank” approach encompassing sweet sorghum production, processing, value-addition, marketing and protecting environment.
3. Farmers’ participatory multilocation testing of the improved biomass (stalks and grain) and juice yielding sweet sorghum cultivars under on-farm situations and development of production and seed systems in the targeted area.

5. Capacity building and skill development of all the stakeholders including rural communities in the enhanced sweet sorghum production and value chain for bioethanol production.

(vii) Research Progress:
- Innovation in stalk supply chain management
- Innovation in sweet sorghum bagasse value chain

Innovations/Success stories

Income and employment generation through sweet sorghum chain
- Achieved higher stalk yields (20 t/ha) and grain yields (1.7 t/ha) of sweet sorghum in spite of a drought year (2009 rainy season) as against 15 t/ha & 1.0 t/ha respectively during previous year. Sweet Sorghum has been cultivated on 44 ha with stalk volume of 600 t in 2009 as against 557 t in 2008.
- Sweet Sorghum Syrup with 40° Bx and more can be stored for more than 12 months without deterioration in Brix content
- Through Work contract model discussion with bullock cart owners took place before harvesting and contract was developed for simultaneous loading, transportation and unloading of stalk just after harvesting on the same day at Decentralised Crushing Unit (DCU) with an contract amount: ₹ 220 per ton of stalk. It resulted into no obligation to farmer and facilitated farmers to attend other works
- Farmer getting higher stalk weight and income as crushing happened on the same day which resulted in 3% higher juice and syrup yield to DCU and farmers got wage earnings by working at DCU
- Sensitized the farmers and fodder agents on benefits of bagasse as animal feed. It resulted in a great demand for sweet sorghum bagasse by the end of the crushing season, subsequently resulted in higher price for chopped & fresh (wet) bagasse of sorghum fodder. By the end of the season, fodder agents offered ₹ 1.20 per kg instead of ₹ 0.50 per kg i.e. regular wage
Income & Employment Generation through Sweet Sorghum Chain

- A decentralized crushing unit of Sweet Sorghum has been established for syrup production and supply chain management using a combination of centralized and decentralized models. Public-private-peoples partnership (PPPP) for forward and backward linkages and knowledge sharing and training the stakeholders in sweet sorghum cultivation, and processing has been established.

(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICRISAT, Hyderabad</td>
<td>449.44</td>
<td>207.23</td>
<td>211.88</td>
<td>102</td>
</tr>
<tr>
<td>DSR, Hyderabad</td>
<td>108.36</td>
<td>56.89</td>
<td>44.56</td>
<td>78</td>
</tr>
<tr>
<td>CRIDA, Hyderabad</td>
<td>62.91</td>
<td>38.48</td>
<td>30.87</td>
<td>80</td>
</tr>
<tr>
<td>IICT, Hyderabad</td>
<td>102.29</td>
<td>73.00</td>
<td>50.20</td>
<td>69</td>
</tr>
<tr>
<td>ILRI, Hyderabad</td>
<td>101.54</td>
<td>85.20</td>
<td>16.01</td>
<td>19</td>
</tr>
<tr>
<td>SVVU, Hyderabad</td>
<td>40.88</td>
<td>25.67</td>
<td>20.48</td>
<td>80</td>
</tr>
<tr>
<td>Rusni, Hyderabad</td>
<td>81.24</td>
<td>45.09</td>
<td>39.99</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>946.64</td>
<td>531.56</td>
<td>413.98</td>
<td>78</td>
</tr>
</tbody>
</table>

12. Sub-project: “A Value Chain on Utilization of Banana Pseudostem for Fibre and Other Value-added Products”–Navsari Agriculture University

(i) Project Code : 20009
(ii) Sanctioned date : 21.06.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 581.56
(iii) Consortia P.I. and Lead Institute : Dr R.G. Patil
(Name, designation and full address) 0237-200020, 09427343511
naipnau_nvs@yahoo.com
(iv) Partners:
- Central Institute for Research on Cotton Technology (CIRCOT), Mumbai (Maharashtra)
- Man Made Textile Research Association (MANTRA), Surat (Gujarat)
- J.K. Paper Ltd., Songadh (Gujarat)
(v) Website: www.circot.res.in
(vi) Objectives:
1. Standardize processes for extracting textile grade fibres from pseudostem and prepare home furnishings
2. Standardize processes of pulp and paper making from pseudostem, fibres and scutching waste both at hand made and industrial levels
3. Develop value-added edible products from central core
4. Preparation and evaluation of enriched sap and scutching waste based vermicompost
5. Develop linkage for marketing of pseudostem based products

(vii) Research Progress:
- Designed and fabricated yarn making machine suitable for banana fibre, pseudostem cutter for speedy sheath separation and power tiller operated raspador.
- Prepared and evaluated cellulose powder and Microcrystalline Cellulose (MCC) from banana fibres.
- Standardised process of application of sap as mordant to cotton fabric for dyeing with natural dyes.
- Evaluated of sap as liquid fertilizer and growth promoters in different crops.
- Standardized process for preparing candy from central core.

Innovations/Success Stories

Entrepreneurship, income and employment generation

After attending first training at NAU, Navsari followed by training at Rajpipla, one farmer viz., Upendrasinh Patel, village Rajpipla, taluka Nandod of Namada district started fibre extraction using one unit supplied under NAIP. Following this, he has up-scaled it to set small-scale industry in GIDC, Rajpipla. He could generate the revenue to the tune of ₹1,68,000.

Subsidy: 25% subsidy for procurement of additional 2 raspador unit at his own cost from District Industrial Cooperation, Namada district

Loan: Project on fibre extraction using raspador was submitted for loan amounting to 9.00 lakhs. Bank has approved 100 per cent loan

Equipments procured: 2 raspador units, 1 carding machine, 1 medlari charkha

Quantity of fibre extracted Kg/day: 25 to 35 kg

Total Quantity of scutching waste based vermin-compost prepared: > 3 tons

Vermibed wash collected: 150 litres

Employment generation: 25 labours per day

Revenue generated From fibre (purchased by NAU, Navsari): ₹1,68,000

Expected from vermicompost: ₹10,000

Expected from Vermiwash: ₹10,000

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

Statement Budgetary Position as on 31 March 2010 (₹ in lakh)

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized up to March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navsari Agriculture University, Navsari</td>
<td>387.89</td>
<td>239.84</td>
<td>170.89</td>
<td>71</td>
</tr>
<tr>
<td>CIRCOT, Mumbai</td>
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<td>70.76</td>
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<td>53</td>
</tr>
<tr>
<td>MANTRA, Surat</td>
<td>61.18</td>
<td>38.01</td>
<td>18.30</td>
<td>48</td>
</tr>
<tr>
<td>JK Paper, Songadh</td>
<td>13.84</td>
<td>7.67</td>
<td>7.83</td>
<td>102</td>
</tr>
<tr>
<td>Total</td>
<td>581.56</td>
<td>356.28</td>
<td>234.60</td>
<td>66</td>
</tr>
</tbody>
</table>
13. Sub-project: “A Value Chain on Fish Production in Fragile Agricultural Lands and Unutilized Aquatic Resources in Maharashtra”

(i) Project Code : 20018
(ii) Sanctioned date : 9.06.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 385.104
(iii) Consortia P.I. and Lead Institute : Dr A.K. Reddy
(Name, designation and full address) Central Institute of Fisheries Education
Fisheries University Road, Mumbai
022-26361446, 09324725229
akreddy_cife@yahoo.co.in
(iv) Partners:
● College of Fisheries (COF), DBSKKV, Ratnagiri
● Vatslya Mandir (VM), Lanja, Ratnagiri District
(v) Website: http://www.naipvaluechaincife.com
(vi) Objectives:
1. **Productivity enhancement**: To enhance the productivity of degraded and under utilized agro-aquatic resources through regenerative and eco-friendly aquaculture practices.
2. **Capacity building**: To develop the capacity of target communities in sustainable use of fragile and unutilized/underutilized aquatic resources and untapped niches for their socio-economic upliftment.
3. **Creation and Strengthening of value chain**: To create and strengthen PCS value chain through diverse aquaculture systems, market-driven product development, value-addition and entrepreneurship development.
(vii) Research Progress:
● Developed two sub-surface drainage units on 8.5 ha common property of 23 farmers at Malkhed village.
● Constructed one Carp hatchery and one Spirulina unit on common property of farmers' land at Shere village.
● Successful demonstration of two production technologies, i.e. (a) carp seed production and (b) carp culture
● Two value-added fish products are developed from fresh water fish (processing technologies).
● Ten carp seed rearing ponds in the vicinity of reservoirs have been constructed which will act as demonstration units to farmers.

**Innovation**
● Two demonstrations units have been established in villages Sheri and Gondi having fallow saline land for the production of carp seed and carp culture. In these villages 29 nursery ponds and grow out ponds could successfully be established.
Carp Seed Production

- In order to see the possibility of carp seed production in salt affected sugarcane fields and, observing growth and survival, 8 nursery ponds were stocked with carp (Catla and Rohu) spawn in the 3rd week of August, 2009 at Shere and Gondi villages. A total of 20 lakhs spawn were stocked in these nursery ponds. 2.5 lakhs carp seed was distributed to the farmers and 2.5 lakhs of fry was stocked in two grow out ponds for rising of yearlings for stocking in grow out ponds at demonstration sites and supply to demonstration farmers in the project area and outside project area during 2010–11. The results of carp seed production are encouraging and needs further refinement to enhance survival.

Carp Culture

- In order to observe growth, survival and production potential of carp culture, 3 grow out ponds at Shere village were stocked with carp yearlings of 25–40 g weight in the months of June/July, 2009. The yearlings were procured from a private produce and transported to a distance of 350 km in open plastic containers having capacity of 1,000 yearlings each by adding clove oil as sedative. The seed was successfully transported with 92–96% survival. The carps have grown to 600 to 1,200 g in 8–9 months. The results are encouraging with regard to growth, whereas production and survival will be worked out after complete harvesting of the 3 ponds. The fish which have grown to more than 1.0 kg are segregated and were stocked separately for maintenance of brood stock.

- In order to check the growth and survival of fingerlings of same season, two grow out ponds at Gondi were stocked with carp fingerlings of 5–7 cm size in the month of October/November, 2009. The growth of fish ranged between 300 and 700 g.

Product Development

- Two fish products, i.e. Fish Cutlet and Fish Shev prepared from freshwater fishes. Products were accepted fairly by the consumers. Further studies are under progress to commercialize the products. Three training programmes were organized by College of Fisheries and Vatslya Mandir on ‘Preparation of value-added fish Products from fresh water fishes’. In order to know the consumer preference of the two products the Vatslya Mandir participated in Food Festival organized by KVK at Lanja. Positive response was received from the consumers.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

(i) Project Code : 20029
(ii) Sanctioned date : 10.02.2009
Completion date : 30.06.2012
Budget (` in lakh) : 896.50715
(iii) Consortia P.I. and Lead Institute : Dr Suresh Singla
(Name, designation and full address) NDRI, Karnal
0184-2252800, 09416876520
singlasuresh@yahoo.com
(iv) Partners:
● SKUAST-Kashmir
(v) Website: www.ndri.res.in
(vi) Objectives:
1. Optimization of Zona Free Cloned Embryo production in buffalo (NDRI).
2. Optimization of Zona Free Cloned Embryo production in Pashmina Goats (SKUAST-K).
3. Cloned embryo freezing, Thawing and transfer to recipients will be optimized and healthy progenies generated in buffalo (NDRI) and Pashmina goats (SKUAST-K).
4. Dissemination of generated technology to end users (State Govt. AH Nuclear farms, to be included in third year) and/or through direct sale of cloned embryos to farmers.
(vii) Research Progress:
● Second hand-guided-cloned buffalo calf was born on June 06, 2009 from somatic cells of the fetus obtained from slaughter house. The calf needed intensive care and efforts. The animal is healthy till the date of reporting. The news remained as main-story for one week on ICAR-website during December, 2009.
● Established somatic cell culture, passaging and cryopreservation for use in nuclear transfer, Optimization of IVM of goat oocytes, Culture of parthenogenesis goat embryos and Production of HMC Pashmina goat embryos (upto early morula stage).
(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead Centre/Partners</th>
<th>Total Sanctioned Budget (` in lakh)</th>
<th>Fund Released up to March 2010 (` in lakh)</th>
<th>Fund Utilized upto March 2010 (` in lakh)</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Institute of Fisheries Education, Mumbai COF, DBSKVV</td>
<td>237.65</td>
<td>121.61</td>
<td>124.39</td>
<td>102</td>
</tr>
<tr>
<td>VM, Ratnagiri</td>
<td>61.76</td>
<td>39.05</td>
<td>36.36</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>385.10</td>
<td>209.96</td>
<td>209.46</td>
<td>100</td>
</tr>
</tbody>
</table>

Statement Budgetary Position as on 31 March 2010 (₹ in lakh)
15. Sub-project: Capitalization of Prominent Landraces of Rice in Orissa through Value Chain Approach

(i) Project Code : 20049
(ii) Sanctioned date : 01.04.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 238.8345
(iii) Consortia P.I. and Lead Institute : Dr Susanta Sekhar Chaudhury
(Name, designation and full address) M.S. Swaminathan RF
Jeypore, Orissa
09937663013
sushantasekhar@rediffmail.com;

(iv) Partners:
- Krishi Vigyan Kendra (OUAT), Semiliguda
- Central Rice Research Institute (CRRI), Cuttack
- Orissa Rural Marketing and Development Society (ORMAS), Koraput

(v) Website: http://www.mssrf.org

(vi) Objectives:
1. To enable enhanced income generation from the large-scale cultivation of potential and promising rice landraces (Machhakanta, Kalajeera and Haladichudi)
2. Introduction of appropriate technologies and management practices for enhanced productivity of the three rice land races.
3. To facilitate and ensure procurement and primary processing with continuous supply-chain management including appropriate market linkages.
4. To develop community based entrepreneurship/institutions for promotion, popularization and commercialization of rice, through value-addition and branding.
5. To enable the resource poor communities to get reward and recognition of their IPR and Traditional Knowledge systems.

(vii) Research Progress:
- Strengthened the Kalinga Kalajeera Rice Grower Co-operative Society (KKRGCS), which was formed in earlier project intervention. The members of the society were trained on crop monitoring, seed distribution, organize village level marketing processes, time-to-time information dissemination etc.
- For the first time the society themselves contacted the marketing agencies, organized meeting and took decisions etc.
The selling price of kalajeera paddy was ₹ 1,700 per quintal which is higher than Government recommended varieties. A farmer can earn net income of ₹ 11,000/acre.

The demonstration of SRI technology created good demand among farm families due to less labour investment and 2 to 3 times more yield increase.

Value-addition of Haladichudi to popped rice have good local market as it visualize by selling the popped rice in different district and state level exhibition.

Village development funds have been initiated in project villages. This will bind the villagers in a bond and the fund will be utilized only for village development and any emergency need.

The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. S. Swaminathan RFJjeypore, Orissa</td>
<td>136.63</td>
<td>57.02</td>
<td>15.65</td>
<td>78</td>
</tr>
<tr>
<td>CRRI, Cuttack</td>
<td>53.15</td>
<td>20.05</td>
<td>15.65</td>
<td></td>
</tr>
<tr>
<td>KVK, Semiliguda</td>
<td>18.28</td>
<td>3.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORMAS, Koraput</td>
<td>30.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>338.83</strong></td>
<td><strong>80.35</strong></td>
<td><strong>15.65</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

**Theme 5: Agro Processing**

Under this theme, following 10 sub-projects are summarized as follows:

**16. Sub-project: “Value Chain on Potato and Potato Products”–Central Potato Research Institute, Modipuram, Meerut**

(i) Project Code : 20007
(ii) Sanctioned date : 01.04.2008
Completion date : 30.06.2012
Budget (₹ in lakhs) : 579.45
(iii) Consortia P.I. and Lead Institute : Dr B.P. Singh
(Name, designation and full address) Central Potato Research Institute
Modipuram, Meerut
0121-2950297, 09412337770
cpricampus@yahoo.com

(iv) Partners:
- Central Institute of Post-harvest Engineering and Technology, Ludhiana
- Plant Tissue Culture and Molecular Biology, TERI, New Delhi
- M/s. United Phosphorus Ltd., Mumbai

(v) Website:
(vi) Objectives:
1. Development of rapid and low-cost alternative technologies and diagnostic tools for augmenting seed production.
2. Upgradation of processing chain on French fries.
3. Establish a supply chain on specialty potatoes in NCR.
4. Utilization of industrial waste and non-marketable potatoes for production of animal feed and dietary fibre.
5. Study market demand and supply chain for planting material, specialty potatoes, French fries, animal feed and dietary fibers.

(vii) Research Progress:
- During this year experiments were conducted for cloning and expression of coat protein genes designing for ICA (Immuno Chromatographic Assay) formats and finally Dipstick kits for detection of PVX, PVS, PVM, PVY virus has been developed.
- 13,000 minitubers were produced and supplied to chain partners.
- Screening of ISSR primers for their suitability in 5 potato verities has been completed and PCR conditions for DNA amplification optimized.
- MP/98-71 has been rated as the best culture for fries, on the basis of higher total tuber yield, higher dry matter, acceptable fry colour and superior texture of fries. The hybrid has been recommended for release as variety Kufri Frysona.
- Crop geometry of 67.5 × 25 cm has been found optimum for getting higher proportion of French fry grade tuber yield (54.4%) in hybrid MP/98-71.
- Depth of planting at 10 cm for higher French fry grade and total tuber yield has been standardized for hybrid MP/98-71.
- Ca nutrition (100 kg at planting) through zypsum increased the French fry grade and total tuber yield substantially in hybrid MP/98-71.
- Identified padding materials for safe heaping of potatoes. 10 cm thick paddy straw can be used for long term (2–3 months) heaping while perforated rubber mat can be used for short term (2–3 weeks) heaping.
- The hybrid MP/98-71 has been found suitable for getting acceptable colour fries after long term storage at 12–14°C with two CIPC treatments.
- Developed two/three row automatic and semi-automatic planters for high density planting of potato for raising special purpose crop for baby potatoes.

Innovations
- Kufri Himsona has been identified as a variety for baby potatoes with dry matter content of 17.2–17.7% (<18%) and better yields (8.9 tons/ha) over Kufri Lauvkar (5.3 tons/ha). Further it can also be grown organically as it produced comparable to 25% of NPK levels at 60 days.
- Micro-irrigation systems lead to better tuber productivity (10.2–38.5%) over flood irrigation system.
- Two row or three row bed planting is better in comparison to conventional ridge-furrow system under drip and sprinkler irrigation system.
4. Kufri Surya with maximum content of phenols, ascorbic acid and total carotenoids (54.0 mg/100 g FW, 26.8 mg/100 g FW and 100.7 µg/100 g FW, respectively) has been identified as a nutritionally rich variety.

5. Animal feed pellets were prepared from unmarketable potato, barley and maize. Feed pellets were prepared by incorporating 10–22% unmarketable potatoes as an ingredient. Proximate composition and compression strength of pellets was analyzed.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Potato Research Institute Modipuram</td>
<td>432.58</td>
<td>236.09</td>
<td>238.16</td>
<td>101</td>
</tr>
<tr>
<td>TERI, New Delhi</td>
<td>54.43</td>
<td>33.81</td>
<td>33.26</td>
<td>98</td>
</tr>
<tr>
<td>CIPHET, Ludhiana</td>
<td>79.75</td>
<td>49.71</td>
<td>42.51</td>
<td>86</td>
</tr>
<tr>
<td>UPL, Mumbai</td>
<td>12.69</td>
<td>3.56</td>
<td>3.41</td>
<td>96</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>579.45</strong></td>
<td><strong>323.17</strong></td>
<td><strong>317.34</strong></td>
<td><strong>98</strong></td>
</tr>
</tbody>
</table>

17. Sub-project: A Value Chain for Clean Meat Production from Sheep–NRC Meat, Hyderabad

(i) Project Code : 20008
(ii) Sanctioned date : 1.04.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 584.77
(iii) Consortia P.I. and Lead Institute : Dr Girish Patil
(Name, designation and full address) NRCM Hyderabad
040-27204541, 09848133969
nrcmnaip@gmail.com
k_napa50@yahoo.co.in
(iv) Partners:
- Sri Venkateshwara Veterinary University, Tirupati
- Mandava Foundation, Venkatachalam
- Department of Animal Husbandry, Nellore
(v) Website: www.naipnrcmeat.org
(vi) Objectives:
1. Augmenting Quality Meat and By-products Production through Nutritional Intervention for Growing Lambs to Optimum/heavy Live Weights.
2. Research on Designing and Establishment of Model Slaughterhouses for Popularizing Clean Meat Production.
3. Training and Awareness Creation about Efficient Lamb Production, Processing and Utilization.
4. Research on Developing Appropriate Technologies for Value-addition to Meat from Heavy Weight Lambs and Spent Sheep.

(vii) Research Progress:
- Increased lamb productivity through feed intervention.
- Slaughter studies revealed that carcass weight and de-boned meat were higher in ram lambs fed complete feed compared to those maintained on grazing (control). Variation in cut up parts was observed among the experimental ram lambs.
- Developed feeding system for early weaned ram lambs
- Produced of value-added meat products.

Innovations/Success Stories

Clean Meat Production
Mutton is a highly preferred meat in India which fetches very high price to the producers. However, at present most of the sheep rearing is grazing based and lacks organized rearing and marketing. For the organized mutton production to develop intensive broiler lamb production need to be promoted and developing a model feeding structure free of grazing is imperative. Hence, a nutritional intervention model involving complete feed production developed by combination of concentrates and locally available agricultural byproducts was started at Mahabubnagar district of Andhra Pradesh which resulted in higher growth rate and yielded greater meat and byproducts yield and more profit to farmers. For preserving the fodder for critical period of the year silage production was done in farmer’s field.

Feeding of lambs in farmers field with complete feed
About 25 ton of silage of maize fodder was produced and about 50 ram lambs fed which gave higher growth and meat yield.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:
18. Sub-project: Value Chain in Coconut–CPCRI, Kasaragod

(i) Project Code : 20010
(ii) Sanctioned date : 31.03.2008
   Completion date : 30.06.2012
   Budget (₹ in lakh) : 444.6795
(iii) Consortia P.I. and Lead Institute : Dr K. Madhavan
   (Name, designation and full address) CPCRI, Kasaragod
   04994-232894, 09447089624
   madhavancpcri@gmail.com
(iv) Partners:
   ● Central Plantation Crops Research Institute, Kasaragod
   ● Kerala Forest Research Institute, Peechi
   ● Defense Food Research Laboratory, Mysore
(v) Website: http://www.cpcri.gov.in/naip.htm
(vi) Objectives:
   1. Technology integration for enhancing production and community level processing of coconut facilitated through stake holder participation for strengthening the value chain.
   2. Developing viable processing technologies and machineries to produce high value products such as Virgin Coconut Oil (VCO), and activated shell charcoal, packing of tender nut water and kernel, packing of matured coconut water and evolving technologies for by-product utilization.
   3. Facilitating market development through promotional activities, consumer preference studies and demand forecasting of coconut value-added products.
(vii) Research Progress:
   ● Standardized the Protocol for Virgin Coconut Oil production by hot processing and by fermentation.
   ● INM practices–Organic recycling through vermi-composting (59 units), application of inorganic fertilizers (250 ha), cover crops (40 ha), intercropping (50 ha), and soil and water conservation in coconut

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Agro-processing centre on Coconut

Established two coconut processing centers of Women SHGs for production of value added products such as coconut chips, coconut chutney powder, and coconut water squash. Ten ladies from each center were given training on coconut food production and on entrepreneurship. They work in these Centers and earn ₹ 50/ day as wages and share the profit on 6 monthly basis. Three SHGs formed who have participated in 23 exhibitions for promotional sales of coconut chips.
gardens (15 holdings).
- IPM&IDM practises–Bud rot Management (Indofil were supplied to 33 Farmers (3 Clusters) for their 2,341 palms) and stem-bleeding management (Calyx in was supplied to the affected palms of 8 clusters).
- A direct type bio-fuel dryer for drying coconut kernel grating so as to produce VCO by direct expelling.

Innovations/Success Stories
- Methods for production of Virgin Coconut Oil (VCO) using hot processing method has been standardized whereas production of VCO through cold process indicated that fermentation time could be reduced by adding starter culture to the coconut milk.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized up to March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPCRI, Kasaragod</td>
<td>281.42</td>
<td>144.29</td>
<td>143.34</td>
<td>99</td>
</tr>
<tr>
<td>KFRI, Peechi</td>
<td>98.74</td>
<td>70.76</td>
<td>69.40</td>
<td>98</td>
</tr>
<tr>
<td>DFRL, Mysore</td>
<td>64.52</td>
<td>40.56</td>
<td>6.34</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>444.68</td>
<td>255.61</td>
<td>219.07</td>
<td>86</td>
</tr>
</tbody>
</table>


(i) Project Code : 20017
(ii) Sanctioned date : 31.05.2008
Completion date : 01.06.2012
Budget (₹ in lakh) : 385.98
(iii) Consortia P.I. and Lead Institute : Dr Rama K Naik
(Name, designation and full address) UASD, Dharwad
0836-2443714, 09448495337
ramanaik2@rediffmail.com
(iv) Partners:
- KLE’s Medical Research Centre, Belgaum
- BAIF, Kasumnagar, Dharwad
- Jaya Food Products, Bangalore
- Chandana Food Products, Gadag
(v) Website: http://naipmilletsdwd.org
(vi) Objectives:
1. To create remunerative market for foxtail and little millet grains through establishing primary processing and build up of supply chain, consumer awareness and preference.
2. To access and enhance neutraceutical value of foxtail and little millet through appropriate processing methods, and develop value-added products for health benefits.
3. To efficiently utilize the by-products of the candidate crops for health and economic benefits by incorporating the by-products in convenience and traditional foods.
4. Field level evaluation of the value-added products for health benefits and nutritional certification to facilitate popularization and promotion of neutraceutical food products in the social market.
5. To strengthen the domestic market by entrepreneurship development and commercialization of value-added neutraceutical food products through linkages with marketers, industry, public catering and philanthropic institutes through ICT.

(vii) Research Progress:
- Consumer trials of little millet cookies have been done on 676 consumers which composed of 215 children, 198 mothers, 45 fathers, 176 other adults and 42 adolescents, accepted by 100% of them.
- Sports mix was developed with different proportions of millet, soya, milk powder and sugar. The product was according to the guidelines of ICM. The product was tested for flavors—cardamom, vanilla and chocolate. The most acceptable was vanilla.
- Eight entrepreneurs have been promoted for marketing economically viable millet products through sale out lets on Sunday, and Thursday bazaars at Dharwad and also supply the products to local whole sale dealers. These ladies both from urban and rural area earning between 8–12 thousand rupees per month.
- Millet flakes have been developed which has potentiality as breakfast cereal for management of non-communicable disorder.

Innovations/Success Stories

Value-added products from millet
- Control gelatinized are extruded and flattened millet flakes are suitable for good health. Flavored with food additives such as dark chocolate, milk chocolate, vanilla, and butter for different tastes. Low moisture food with long shelf life.
- Ingredients: Little millet, sugar and salt.
- Nutritional Information: 30 g of flakes provide 21.1 mg of iron, calcium, 5.1mg, seven folds higher fiber (5.43 g) over commercial corn flakes. Energy supplied is 95 Kcals, protein, 2.3g, fat, 0.08g, and carbohydrates 15.78
- Eight entrepreneurs have been developed for market economically viable millet products through sale out lets on Sunday, and Thursday bazaars at Dharwad and also supply the products to local whole sale dealers. These ladies both from urban and rural area earning between 8-12 thousand rupees per month.

Sports food mix
The product is fabricated on optimal protein energy ratio as per guidelines of ICMR. Ready to prepare food, easy to mold into hot beverage with dense nutrients. Ideal for glycogen storage by loading prior to the sports event for physical endurance.
- Ingredients: Little millet, soybean, skimmed-milk powder.
- Nutritional information: 50 g of mix provides 188 kcals of energy, 7 g of protein, 141 mg of calcium and 2.5 mg of iron.
Mighty millet monitors diabetes

The specific composition of low glycemic spice mix in the optimum ratio in the prime mix of millet and black gram dhal monitors the blood sugar and lipid parameters in diabetics to the near control levels and prevents complications.

Ingredients: Foxtail millet, Split black gram, Black pepper, Cinnamon, Fenugreek seeds, Coriander seeds and Cumin seeds.

Impact: Optimal blood sugar and lipid control with reduction in developing diabetic risks in the later years. Improves life quality. The technology can be transformed into an enterprise with farm families for economic empowerment.

Nutritional Information: One serving of mix (80 g) provides 16 g of dietary fibre, 248 kcals of energy, 11.4 g of protein, 71 mg of calcium, 3 mg of iron and 60 μ of carotene.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UASD, Dharwad</td>
<td>336.40</td>
<td>186.72</td>
<td>194.37</td>
<td>104</td>
</tr>
<tr>
<td>KLEMRC, Belgaum</td>
<td>21.57</td>
<td>4.89</td>
<td>2.30</td>
<td>47</td>
</tr>
<tr>
<td>BAIF, Dharwad</td>
<td>16.72</td>
<td>6.61</td>
<td>4.17</td>
<td>63</td>
</tr>
<tr>
<td>Chandana, Gadag</td>
<td>8.15</td>
<td>5.00</td>
<td>4.79</td>
<td>96</td>
</tr>
<tr>
<td>Jaya, Bangalore</td>
<td>3.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>385.99</strong></td>
<td><strong>203.22</strong></td>
<td><strong>205.63</strong></td>
<td><strong>101</strong></td>
</tr>
</tbody>
</table>

20. Sub-project: A Tomato Processing Prioritizations for Global Competence

(i) Project Code: 20020
(ii) Sanctioned date: 19.08.2008
    Completion date: 30.06.2012
    Budget (₹ in lakh): 660.6835
(iii) Consortia P.I. and Lead Institute: Dr S.D. Warade MPKV, Rahuri
    (Name, designation and full address): 09423022479
    hodhort@hotmail.com

(iv) Partners:
    ● Agri Food Park (I) Ltd
    ● Sangvi and KVK Baramati

(v) Website: www.mpkv.com
(vi) Objectives:
1. To standardize cultivation practices of processing tomatoes for high productivity, TSS, pectin and lycopene by varietal selection, integrated crop production (ICM, IPM, IPNM), micro irrigation etc.
2. To develop centralized large-scale nursery management system and farm equipments for tomato cultivation (transplanters, harvester, plant protection devices etc.).
3. To develop protocols of food safety management system and product traceability from ‘farm to fork’ based on GAP (production) and HACCP (processing) standards.
4. To apply electronics and IT-based systems in value chain (Farm, logistic and processing) for accurate and faster data communication.
5. To design the model for Collaborative farming linked with holistic extension services based on cluster development between farmers and processors with buyback system.
6. To improve demand of tomato products through development of novel products and processes.

(vii) Research Progress:
(a) Adopted Tomato hybrids for dual purposes, i.e. table purpose and processing.
(b) Standardised of seedling quality such as disease free, vigour and age under controlled and field condition.
(c) Developed customized fertilizer under soil test crop response and fertigation system.
(d) Adopted eco friendly and sustainable tomato production under IPM and INM technology by the farmers.
(e) Developed decision support software on tomato for diagnosis of pest and diseases based on weather forecasting.

(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPKV, Rahuri</td>
<td>381.10</td>
<td>287.70</td>
<td>93.20</td>
<td>32</td>
</tr>
<tr>
<td>Krishi Vigyan Kendra, Baramati</td>
<td>72.12</td>
<td>41.77</td>
<td>39.74</td>
<td>95</td>
</tr>
<tr>
<td>Agri Food Park (India) Ltd</td>
<td>207.46</td>
<td>55.40</td>
<td>55.30</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>660.68</td>
<td>384.87</td>
<td>188.24</td>
<td>49</td>
</tr>
</tbody>
</table>

21. Sub-project: “Value Chain on Novelty Pork Products under Organized Pig Farming System”–Assam Agricultural University, Khanapara, Guwahati

(i) Project Code : 20025
(ii) Sanctioned date : 12.09.2008
     Completion date : 30.06.2012
     Budget (₹ in lakh) : 669.15
(iii) Consortia P.I. and Lead Institute: Dr R.N. Borpuzari
(Name, designation and full address) AAU, Guwahati, Assam
0376-2340013, 09435114497
rnborpuzari@yahoo.com

(iv) Partners:
- National Research Centre on Pig, ICAR Guwahati, (NRCP)
- Central Institute of Post Harvest Engineering and Technology, Ludhiana, ICAR (CIPHET)

(v) Website: www.aau-pigproject.in

(vi) Objectives:
1. To promote innovative value chain concept in novelty pork products development under organized pig farming system and optimization of the technological processes of value-added pork products to suit to the local taste.
2. To develop low cost pig ration by incorporating locally available feed ingredients for better economic return.
3. Refinement of design and development of selected meat processing equipment for import substitution.
4. Development of entrepreneurs in scientific rearing of pigs, production and marketing of wholesome pork and pork products.

(vii) Research Progress:
- Established a pig farm and introduced base pig stock.
- One booklet on “Nutritional Profile of Locally Available Feed Ingredients of Assam” has been printed and will be released in the Annual Workshop. The manuscript of the booklet “Hand Book on Quality Control of Pork and Pork Products” has been prepared. One leaflet on “Classical Swine Fever” has been released.
- Two hands-on training on “Scientific Management of Pig Farm for Profit Generation” have been organized.
- Regular AI is being carried out in the project farm with the semen collected from boars of Ghungroo and Hampshire breeds.
- Conceptual design of bowl chopper, sausage filler, electric stunner and transport system have been prepared for fabrication as substitute for imported ones.

Innovations/Success Stories

Value chain on pig meat

- Use of the guard rail of pig sty used as water supply pipeline to reduce the cost of construction of pig sty.
- Refinement of technologies for production of cooked pork sausage with fermented bamboo shoot.

- Pork sausage with fermented bamboo shoot
- Guard rail of pig sty used as water supply line
(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

Statement Budgetary Position as on 31 March 2010

(₹ in lakh)

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAU, Guwahati</td>
<td>599.51</td>
<td>388.01</td>
<td>309.10</td>
<td>80</td>
</tr>
<tr>
<td>NRCP</td>
<td>42.62</td>
<td>29.91</td>
<td>25.71</td>
<td>86</td>
</tr>
<tr>
<td>CIPHET</td>
<td>27.02</td>
<td>15.52</td>
<td>12.76</td>
<td>82</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>669.15</strong></td>
<td><strong>433.44</strong></td>
<td><strong>347.57</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

22. Sub-project: **Protected Cultivation of High Value Vegetables and Cut Flowers-A Value Chain Approach**

(i) Project Code : 20032

(ii) Sanctioned date : 09.03.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 603.34

(iii) Consortia P.I. and Lead Institute : Dr Balraj Singh
(Name, designation and full address) IARI, New Delhi
011-25843375, 9811271303
drbsingh2000@yahoo.com

(iv) Partners:
● G.B. Pant University of Agriculture and Technology, Pant Nagar
● ARS, Durgapura, Rajasthan Agricultural University, Bikaner
● National Centre for Integrated Pest Management, IARI, New Delhi

(v) Website:

(vi) Objectives:
1. (Design and Development) To build infrastructure (greenhouses, net houses, shade nets, nurseries, drip fertigation system) for protected cultivation of high value vegetables, i.e. tomato, capsicum, cucumber, and flower crops, i.e. gerbera and chrysanthemum in different agro-climatic locations with the aim of developing model production systems.

2. (Production and Processing) To standardize production technologies for tomato, capsicum, cucumber, gerbera and chrysanthemum under protected cultivation including IPM, grafting of vegetable seedlings and the use of drip fertigation and super absorbents for improving water and nutrient use efficiency.

3. (Post-harvest and value-addition) To standardize post-harvest technology, on-farm value-addition for high value vegetables, i.e. tomato, capsicum, cucumber and cut flowers, i.e. gerbera and chrysanthemum grown under protected cultivation.

4. (Value Chain and Marketing Linkages) Field level evaluation of the value-added products and development of effective linkages of marketing high value horticultural produce including establishment of cool chain management system.
5. (HRD) To strengthen human resources for development of entrepreneurial skills for commercialization of protected cultivation technologies.

(vii) Research Progress:
- Standardized production technologies for tomato, capsicum and parthenocarpic cucumber under naturally ventilated and semi climate control greenhouse started.
- Standardized production technologies for gerbera and chrysanthemum have been initiated and experiments land.
- Grafting technology started with existing facilities and germplasm.
- On-farm value-addition in high value vegetables and processing in capsicum.
- Protocols of Good Agricultural Practices (GAP) for vegetable cultivation identified and used.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget (₹ in lakh)</th>
<th>Fund Released up to March 2010 (₹ in lakh)</th>
<th>Fund Utilized upto March 2010 (₹ in lakh)</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IARI, New Delhi</td>
<td>286.35</td>
<td>201.48</td>
<td>119.97</td>
<td>60</td>
</tr>
<tr>
<td>GB Pantnagar</td>
<td>150.10</td>
<td>101.41</td>
<td>82.54</td>
<td>81</td>
</tr>
<tr>
<td>ARS Durgapura</td>
<td>99.04</td>
<td>57.98</td>
<td>3.49</td>
<td>6</td>
</tr>
<tr>
<td>NCIPM, New Delhi</td>
<td>67.85</td>
<td>36.43</td>
<td>38.01</td>
<td>104</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>603.30</strong></td>
<td><strong>397.30</strong></td>
<td><strong>244.01</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>

23. Sub-project: A Value Chain on Lac and Lac Based Products for Domestic and Export Markets

(i) Project Code : 20036
(ii) Sanctioned date : 05.02.2009
    Completion date : 30.06.2012
    Budget (₹ in lakh) : 227.413
(iii) Consortia P.I. and Lead Institute : Dr Niranjan Prasad
    (Name, designation and full address) IINRG, Ranchi
    0651-2261156, 2261069
    niranjan_ilri_1999@yahoo.com
(iv) Partners:
- Tajna Shellac Pvt. Ltd, Khunti (Jharkhand)
- M/s Gupta Brothers (Shellac) Bundu Ranchi (Jharkhand)
- Nav Bharat Jagriti Kendra (NBJK) Khunti (Jharkhand)
(v) Website: http://www.icar.org.in/iinrg/comp2.htm
(vi) Objectives:
1. To promote cultivation of high yielding lac insects *(kusmi)* for continuous supply-chain management
2. To promote primary processing of lac at village level
3. To reduce losses during processing, improve quality, develop suitable packaging for lac (shellac) and lac based products (bleached lac and aleuritic acid) for domestic and export markets.
4. To recover and purify the by-product of lac industry (lac dye from wash water) for economic benefits.

(vii) Research Progress:
● A total of 171 farmers were empowered with scientific method of lac cultivation and 15 farmers with primary processing of lac through five nos. of Institute and On-farm training programmes.
● The model demonstration of high yielding lac production on ber and alternatively on kusum carried out with 152 farmers in nine villages will show them a model and will also results in percolation of this technology to other areas.
● Plantations of F. semialata and Ber were raised in villages of both Ranchi and Khunti district.

Innovations/Success Stories
● A total of 171 farmers from different villages of Ranchi and Khunti were empowered with scientific method of lac cultivation and 15 farmers with primary processing of lac through five nos. of Institute and on-farm training programmes. The model demonstration of high yielding lac production on ber and alternatively on kusum carried out with 152 farmers in nine villages will show them a model and will also results in percolation of this technology to other areas.
● Plantations of F. semialata and Ber were raised in villages of both Ranchi and Khunti district. For this, 10,000 quick growing lac host plants (F. semialata) were planted in about 1 ha land at three different locations in three villages, i.e. Mangubandh (in Ranchi district), Lupungdih and Jordag Salga (Khunti district) and 600 ber seedling were planted in about 1 ha in two different locations in two villages, i.e. Mangubandh (in Ranchi district) and Jordag Salga (Khunti district). These plantations are growing for demonstration purpose of lac cultivation on plantation.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IINRG, Ranchi</td>
<td>205.95</td>
<td>115.71</td>
<td>12.96</td>
<td>11</td>
</tr>
<tr>
<td>TSPL, Khunti</td>
<td>5.51</td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GBS, Bundu</td>
<td>3.41</td>
<td>0.16</td>
<td>0.16</td>
<td>99</td>
</tr>
<tr>
<td>NBJK, Khunti</td>
<td>12.53</td>
<td>5.54</td>
<td>4.33</td>
<td>78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>227.41</strong></td>
<td><strong>121.88</strong></td>
<td><strong>17.44</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>
### 24. Sub-project: A Value Chain for Kokum, Karonda, Jamun and Jackfruit

(i) **Project Code**: 20043  
(ii) **Sanctioned date**: 24.02.2009  
     **Completion date**: 30.06.2012  
     **Budget (₹ in lakh)**: 247.48  
(iii) **Consortia P.I. and Lead Institute**: Dr Nayansingh J. Thakor  
     **BSKKV, Dapoli**  
     02358-282064, 09420906951  
     nayan07@gmail.com  
     nayan07@rediffmail.com  
     apedapoli@gmail.com

(iv) **Partners**:  
     - Hardikar’s fruit Processing Pvt, Ltd., Pune  
     - Sagar Engineering Works, Kudal

(v) **Website**: Under construction

(vi) **Objectives**:  
1. **Standardization of procedures for traditional processing methods.**  
   - To standardize the procedures for existing traditional processing methods for syrup and Agal, from kokum; powder from Jamun seed and ripe jackfruit leather.  
2. **Value-addition**  
   - Develop the different processed products from candidate fruit corps and their by-products.  
3. **Storage and Packaging**  
   - Studies on storage and packaging of processed products and by-products of the candidate fruit crops.  
4. **Transfer of Technology**  
   - Training of standardized procedures and technologies to the SHGs, small-scale food processors and Entrepreneurs.  
   - Training of developed value-added technologies to the Entrepreneurs.

(vii) **Research Progress**:  
     - Standardized procedures for Agal from Kokum, Jamun seed powder, Jackfruit bulb leather.  
     - New standardized quality products kokum sarbat mix, Solkadhi mix, Kokum rind powder, dehydrated ripe Jackfruit bulbs etc.  
     - Process technology for Karonda wine and Jamun wine derclysed.  
     - Process for Extraction of oil (butter from Kokum seed) standarised.

(viii) **The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:**
### Statement Budgetary Position as on 31 March 2010

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSKKV, Dapoli</td>
<td>224.17</td>
<td>155.48</td>
<td>116.04</td>
<td>75</td>
</tr>
<tr>
<td>HFPPL, Pune</td>
<td>19.06</td>
<td>6.36</td>
<td>6.37</td>
<td>100</td>
</tr>
<tr>
<td>SEW, Kudal</td>
<td>4.25</td>
<td>4.26</td>
<td>2.13</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>247.48</strong></td>
<td><strong>166.11</strong></td>
<td><strong>124.54</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>

25. **Sub-project: A Value Chain on Linseed: Processing and Value-addition for Profitability**

(i) Project Code : 20051  
(ii) Sanctioned date : 10.06.2009  
   Completion date : 30.06.2012  
   Budget (₹ in lakh) : 378.02  
(iii) Consortia P.I. and Lead Institute : Mr Ramesh Rawal  
   (Name, designation and full address) : BAIF, Pune  
   rawal.ramesh@gmail.com  
   020-25231661, 9811193887  
(iv) Partners:  
   ● BAIF Development Research Foundation, Pune: Lead Centre  
   ● Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola  
   ● Bharati Vidyapeeth University, Pune  
   ● Ensigns Diet Care Private limited, Industrial partner  
(v) Website: www.baifnaip.org.in  
(vi) Objectives:  
   1. Identification and introduction of high yielding and resistant varieties of linseed crop.  
   2. Processing of linseed crop for Omega 3 oil and omega 3 by-products.  
   3. Recovery of lignan from linseed cake for pharma application.  
(vii) Research Progress:  
   ● Developed omega-3 feed (EFM) formulations, which can be added to broiler COBB 400 feed and produce omega-3 enriched chicken meat.  
   ● Extraction of linseed. lignan (SDG) quantification by HPTLC, rat studies for pharma applications.  
   ● Partially purified SDG fraction exhibited cardio protective effect to Isoprinosine induced cardio toxicity in rat model.  
   ● Standardized method for Linseed germplasm screening.  
   ● Fatty acid analysis, Organoleptic properties, and physical characteristic of omega-3 chicken meat (COBB-400) were conducted.  
   ● Improved package of linseed provided to 140 farmers, hence linseed cultivated on 190 acres.  
   ● Seed production programme with 80 farmers started.
Marketing expeditions with Ensigns: (November 2009 to March 2010).
Launch of Mega + eggs (omega 3 eggs) on 28th November 2009 at Yashada, Pune.

(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

**Statement Budgetary Position as on 31 March 2010**

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Fund Released up to March 2010 (` in lakh)</th>
<th>Fund Utilized up to March 2010 (` in lakh)</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAIF, Pune</td>
<td>50.04</td>
<td>31.92</td>
<td>64</td>
</tr>
<tr>
<td>PDKV, Akola</td>
<td>110.96</td>
<td>14.98</td>
<td>14</td>
</tr>
<tr>
<td>BVU, Pune</td>
<td>37.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>198.00</strong></td>
<td><strong>46.90</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

**Theme 6: Export Promotion**

Under this theme, following 10 sub-projects are summarized as follows:

26. **Sub-project: A Value Chain on Oceanic Tuna Fisheries in Lakshadweep Sea–CMFRI, Kochi**

(i) Project Code : 20005
(ii) Sanctioned date : 18.03.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 638.54
(iii) Consortia P.I. and Lead Institute : Dr E.V. Radhakrishnan
(Name, designation and full address) CMFRI, Kochi
0484-2394867, 09447250634
evrkrishnan@yahoo.com

(iv) Partners:
- Central Institute of Fisheries Technology, Cochin
- Fishery Survey of India, Mumbai
- Department of Fisheries, Kavarati, UT of Lakshadweep

(v) Website: www.cmfri.org.in

(vi) Objectives:
1. To evolve effective fishing methods and policies for Lakshadweep Sea to increase and sustain production of oceanic tunas and related resources by assessing the status and health of the stocks and ecosystems.
2. To develop technologies on hygienic and improved handling, processing and packaging and high-value products; to develop market intelligence on domestic and overseas market.
3. To transfer the new fishing and processing technologies and marketing strategies to the stakeholders, and empower their efficiency and socio-economic status.
4. To ensure seafood safety and health assurance to the consumers.

(vii) Research Progress:
- Developed Fishkure (tunakure) using red meat
- Prepared Masmin flakes from Masmin
- Developed Gelatin from Tuna skin
- Smoked Tuna in Oil
- SILO feed decrystaled from tuna waste

Innovations/Success Stories

Fish feed from fish waste
- Waste generated during processing of tuna was converted into a liquid protein source for animal feed preparation. From this fish feed under the brand name of SILO feed is developed. Feeding trials conducted by CMFRI revealed that it is a promising feed for cultivable fishes such as Sea bass, Grouper and Cobia.
- In Agatti island 1378 t of tuna were landed in 2009-10 and approximately 550 t of tuna wastes would have been generated. The wastes are buried in the beach and the dry feed that could be produced from the wastes will be 550 t with the addition of other ingredients. The estimated cost of production is ₹ 25/Kg. The cost of feed in the market is ₹ 60/Kg. There is a heavy demand for fish feed as fish farming activity has been on the up rise recently due to the availability of hatchery produced seeds.
- CMFRI succeeded in hatchery production of a high value fish Cobia and heavy demand for the seed is expected as this is a fast growing fish. The revenue generation expected from sale of feed is ₹ 2.2 crores if the feed is sold at ₹ 40/Kg. The capital cost for establishing a feed mill to produce 500t/ annum is ₹ 60 lakhs.
- A tuna exporter M/S. Britto Exports from Tuticorin, Tamilnadu has approached the project for transfer of feed technology as he is generating an average 4 tons of tuna wastes per day. The technology will be transferred to the entrepreneur after a feasibility study.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Statement Budgetary Position as on 31 March 2010 (₹ in lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lead centre/Partners</strong></td>
</tr>
<tr>
<td>CMFRI, Kochi</td>
</tr>
<tr>
<td>CIFT, Kochi</td>
</tr>
<tr>
<td>FSI, Mumbai</td>
</tr>
<tr>
<td>FD LAK, Kavarati</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
27. Sub-project: A Value Chain in Major Seed Spices for Domestic and Export Promotion–SDAU, Sardarkrushinagar

(i) Project Code : 20006
(ii) Sanctioned date : 18.03.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 530.16
(iii) Consortia P.I. and Lead Institute : Dr Y. Ravindrababu
(Name, designation and full address) SDAU Banskantha Gujarat
02762-291925, 09427493331
ravindrababuy@yahoo.com
(iv) Partners:
● National Research Centre for Seed Spices, Tabiji, Ajmer (ICAR)
● Central Institute of Agricultural Engineering, Bhopal (ICAR)
● Krushik Vikas Sansthan, Ajmer (NGO)
● VIKSAT, Nahru Foundation for Development Ahmedabad (NGO)
(v) Website: www.sdau.edu.in
(vi) Objectives:
1. Enhancement of productivity, profitability and quality through Good Agricultural Practices (GAP)
2. Standardization of post harvest handling, storage and processing technologies to minimize post harvest losses
3. Quality maintenance and confirmation to the standards wrt ASTA, ESA and ISO for use in quality testing
4. Market intelligence to the seed spice growers, traders, processors and exporters
5. Transfer of technology at farm and industry level
(vii) Research Progress:
● For the first time drip irrigation system was installed for cumin crop in north Gujarat.
● Modified seed cum fertilizer drill was used for sowing of cumin crop under conserved moisture conditions resulting in a saving of 6 kg seed per hectare that results into saving of inputs, i.e. ₹ 1,050 per ha. The germination is earlier by 4–5 days with uniform germination and with a saving of 1,95,312 liters of water per hectare.
(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDAU, Sardarkrushinagar</td>
<td>296.22</td>
<td>195.50</td>
<td>138.37</td>
<td>71</td>
</tr>
<tr>
<td>NRCSS, Ajmer</td>
<td>82.87</td>
<td>48.13</td>
<td>38.54</td>
<td>80</td>
</tr>
<tr>
<td>CIAE, Bhopal</td>
<td>47.22</td>
<td>23.42</td>
<td>22.00</td>
<td>94</td>
</tr>
<tr>
<td>KVS, Ajmer</td>
<td>31.14</td>
<td>12.65</td>
<td>12.61</td>
<td>100</td>
</tr>
<tr>
<td>VIKSAT, Ahmedabad</td>
<td>72.71</td>
<td>35.85</td>
<td>26.64</td>
<td>74</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>530.16</strong></td>
<td><strong>315.53</strong></td>
<td><strong>238.16</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>
28. Sub-project: Value chain on flowers for domestic and export markets

(i) Project Code: 20019

(ii) Sanctioned date: 01.09.2008
Completion date: June, 2012
Budget (₹ in lakh): 353.29

(iii) Consortia P.I. and Lead Institute: Dr. M. Jawaharlal
(Name, designation and full address) TNAU, Coimbatore
0422-6611251, 09442126242
jawaharflori@yahoo.com

(iv) Partners:
- M/s. AVT Natural Products Ltd., Erode Dt., Tamil Nadu
- M/s. Salem Spices Pvt. Ltd., Salem, Tamil Nadu
- M/s. Vanguard Exports Pvt. Ltd., Coimbatore, Tamil Nadu
- M/s. Elkhill Agrotech Pvt. Ltd., The Nilgiris, Tamil Nadu

(v) Website: www.tnau.ac.in/naip/flowers

(vi) Objectives:
1. To optimize cost effective production technologies for potential flower crops.
2. To standardize technologies for post harvest management and value-addition.
3. To impart training to growers and entrepreneurs on production and post-production technologies.
4. To create floriculture database and to facilitate market linkage and supply chain management in flowers for domestic and export trade.

(vii) Research Progress:
- Under the experiment entitled ‘Identification of new plant species suitable for dry flower industry’, the following 8 species available at Shevroy hills have been identified.
  - Pods of *Castospermum australe*
  - Pods of broom grass (*Garnopia eleta*)
  - Flowers of cup and saucer plant (*Holmskioldia sanguinea*)
  - Leaves of ferns (*Adiantum venustum, Doryopteris concolor*)
  - Fruits of mandarin orange (*Citrus reticulata*)
  - Fruits of chinese lantern (*Physalis peruviana*)
  - Twigs of coffee (*Coffea arabica*)
  - Spikes of bottle brush (*Callistemon lanceolatus*)

**Export Expansion of Jasmine Flowers through NAIP Interventions**
- Post-harvest treatments have been standardized for shelf life extension of *Jasminum sambac* flowers:
  - Long distance transport (gel ice-cold condition): Thermocolle packaging + Aluminium foil lining + Boric acid 4%
  - Short distance transport (ambient conditions): Polypropylene packing 60 m + Boric acid 4% + CFB packaging
  - Long-term storage (cold room conditions at 7°C): Polypropylene packing 60 m + Boric acid 4% + CFB packaging
Innovations/Success Stories

Export expansion of jasmine flowers through NAIP interventions

- TNAU Cimbatore has developed and refined the technology for improving keeping quality and export potential of Jasmine Flowers through innovative export packaging technology using Basic Acid 4 % + Polypropylene bags 60 ì + CFB boxes.
- It helped in keeping the flowers fresh for 72 hrs with negligible damage and could help in export of the flowers to USA markets also, in addition to existing Dubai flower markets.
- Jasmine export volume of the Consortium Partner M/s Vanguard Exports of the project increased from 192 t/year to 217 t/year and export extended from neighbouring countries like Dubai, Singapore, Malaysia to Long distant market – the United States.
- Export of a dry flower product (wreath) from the Consortium Partner M/s. Salem Spices, Salem of the project has improved as number of dry flower product (wreath) increased from 5,000 to 15,000. The increase in export volume is attributable to increased production which has been achieved involving beneficiaries of NAIP training programmes.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNAU, Coimbatore</td>
<td>277.10</td>
<td>170.13</td>
<td>176.10</td>
<td>104</td>
</tr>
<tr>
<td>AVT, Erode</td>
<td>16.51</td>
<td>5.94</td>
<td>6.50</td>
<td>109</td>
</tr>
<tr>
<td>SSPL, Salem</td>
<td>17.51</td>
<td>7.40</td>
<td>7.30</td>
<td>99</td>
</tr>
<tr>
<td>VEPL, Coimbatore</td>
<td>14.91</td>
<td>6.31</td>
<td>6.51</td>
<td>103</td>
</tr>
<tr>
<td>EAPL, Nilgiris</td>
<td>27.27</td>
<td>9.19</td>
<td>13.30</td>
<td>145</td>
</tr>
<tr>
<td>Total</td>
<td>353.29</td>
<td>198.97</td>
<td>209.72</td>
<td>105</td>
</tr>
</tbody>
</table>

29. Sub-project: A Value Chain Enhanced Productivity and Profitability of Pashmina Fibre

(i) Project Code : 20030
(ii) Sanctioned date : 28.01.2009
   Completion date : 30.06.2012
   Budget (₹ in lakhs) : 943.034
(iii) Consortia P.I. and Lead Institute: Dr Sarfaraz Ahmad Wani
     (Name, designation and full address) SKUAST, Srinagar
     0194-2490801, 09419088688
     sarfarazawani@gmail.com
     sarfarazawani@yahoo.co.in
(iv) Partners:
- CSK HP KVV, Palampur
- CSWRI, Avikanagar, Rajasthan
- Sheep Husbandry Department, Kashmir

(v) Website: www.naippashmina.com/www.skuastk.ac.nic

(vi) Objectives:
1. Augmentation of Pashmina Productivity and Production.
2. Improvement in Pashmina Utilization.

(vii) Research Progress:
- Identified families for intervention under production system (155 in traditional system and 84 in Non-traditional system) as well as in processing (115 spinners and 27 weavers).
- 831 animals were procured and distributed in 84 identified farm families in non-traditional belt at SKUAST-K. Further Procurement is under progress both at SKUAST-K and CSKHP KVV, Palampur. Trainings were also conducted to the beneficiary families in the identified villages.
- Problems in tools and techniques of Combs, Charkha and looms have been identified and improvisation of charkha done.
- Trials on blending of Pashmina and Angoora wool has been under taken using traditional and machine spinning.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKUAST, Srinagar</td>
<td>648.54</td>
<td>423.10</td>
<td>334.50</td>
<td>79</td>
</tr>
<tr>
<td>CSK HP KVV, Palampur</td>
<td>138.67</td>
<td>57.34</td>
<td>24.48</td>
<td>43</td>
</tr>
<tr>
<td>CSWRI, Avikanagar</td>
<td>107.54</td>
<td>60.71</td>
<td>54.48</td>
<td>90</td>
</tr>
<tr>
<td>SHD, Kashmir</td>
<td>48.28</td>
<td>15.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>943.03</strong></td>
<td><strong>556.85</strong></td>
<td><strong>413.46</strong></td>
<td><strong>74</strong></td>
</tr>
</tbody>
</table>

30. Sub-project: Utilization Strategy for Oceanic Squids in Arabian Sea: A Value Chain Approach

(i) Project Code: 20033
(ii) Sanctioned date: 2008–09
Completion date: 30.06.2012
Budget (₹ in lakh): 541.297
(iii) Consortia P.I. and Lead Institute:
Name, designation and full address: Dr K.S. Mohamed
CMFRI, Kochi
0484-2394867, 09447056559
ksmohamed@vsnl.com
(iv) Partners:
- Fishery Survey of India (FSI), Mumbai.
- National Institute of Fisheries Post-harvest Technology and Training (NIFPHATT), Kochi.
- Central Institute of Fisheries Technology (CIFT), Kochi


(vi) Objectives:
1. **Production:** To establish a new commercial jigging fishery for oceanic squids in the Central Arabian Sea and to determine the resilience of the species to exploitation. Initiate sustainability certification of oceanic squid jigging as an ecolabelled fishery.
2. **Processing:** Develop protocols for onboard preservation and processing of oceanic squids and to enhance organoleptic characteristics of oceanic squids.
3. **By-products value-addition:** Develop value-added products from oceanic squids such as squid surimi and balls and efficient utilization of squid processing waste by developing by-products such as fish meal and chitosan.
4. Specific to value chain: Determine the techno-economic feasibility of commercial distant water squid jigging operations. Formulate Model bankable project/scheme on distant-water squid jigging suitable for NABARD to accelerate the flow of credit from scheduled banks by refinance.
5. Market Linkages: Develop market intelligence on global oceanic squid markets and products. Develop export and domestic marketing channels through private partnership.

(vii) Research Progress:
- Mapping of Oceanic squids in Arabian Sea, overlaying cruise details, with historical information was carried out.
- One commercial fishing trawler (MV Titanic) was converted to squid jigger by installing five micro-processor controlled squid jigging machines, halogen lights and auxiliary generator.
- Pablo boat deck modification layout for hand jigging; lift net operation, pair trawling and pole and line fishing was designed for conversion of traditional crafts for squid jigging.
- Nutritional profiling of Oceanic squid with respect to proximate composition; mineral content, fatty acid levels and amino acid levels completed for labeling nutritional facts.
- Three value-added Ready to Eat Oceanic squid products developed and kept for sensory evaluation.

**Innovations/Success Stories**

**Conversion of fishing vessel**
- *Mechanised craft:* A fishing trawler (MV Titanic) of >20 m overall length was modified for commercial squid jigging operations. Five numbers of micro-processor controlled
squid jiggling machines with pulling power 90–100 kg was installed. The accessory generator and aerial lighting system comprising of 1.5 kW halogen lamps were set for lighting.

- Motorized traditional craft: Deck modification designs of Pablo boats for hand jiggling, lift netting, pair trawling and pole and line fishing finalized.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

Statement Budgetary Position as on 31 March 2010 (₹ in lakh)

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMFRI, Kochi</td>
<td>393.89</td>
<td>224.09</td>
<td>167.37</td>
<td>75</td>
</tr>
<tr>
<td>FSI, Mumbai</td>
<td>48.61</td>
<td>25.73</td>
<td>14.05</td>
<td>55</td>
</tr>
<tr>
<td>NIFPHATT, Kochi</td>
<td>75.70</td>
<td>53.28</td>
<td>39.30</td>
<td>74</td>
</tr>
<tr>
<td>CIFT, Kochi</td>
<td>23.10</td>
<td>5.29</td>
<td>4.53</td>
<td>86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>541.30</strong></td>
<td><strong>308.39</strong></td>
<td><strong>225.24</strong></td>
<td><strong>73</strong></td>
</tr>
</tbody>
</table>

31. Sub-project: A Value Chain on High Value Shellfish from Mariculture Systems

(i) Project Code : 20035
(ii) Sanctioned date : 10.02.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 354.12
(iii) Consortia P.I. and Lead Institute : Dr V. Kripa
(Name, designation and full address) CMFRI, Kochi
0484-2320102, 09495317931
vasantkripa@gmail.com
(iv) Partners:
- National Institute of Post Harvest Technology and Training (NIFPHATT, Kochi)
(vi) Objectives:
- Production: (i) To enhance mariculture production through refinement of seed production techniques and commercialization of farming techniques of the edible oyster, *Crassostrea madrasensis* and the sand lobster, *Thenus orientalis*.
- Processing: To develop and standardize techniques for production of value-added products like ready-to-serve/cook products from farmed oysters with special emphasis of food safety and quality, and popularization and promotion of farmed marine products.
- By-product development: To develop model processing systems for production of ‘oyster flavor extract’ from oysters.
- Market: Expansion and strengthening of marketing linkages between production units, seafood industry and public caterers for commercialization of farmed marine live fish trade and value-added products in domestic and global markets.
(vii) Research Progress:

- An oyster hatchery with a production capacity of lakh spat (seed) per annum developed in the KVK complex in Kerala which is the first unit for training farmers in technical protocols of seed production.
- Four ready to serve oyster products (oyster pickle, oyster curry in coconut milk, oyster curry with vegetables, oyster soup,) and two ready-to-cook oyster product (battered and breaded oysters, IQF) were developed from oysters.
- In central Kerala, one full fledged seafood processing unit for the production of value-added product development was set up in partnership with a private entrepreneur and 14 villagers from three villages were trained in product development following HACCP protocols.
- The proximate composition (% of protein, fat etc) and the profile of polyunsaturated fatty acids in fresh and processed oysters was estimated. This will be used for printing as “Oyster Fact Sheet” in oyster products and for promoting oyster market.
- The seasonal variations in hydrographic variations (8 abiotic factors), pollution levels (7 metals) and microbial load at the commercial farm site were analyzed and recorded. The oysters were also screened for occurrence of parasites. This will be used to promote the product indicating the ecological health of farm site.

Innovations/Success Stories

- An oyster hatchery with a production capacity of lakh spat (seed) per annum was developed in the KVK complex in Kerala which is the first unit in the country for training farmers in technical protocols of oyster seed production. The production of hatchery produced seed can increase the productivity of farms and reduce dependence on natural for seed.
- Three ready to serve oyster products (oyster pickle, oyster curry in coconut milk, oyster curry with vegetables, oyster soup) and two ready-to-cook oyster product (battered and breaded oysters and Individually Quick Frozen oysters) were developed from oysters. These products will be marketed through supermarkets at Kochi and Bangalore.
- In central Kerala, one full fledged oyster processing unit for the production of value-added product development unit was set up in partnership with a private entrepreneur and 14 villagers from three villages were trained in product development following HACCP protocols. This will become operational from May 2010 thereby introducing value-added oyster products in the country.
- The proximate composition (% of protein, fat etc) and the profile of polyunsaturated fatty acids in fresh and processed oysters was estimated. This will be used for printing as “Oyster Fact Sheet” in oyster products and for promoting oyster market.
- The seasonal variations in hydrographic variations (8 abiotic factors), pollution levels (7 metals) and microbial load at the commercial farm site were analyzed and recorded. The oysters were also screened for occurrence of parasites. This
SUB-PROJECTS-WISE RESEARCH PROGRESS

information will be used to promote the product indicating the ecological health of farm site.

- More than 250 oyster broodstock collected and induced to spawn, two million larvae produced, 2,000 cultchless spat produced and the oysters spat are farmed in trays.
- Popularisation of oyster farming was done by conducting TOT programs. Three training programs organized, trained nearly 470 villagers in oyster farming, provided technical support for 75 families to start oyster farms which would increase oyster production by 25%.
- For Legal policy document on mariculture, a draft frame work for mariculture policy was drafted.
- Documentary on oyster farming and popularization through advertisements: Prepared of script and film/ad production Script for oyster farming film (20 minutes duration) prepared, items for cookery show decided and ad prepared.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

**Statement Budgetary Position as on 31 March 2010 (₹ in lakh)**

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMFRI, Kochi</td>
<td>301.16</td>
<td>177.67</td>
<td>171.73</td>
<td>97</td>
</tr>
<tr>
<td>NIFPHATT, Kochi</td>
<td>52.96</td>
<td>38.42</td>
<td>30.93</td>
<td>81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>354.12</strong></td>
<td><strong>216.09</strong></td>
<td><strong>202.66</strong></td>
<td><strong>94</strong></td>
</tr>
</tbody>
</table>

32. **Sub-project: A Value Chain on Kashmir Saffron**

(i) Project Code : 20037  
(ii) Sanctioned date : 16.02.2009  
Completion date : 30.06.2012  
Budget (₹ in lakh) : 300.1235  
(iii) Consortia P.I. and Lead Institute : Dr Firdos Ahmad Nehvi  
(Name, designation and full address) SKUAST, Srinagar  
0194-2461261, 09419974563  
f.nehvi@rediffmail.com  
(iv) Partners:  
- Indian Institute of Integrated Medicine (IIIM), Jammu  
(v) Website: www.skuastkashmir.ac.in  
(vi) Objectives:  
1. Refinement and on-farm testing of cultivation practices for enhancing saffron productivity in traditional and non-traditional areas through input use efficiency.  
2. Development of viable systems of commercial corm production.  
3. To standardize post-harvest handling and value-addition of saffron using low cost commercial solar, hot air dryers and scientific methods of picking, separation of stigmas and packing.
4. Development of protocol for quality standards, adulteration, mechanisms for post-harvest handling under controlled conditions and food/cosmetic products.
5. Conduct market research, analyse and create avenues for market linkage on dynamic basis to enable better returns to stakeholders across the supply chain.
6. Entrepreneurship development cum capacity building and HRD of stake holders for the technologies.

(vii) Research Progress:
- Identified 256 farm families in 7 clusters of district Pulwama and Budgam for refinement of production technologies to develop eco-compatible production technology for large-scale production of saffron in traditional and non-traditional areas with consistency in quality and quantity to meet internal and export market demands. Adhoc recommendations improve saffron yield by above 46% over the bench value of 2.15 kg/ha.
- For promotion of saffron gardens for commercial corm production, 240 saffron nurseries were established over 6 ha of saffron area with 2 public sector nurseries established at KD & SRSS Konibal.
- 1,024 flower samples were analyzed for Integrating pre and post harvest systems of saffron for value-addition to boost efficient quality production. Efficient method of post harvest processing improves saffron recovery/kg of fresh flowers from 18 g/kg to 37 g.
- All Zamindar Saffron Growers Society has been established for developing efficient linkages between technology generators and stakeholders.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized up to March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKUAST, Srinagar</td>
<td>240.67</td>
<td>176.79</td>
<td>116.89</td>
<td>66</td>
</tr>
<tr>
<td>IIIM, Jammu</td>
<td>59.46</td>
<td>39.56</td>
<td>0.23</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300.12</strong></td>
<td><strong>216.35</strong></td>
<td><strong>117.11</strong></td>
<td><strong>54</strong></td>
</tr>
</tbody>
</table>

33. Sub-project: A Value Chain on Ginger and Ginger Products

(i) Project Code : 20040
(ii) Sanctioned date : 15.04.2009
Completion date : 30.06.2012
Budget (₹ in lakhs) : 715.03
(iii) Consortia P.I. and Lead Institute : Dr H.N. Atibudhi
(OUAT, Bhubaneswar
0674-2397700, 09337101258
hnatibudhi@rediffmail.com)
(iv) Partners:
- CTRAN Consulting, Bhubaneswar
- Natural Remedies Private Limited, Bangalore
- KASAM, Kandhamal
- Integrated Agency for Education, Environment and Technology [IAEET], Koraput

(v) Website: http://www.orissaginger.com

(vi) Objectives:
1. **Production**—Augmentation in production of suitable Ginger varieties (for value-addition) in clusters with improved package of practices.
2. **Processing—Improvement** in post-harvest technology of Ginger to minimise post-harvest losses and research to develop higher value-added products.
3. **Market Linkage**—Improvement in value chain of Ginger for improved economic return to growers through remunerative market of branded and certified ginger and ginger based products.
4. **Institutional**—Establishment/linking producer’s company/Organizations for better market access and enhanced bargaining power of the producers.

(vii) Research Progress:
- Planted the elite variety of ginger at farmers’ field using raised bed method.
- Timely harvest of the produce considering the deprived processing benefits was adused.
- Proper storage method of ginger developed.

**Innovations/Success Stories**
- Tribal farmers in Pottangi area of Koraput district were growing ginger for past several years. They were growing mostly local variety of ginger and selling the product just after harvest or by forward contract to the middleman before the crop is harvested. After implementation of the project “A Value Chain on Ginger and Ginger Products” 25 farmers were identified and were given 40 kg of “Suprabha” variety breeder seeds to each of them. The farmers were trained to plant the crop in the raised bed and to use mulching, treat the planting materials in the fungicides and plant the crop in the raised bed and harvesting and management of the crop. By NAIP intervention, farmers were trained to store the product by making a pit of size 1 feet depth, 1 m width and 2–3 m length and are also instructed to use paddy straw as insulation in all the sides and the bottom and put the planting material inside. They were also instructed to cover the same with paddy straw and keep it raised 6 inches to 1 foot above the ground level. The pits were covered with shade and arrangements were made so that the place is kept well drained from occasional showers. 25 beneficiaries who were given planting materials were surveyed and the following results arrived from the study.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:
### Statement Budgetary Position as on 31 March 2010

(₹ in lakh)

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUAT, Bhubaneswar</td>
<td>208.12</td>
<td>161.23</td>
<td>88.72</td>
<td>55</td>
</tr>
<tr>
<td>KASAM, Kandhamal</td>
<td>24.71</td>
<td>7.95</td>
<td>4.34</td>
<td>55</td>
</tr>
<tr>
<td>CTRAN, Bhubaneshwar</td>
<td>44.30</td>
<td>20.54</td>
<td>13.78</td>
<td>67</td>
</tr>
<tr>
<td>IAEET, Koraput</td>
<td>24.82</td>
<td>7.12</td>
<td>2.54</td>
<td>36</td>
</tr>
<tr>
<td>Natural Remedies Private</td>
<td>413.08</td>
<td>163.13</td>
<td>74.18</td>
<td>45</td>
</tr>
<tr>
<td>Limited, Bangalore</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>715.03</strong></td>
<td><strong>359.96</strong></td>
<td><strong>183.55</strong></td>
<td><strong>51</strong></td>
</tr>
</tbody>
</table>

#### 34. Sub-project: A Value Chain on Cashew for Domestic and Export Market

(i) Project Code : 20041

(ii) Sanctioned date : 17.02.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 287.319

(iii) Consortia P.I. and Lead Institute : Dr V.P. Potty
(Name, designation and full address) CEPCI, Kollam
0474-2761003, 09895528698
vppotty@yahoo.com

(iv) Partners:
- UAS Bangalore
- DCR Puthur
- KSCDC Kollam

(v) Website: www.cepclab.org

(vi) Objectives:
1. Developing standards for raw cashew nuts.
2. To develop high performance cashew processing system.
5. Packaging standardization, evaluation and promotion of developed technologies, quality certification and entrepreneurship development.

(vii) Research Progress:
- 6 bacterial species as *Pseudomonas pseudoalcaligenes*, *Enterobacter sakazakii*, *Sphingomonas paucimobilis*, *Pseudomonas stutzeri*, *enterobacter cloacae*, *Escherichia coli* were identified for the biodegradation of CNSL.
- From the biochemical analysis it is observed that the free fatty acid content is increasing as well as the chain length of fat is decreasing which leads to the formation of rejects in cashew kernel during storage of RCN.
- Economically important cardanol was separated from technical CNSL by distillation.
at 200–215 degree Celcius at 700 mm Hg.

- Residol from CNSL was separated and converted into rubber like material by treating with urea and formaldehyde and it is hardened, mixed with cotton fibre for making various composites bio-polymer degradation enzymes such as cellulase, pectinase and tannase were produced from by-product of cashew industry.

**Innovations could be written**

- Anacardic acid was separated from natural CNSL as calcium and sodium salts. Then it is converted to anacardic acid. Characterization and its stability studies is in progress.
- Improvement of CNSL extraction process from shell. CNSL from thermally and non-thermally treated kernels, were extracted for maximum possible quantity and Anacardic acid content.
- Cardanol was polymerized to highly viscous thermoset compound. Natural fibre composites were prepared using polymerised cardanol. Characterization and its application studies is in progress.
- After separation of cardanol, balance amount of CNSL is known as residol. Which is converted into rubber like material by treating with urea and formaldehyde and it is hardened by mixed with cotton fibre. Epoxy resin was prepared and evaluated. Improvement and application study is continuing.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEPCI, Kollam</td>
<td>142.16</td>
<td>100.07</td>
<td>95.59</td>
<td>96</td>
</tr>
<tr>
<td>UAS, Bangalore</td>
<td>57.10</td>
<td>32.65</td>
<td>30.33</td>
<td>93</td>
</tr>
<tr>
<td>DOR, Puthur</td>
<td>68.91</td>
<td>42.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KSCDC, Kollam</td>
<td>19.15</td>
<td>4.46</td>
<td>4.46</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>287.32</strong></td>
<td><strong>179.37</strong></td>
<td><strong>130.38</strong></td>
<td><strong>73</strong></td>
</tr>
</tbody>
</table>

35. **Sub-project: A Value Chain on Mango and Guava for Domestic and Export Market**

(i) Project Code : 20046
(ii) Sanctioned date : 26.03.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 443.7565
(iii) Consortia P.I. and Lead Institute : Dr S.K. Shukla
(Name, designation and full address) : CISH, Lucknow
0522-2841022, 09415428049
skscish@yahoo.com
skshuklacish@gmail.com
(iv) Partners:
- Tamil Nadu Agricultural University, Coimbatore
- Andhra Pradesh Horticulture University, Andhra Pradesh
- Navsari Agricultural University, Navsari, Gujarat
- BAIF Development Research Foundation, Pune

(v) Website: www.valuechain.cishko.org

(vi) Objectives:
1. Enhancing productivity and quality of mango and guava through good agricultural practices.
2. Reducing post-harvest losses, enhancing shelf life through scientific pre and post harvest management practices.
3. Strengthening of processing of mango and guava through entrepreneurship development and tying up with processors.
4. Facilitating the producers in getting domestic and international market access for their produce by creating market linkages.

(vii) Research Progress:
- Based on soil, and leaf analysis from mango and guava orchards fertilizer was recommended which improved fertilizer use efficiency.
- Mango is rarely pruned, but the intervention of Centre opening and light pruning in mango has improved light penetration in mango orchards which would lead to higher fruit yield.
- Use of paclobutrazol helped in regular flowering in mango. Spraying of KNO$_3$ before flowering helped in uniform flowering in otherwise erratic flowering.
- Integrated management of mango mealy bug and fruit fly in both mango and guava has helped the farmers in effective management of these pests.
- Imparted training to mango and guava farmers (129) in fruit processing and hygiene and sanitation by BAIF.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISH, Lucknow</td>
<td>135.92</td>
<td>67.63</td>
<td>34.74</td>
<td>51</td>
</tr>
<tr>
<td>TNAU, Coimbatore</td>
<td>103.17</td>
<td>56.24</td>
<td>55.70</td>
<td>99</td>
</tr>
<tr>
<td>APHU, AP</td>
<td>97.61</td>
<td>50.07</td>
<td>50.18</td>
<td>100</td>
</tr>
<tr>
<td>NAU, Navsari</td>
<td>97.61</td>
<td>57.88</td>
<td>57.88</td>
<td>100</td>
</tr>
<tr>
<td>BAIF DRF, Pune</td>
<td>9.45</td>
<td>3.57</td>
<td>3.09</td>
<td>87</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>443.76</strong></td>
<td><strong>235.39</strong></td>
<td><strong>201.59</strong></td>
<td><strong>85</strong></td>
</tr>
</tbody>
</table>
**Theme 7: Income Augmentation and Employment Generation/Processing**

Under this theme, following 3 sub-projects are summarized as follows:

### 36. Sub-project: Value Chain on Value-added Products Derived from Prosopis juliflora

(i) **Project Code**: 20013  
(ii) **Sanctioned date**: 1.09.2008  
     **Completion date**: 30.06.2012  
     **Budget (₹ in Lakh)**: 193.53  
(iii) **Consortia P.I. and Lead Institute**  
     **(Name, designation and full address)**: Dr L.N. Harsh  
     CAZRI, Jodhpur  
     0291-2786584, 09414701366  
     inharsh@cazri.ac.in  
     harshcazri@gmail.com  
(iv) **Partners**:  
     - National Food Products (India), Jodhpur (Industrial partner); Desert Environmental Conservation Association (DECO) (NGO partner)  
(v) **Website**: www.cazri.res.in  
(vi) **Objectives**:  
1. Refinement of standardized silvicultural and tree stand management practices for production of pods having high sugar content.  
2. Refinement in developed process of preparing cheaper concentrate ration by inclusion of *Prosopis* pods for livestock.  
3. Development and refinement of human food products prepared by *Prosopis* pods having high and low sugar content and their physico-chemical analysis.  
4. Study of the present use of *Prosopis* pods and impact of various developed feed and food products on the economy of rural people and also pricing, marketing and social aspects of *Prosopis* products value chain.  
(vii) **Research Progress**:  
- Total 44 tree stands have been analyzed to establish relationship among tree structural, pod morphological and pod biochemical characteristics. Tending operations have been carried out on 300 trees. 1,000 seedlings of sweet pod bearing tree type have been raised in the nursery. Two multipurpose threshers are ready to thresh the pods as per requirement.  
- Technologies have been developed for preparation of cheaper concentrate ration nutrient feed block by inclusion of *P. juliflora* pod flour. 4,000 kg of concentrate ration and 50 multinutrient feed blocks have been prepared and distributed to stakeholders.  
- Various fractions of Prosopis juliflora pods, viz. moisture, dry matter, organic matter, mineral and crude protein content, and as well as ether extract, total CHO and gross energy have been analyzed in ripened pods and in pod mesocarp of grade >16, 16–30, 30–72 and >72 mesh. 1,000 kg pods have been processed for preparation of Prosopis coffee and mineral rich sugary concentrate.
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- 4 groups of farmers (primary stakeholders) have been organized by the partner NGO. Stakeholders were trained on pod threshing and grading activities. They were sensitized about the products of *Prosopis* pods (both livestock and human consumption). 2 field trainings and 1 exhibition were organized by partner NGO.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized up to March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAZRI, Jodhpur</td>
<td>169.97</td>
<td>67.43</td>
<td>33.85</td>
<td>50</td>
</tr>
<tr>
<td>Conservation Association (DECO) NGO</td>
<td>7.83</td>
<td>3.10</td>
<td>2.69</td>
<td>87</td>
</tr>
<tr>
<td>National Food Products (India), Jodhpur</td>
<td>15.71</td>
<td>14.56</td>
<td>36.54</td>
<td>43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>193.51</strong></td>
<td><strong>85.08</strong></td>
<td><strong>36.54</strong></td>
<td><strong>43</strong></td>
</tr>
</tbody>
</table>

37. **Sub-project: A Value Chain on Enhanced Productivity and Profitability of Patchouli (Pogostemon Patchouli)**

(i) Project Code : 20047  
(ii) Sanctioned date : 08.04.2009  
Completion date : 30.06.2012  
Budget (₹ in lakh) : 287.106 lakhs  
(iii) Consortia P.I. and Lead Institute : Er. R. Dayananda Kumar  
(Name, designation and full address)  
JAFPL, Bangalore  
080-22107400, 09342502191  
dayana_704@yahoo.com  
dayananda@giftakshay.com  
(iv) Partners:  
- University of Agricultural Sciences (UAS), Bangalore.  
- Institution of Agricultural Technologists (IAT), Chitradurga  
(v) Website: www.jewargiagrofoodpark.in  
(vi) Objectives:  
1. To assess/identify suitable patchouli variety and develop good agricultural practices to increase productivity and profitability of patchouli cultivation as an under crop in coconut plantations (Production).  
2. To develop and demonstrate suitable post harvest techniques, enzyme based pre treatment and efficient distillation units for enhancing quality and quantity of patchouli oil (Post-harvest and Processing).  
3. To undertake chemical analysis of Hydrosol and spent materials obtained during steam distillation and develop efficient processes and value-added products. (Value-addition).  
4. To develop a market intelligence system to ensure advance marketing of patchouli and its by products (Marketing).
5. Promotion of commercial projects to entrepreneur, farm communities and other organisations to develop the region as a major patchouli production centre. (Scale-up).

(vii) Research Progress:
- Micro sprinkler irrigation was found to be better than the conventional flood irrigation for patchouli production.
- Research studies in the demonstration plots indicate patchouli can be cultivated in different soils having varied pH.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAFPL, Bangalore</td>
<td>61.12</td>
<td>19.46</td>
<td>31.78</td>
<td>163</td>
</tr>
<tr>
<td>UAS, Bangalore</td>
<td>214.56</td>
<td>227.56</td>
<td>5.38</td>
<td>2</td>
</tr>
<tr>
<td>IAT, Chitradurga</td>
<td>11.43</td>
<td>1.97</td>
<td>3.50</td>
<td>178</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>287.11</strong></td>
<td><strong>248.99</strong></td>
<td><strong>40.66</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

38. **Sub-project: A Milk Value Chain for the Unorganized Sector**

(i) Project Code : 20050
(ii) Sanctioned date : 28.04.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 334.938
(iii) Consortia P.I. and Lead Institute : Dr C. Naresh Kumar
(Name, designation and full address) TNVASU, Chennai
044-25551574, 09790751430
drcnareshkumar@yahoo.com
(iv) Partners:
- Tamil Nadu Veterinary and Animal Sciences University, Chennai
- Dairy Technology Programme, College of Veterinary Science, Tirupati
- Madras Social Service Society, Chennai
- M/s Winner Dairy, Pondicherry
(v) Website: www.naipmv cus.com
(vi) Objectives:
1. **Production:** To enhance the milk production in the un-organized sector by nutritional supplementation with minerals, to enhance hygiene by machine milking and to improve the keeping quality by use of Vapour Absorption Refrigeration System based bulk milk chillers working on gas.
2. **Processing:** To develop dairy based convenience synbiotic health foods by potential application of probiotics, prebiotics and phytogenic compounds, to optimize the processing parameters with redesigned equipments and to evaluate their health claims
3. **Packaging**: To study the prospects of utilizing coconut shell and areca nut leaf container as eco-friendly packaging materials to improve shelf-life of bulk foods.

4. **Marketing**: Development of integrated quality management systems for emerging markets and establishment of linkages for commercialization.

(vii) **Research Progress**:
- Developed Prototype Milking machine.
- Developed ecofriendly packaging material—Oxo biodegradable packs.
- Developed value-added dairy products with natural ingredients.
- Developed Probiotic dairy foods—Bifidogenic milk powder.

(viii) **The status of the utilization of the budget under this sub-project upto March, 2010 is presented below**:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget (` in lakh)</th>
<th>Fund Released up to March 2010 (` in lakh)</th>
<th>Fund Utilized up to March 2010 (` in lakh)</th>
<th>Fund Utilized to Sanctioned up to March 2010 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNVASU, Chennai</td>
<td>260.61</td>
<td>120.86</td>
<td>62.43</td>
<td>52</td>
</tr>
<tr>
<td>College of Veterinary Science,Tirupati</td>
<td>61.77</td>
<td>33.97</td>
<td>23.62</td>
<td>70</td>
</tr>
<tr>
<td>Madras Social Service Society, Chennai</td>
<td>3.57</td>
<td>0.66</td>
<td>0.54</td>
<td>14</td>
</tr>
<tr>
<td>Winner Dairy, Pondicherry</td>
<td>9.01</td>
<td>1.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>334.95</strong></td>
<td><strong>156.65</strong></td>
<td><strong>86.58</strong></td>
<td><strong>55</strong></td>
</tr>
</tbody>
</table>

**Theme 8: Food Security & Income Augmentation/Agro-Processing**

Under this theme, following 13 sub-projects are summarized as follows:

39. **Sub-project**: **Creation for Demand for Millet Foods through PCS Value-Chain–NRCS, Hyderabad**

   (i) **Project Code**: 20002
   (ii) **Sanctioned date**: 20.12.2007
   (iii) **Completion date**: 30.06.2012
   (iv) **Budget (` in lakh)**: 579.50
   (v) **Consortia P.I. and Lead Institute**: Dr B Dayakar Rao
       NRCS, Hyderabad
       040-24015349, 09989710405
dayakar@nrcsorghum.res.in
   (vi) **Partners**:
- National Institute of Nutrition (NIN), Hyderabad.
- ITC Limited, International (Business) Division, Secunderabad.
- Acharya N.G. Ranga Agricultural University (ANGRAU), Hyderabad.
   (v) **Website**: www.sorghum.res.in
   (vi) **Objectives**:
- 1. To enable market-driven millets production for specific end-uses, procurement and primary processing for continuous supply-chain management.
- 2. Fine-tuning of the technologies for development of millet food products and upscaling.
- 3. Testing for nutritional evaluation and safety of selected millet foods.
5. Developing entrepreneurship and appropriate strategies to promote and popularize millets for commercialization through value-addition and branding as health foods

(vii) Research Progress:
- Commercialized sorghum/bajra products, which are fine-tuned and standardized.
- Sorghum based products such as ready-to-eat rava laddu, murukulu and chekkalu were 2–12% costlier than their rice based products.
- The costing of sorghum based flakes, rawa and flour indicated a price advantage of 6–16% over the products that are available in the market based on other cereals while sorghum based noodles are expensive by 25% than bambino noodles made from maida.
- Awareness campaigns generated demand for the Jowar based health foods in retail organized malls, public parks in Hyderabad etc.
- Established of the brand “eatrite”—JAICAR Foods.
- Agreement on MoU with ‘Bhagyanagar Foods’ for processing, developing, packing, and distribution of sorghum products from May, 2010 was signed.
- The “Jowar – Health meets Taste” communication campaign had been initiated for a behavioral shift in urban consumers from their regular wheat and rice foods to millet foods by highlighting the nutritional values of Jowar and developing preference for it.
- Successfully imparted Jowar awareness to more than 10,000 consumers via In-Mall Promotions and Road shows.
- Wet Sampling of Jowar Products as part of the BTL activities to impart the taste of Jowar into the Urban Segment.
- PR approach to promote Jowar through Newspapers and TV News Channels, Regular updates to Press about the project. More than 8 articles and coverages across leading News Mediums.
- Set up Information Touch Screen Kiosks in Retail Stores with Jowar Trivias, Recipe’s and Questionnaires
- Encouraged Entrepreneurs to Launch Jowar Based Foods and helped them realized the potential. E.g. Bharat Biotech Ltd. and Vegan Premium Batter Foods.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRCS, Hyderabad</td>
<td>348.66</td>
<td>214.58</td>
<td>194.91</td>
<td>91</td>
</tr>
<tr>
<td>NIN, Hyderabad</td>
<td>98.61</td>
<td>59.16</td>
<td>55.84</td>
<td>94</td>
</tr>
<tr>
<td>ANGRAU, Hyderabad</td>
<td>59.23</td>
<td>33.72</td>
<td>30.85</td>
<td>91</td>
</tr>
<tr>
<td>ITC-LTD, Secunderabad</td>
<td>73.00</td>
<td>31.63</td>
<td>19.98</td>
<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>579.50</td>
<td>339.08</td>
<td>301.57</td>
<td>89</td>
</tr>
</tbody>
</table>
40. Sub-project: A Value Chain on Seabuckthorn (Hippophae L), CSKHP Agricultural University, Palampur

(i) Project Code : 20012
(ii) Sanctioned date : 09.06.2008
Completion date : 30.06.2012
Budget (₹ in lakh) : 402.468
(iii) Consortia P.I. and Lead Institute : Dr Virendra Singh
(Name, designation and full address) CSKHPKV Palampur
(iv) Partners:
- All India Institute of Medical Sciences, New Delhi
- Lahaul-Spiti Seabuckthorn Cooperative Society, Keylong (Himachal Pradesh)
- Kala Sangam Avam, Rojgar Sarjan Manch, Jhalma, Lahaul (Himachal Pradesh)
(v) Website: Not available
(vi) Objectives:
1. To improve production and collection of seabuckthorn berries on marginal/forest lands for sustainable supply-chain management.
2. Fine-tuning the technologies for development of specific seabuckthorn foods, veterinary and neutraceutical products.
3. To utilize seabuckthorn waste to develop animal feed.
4. To assess economics of production and processing and consumer acceptability of end-products.
5. To develop entrepreneurship and appropriate strategies to promote and popularize seabuckthorn for commercialization through value-addition and branding seabuckthorn as health food.
(vii) Research Progress:
- Extension and training of growers and developmental agencies:
  - On-campus trainings of farmers on cultivation of seabuckthorn 2.
  - Off-campus trainings of farmers 6.
- Selection of high yielding forms: Six forms of *H. rhamnoides* ssp. turkestanica and *H. salciifolia* have been evaluated and are being mass propagated at the Krishi Vigyan Kendra, Kukumseri in Lahaul. These forms are high yielding (4.5–8 kg/plant), rich in oil (3.5–4.5%) and vitamin C (600–2,700 mg/100 g). More land races have been selected, being evaluated and mass propagated under the NAIP/ICAR funded project on “A value chain on Seabuckthorn”.
- Mass propagation and supply of high yielding cultivars: 50,000 saplings of high yielding (>4.5 kg fruit/plant), vitamin C rich (>600 mg/100 g) and fruit oil (>3.5) were prepared and supplied to farmers for plantation on 400 bigah marginal lands.
- Management of orchard effect of pruning: Seabuckthorn saplings can be planted in 2 cubic feet pits. Pruning intensity of 20–30% significantly gave higher yield of 1.4 kg/plant than other treatments.
- Organic cultivation: Vermicompost alone or Vermicompost + FYM/Compost (75%+25%) produced significantly improved growth of seabuckthorn plants.
● **Development of silvipastoral system**: Mix grasses, fesque and orchard gave best result of growth with seabuckthorn. On an average, these treatments recorded 33.8% higher forage yield over the control (local grass). The green forage yield of Fescue and Orchard grass on an average was 19.6% higher over the local grass. One million seedlings of improved grasses have been produced for supply to farmers for plantation between seabuckthorn rows.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSKHPKV Palampur</td>
<td>344.11</td>
<td>168.75</td>
<td>153.52</td>
<td>91</td>
</tr>
<tr>
<td>AIIMS, New Delhi</td>
<td>33.30</td>
<td>6.62</td>
<td>2.46</td>
<td>37</td>
</tr>
<tr>
<td>LSSCS, Keylong</td>
<td>12.62</td>
<td>2.68</td>
<td>4.80</td>
<td>179</td>
</tr>
<tr>
<td>Kala Sangam Avam, Rojgar Sarjan Manch, Jhalma, Lahaul</td>
<td>12.44</td>
<td>2.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td><strong>402.47</strong></td>
<td><strong>55.4728</strong></td>
<td><strong>66.48535</strong></td>
<td><strong>119.85</strong></td>
</tr>
</tbody>
</table>

41. **Sub-project: Value Chain on Food Products from Small Millets of Bastar Region of Chhattisgarh**

(i) Project Code : 20023  
(ii) Sanctioned date : 11.08.08  
Completion date : 30.06.2012  
Budget (₹ in lakh) : 433.710  
(iii) Consortia P.I. and Lead Institute : Dr S. Patel  
(Name, designation and full address) SGCARS/IGKV, Raipur  
0771-2100564, 09826565675  
patels47@rediffmail.com  
(iv) Partners:  
● Indira Gandhi Krishi Vishwavidyalaya, Jagdalpur, Raipur  
● National Institute of Nutrition, Hyderabad  
● Sanjeevini – CG State Minor Forest Produce (Trading and Development) Cooperative Fed. Ltd., Raipur  
● Ram Krishna Mission Ashram, Narayanpur (NGO)  
(v) Website: www.naip-sgcars.com  
(vi) Objectives:  
1. To enhance the productivity and profitability of millet cultivation in the target area.  
2. To develop and evaluate millet based food products.  
3. To establish linkage with the processors/entrepreneurs for commercialization/popularization and up scaling of millet products.  
4. To assess consumer acceptability, pricing and plan marketing strategies.
(vii) Research Progress:
- A significant increase in the productivity of targeted millets (ragi and kodo) from an average productivity of 1.8 to 3.0 q/ha to 5–9 q/ha in case of kodo and 10–30 q/ha in case of ragi.
- A three fold increase in the income from the millet cultivation increased an average profitability of 70% of the participating farmers.
- On an average about 15–20% higher opportunities of employment compared to the traditional ways of millet cultivation was generated due to millet cultivation adopting the improved package of practices.
- This is the first time that about 300 quintals of certified ragi seed has been procured in the region by the state agency.
- The training and capacity building of SHGs/Women groups and small processors on processing and value-addition of millets has attracted the attention of different agencies including financial institutions.

Innovations/Success Story

Higher millet yield through intervention

- Significant increase in the productivity of targeted millets (ragi and kodo) from an average productivity of 1.8 to 3.0 q/ha to 5–9 q/ha in case of kodo and 10–30 q/ha in case of ragi. A three fold increase in the income from the millet cultivation increased an average profitability of 70% of the participating farmers. Additionally, the increased productivity also opened the newer avenues of employment for the farmers namely, increased man days in the field operations and marketing. On an average about 15–20% higher opportunities of employment compared to the traditional ways of millet cultivation was generated due to millet cultivation adopting the improved package of practices.

The training and capacity building of SHGs/Women groups and small processors on processing and value addition of millets has attracted the attention of different agencies including financial institutions. The processed food products from millets are well accepted by the urban mass and getting good response from all segments of the population. Due to enhanced demand of millets for processing, the retail values of these two millets have increased more than 25% in the last two years.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGCARS/IGKV, Raipur</td>
<td>349.81</td>
<td>196.66</td>
<td>142.00</td>
<td>72</td>
</tr>
<tr>
<td>NIN, Hyderabad</td>
<td>21.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SANJIVNI, Raipur</td>
<td>21.07</td>
<td>5.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RKM, Narayanpur</td>
<td>41.32</td>
<td>14.4</td>
<td>13.92</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>433.71</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
42. **Sub-project: Value Chain on Commercialisation of Maize Products**

(i) **Project Code**: 20026

(ii) **Sanctioned date**: 03.12.2008  
**Completion date**: 30.06.2012  
**Budget (₹ in lakh)**: 451.22

(iii) **Consortia P.I. and Lead Institute**: Dr T.A. Sreerama Setty  
(Name, designation and full address) UAS, Bangalore  
080-23332442, 09449177138  
tas.setty@gmail.com

(iv) **Partners:**  
- National Institute of Nutrition, FDTRC, Hyderabad-500 604.  
- Karnataka State Agro Corn Products Ltd., Bangalore.  
- Karnataka Milk Federation, Bangalore.  
- Project Directorate on Poultry, Hyderabad.  
- Association of Women Entrepreneurs of Karnataka, Bangalore.

(v) **Website**: www.uasbangalore.edu.in

(vi) **Objectives:**

1. Fine-tuning of the existing agricultural practices for sustainable increased productivity and dissemination among the farmers  
2. To formulate innovative balanced nutritive foods from maize, studying their shelf-life and fine tuning technologies for commercialization  
3. To evaluate the nutritionally cooked recipes from maize and to determine the beneficial effects for chronic disorders  
4. Evaluation of maize grain by-products for balance feeds and popularization for enhanced live stock productivity  
5. Strengthening entrepreneurship skills of SHGs and NGOs for capacity building in up scaling of production for commercialisation and marketing of value-added products.

(vii) **Research Progress:**

- 10 maize grower groups were formed with a membership strength of 450, in the project area  
- Protocol for 8 new maize value-added foods and other pasta products have been standardized for commercialization.  
- 10 Women SHG entrepreneur groups were formed for EDP training with a membership strength of 250  
- Critical inputs package was designed and distributed to the 450 Maize growers in the project area during *kharif*, QPM seeds for 12 farmers during *rabi* and distributed NAH-2049 Maize hybrids for 125 farmers during *Rabi*-summer.  
- Total area covered under new high yielding hybrids of maize is 587 ha in project area.  
- Popularized improved new maize production technologies and cattle feeds in the project area (exhibition, training, seminar, demonstrations street plays, convention,
Doordarshan, etc). More than 2,500 farmers and farm women participated and benefitted.

- Corn flake Sample and Curls were prepared for quality testing and commercialization by KSACP Ltd., Bengaluru.
- Common facility centre was established in Malavalli for EDP training on value-added healthy foods for women SHGs

**Innovations/Success Stories**

- ‘Maizy’ brand registered for commercialization of maize products—‘Maizy’ brand of vermicelli, noodles, crisps—brand released during Krishimela 19th November, 2009.
- More than 15 demonstrations on value-added maize healthy foods (roti and upma) were organized in all the 10 villages of the project.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAS, Bangalore</td>
<td>207.98</td>
<td>108.49</td>
<td>111.74</td>
<td>103</td>
</tr>
<tr>
<td>NIANP, Adugodi, Bangalore</td>
<td>38.43</td>
<td>26.09</td>
<td>8.65</td>
<td>33</td>
</tr>
<tr>
<td>NIN, Hyderabad</td>
<td>59.52</td>
<td>36.79</td>
<td>16.58</td>
<td>45</td>
</tr>
<tr>
<td>PDP, Hyderabad</td>
<td>50.89</td>
<td>20.83</td>
<td>19.46</td>
<td>93</td>
</tr>
<tr>
<td>Awake, Bangalore</td>
<td>32.28</td>
<td>6.90</td>
<td>12.02</td>
<td>174</td>
</tr>
<tr>
<td>KMF, Bangalore</td>
<td>13.97</td>
<td>3.60</td>
<td>0.06</td>
<td>2</td>
</tr>
<tr>
<td>KSACP Ltd., Bangalore</td>
<td>48.15</td>
<td>45.49</td>
<td>0.37</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>451.22</strong></td>
<td><strong>248.19</strong></td>
<td><strong>168.87</strong></td>
<td><strong>68</strong></td>
</tr>
</tbody>
</table>

43. **Sub-project: A Value Chain on Commercial Exploitation of Underutilized Fruits of Tribal Zones of Rajasthan**

(i) Project Code: 20028
(ii) Sanctioned date: 05.12.2008
Completion date: 30.06.2012
Budget (₹ in lakh): 343.714
(iii) Consortia P.I. and Lead Institute: Dr R.A. Kaushik
(MPUAT, Udaipur
09887281595
kaushik_ra@yahoo.co.in
(iv) Partners:
- CIPHET, Abohar
- FIRST Sansthan, Udaipur
- GG Foods, Udaipur
(v) Website: www.mpuat.ac.in
(vi) Objectives:
1. To standardize rejuvenation or production technology for enhancement in productivity and quality of underutilized fruits such as custard apple, aonla and ber in the tribal and arid dominated area of Rajasthan.
2. To standardize post harvest management for underutilized fruits such as custard apple, aonla, ber and jamun to increase shelf-life.
3. To develop novel products and value chain for these fruits for higher economic returns.
4. Transfer of technologies among farmers and industries for commercial exploitation and sustainability.

(vii) Research Progress:
- Market studies on processed products developed in this project have been completed by GG Foods and accordingly full business plan is being developed.
- One large industry (2 tons/h capacity) at Rashmi (Chittorgarh), Rajasthan established with the consultancy of this project.
- Technology developed for browning free pulp storage of custard apple.
- Standardized storage methods for jamun, custard apple, ber and aonla (4 protocols developed).
- Low cost equipments modified/manufactured for the post-harvest management of crops under study namely, Ber harvester, Jamun harvester, platform for jamun harvesting, ber destoner, aonla pricker, etc (5 tools/equipments developed).
- Standardized antidiabetic tablets from jamun (2 types of tablets developed).
- Standardized the process and recipes for value-added products from ber, custard apple, jamun and aonla (21 products standardized).

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget (₹ in lakh)</th>
<th>Fund Released up to March 2010 (₹ in lakh)</th>
<th>Fund Utilized up to March 2010 (₹ in lakh)</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPUAT, Udaipur</td>
<td>245.366</td>
<td>163.70</td>
<td>145.36</td>
<td>89</td>
</tr>
<tr>
<td>CIPHET, Ludhiana</td>
<td>70.729</td>
<td>39.28</td>
<td>6.55</td>
<td>17</td>
</tr>
<tr>
<td>GG Foods, Udaipur</td>
<td>7.729</td>
<td>2.65</td>
<td>0.76</td>
<td>29</td>
</tr>
<tr>
<td>FIRST NGO, Udaipur</td>
<td>19.849</td>
<td>6.06</td>
<td>6.46</td>
<td>107</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>343.714</strong></td>
<td><strong>211.69</strong></td>
<td><strong>159.13</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>

44. Sub-project: A Value Chain on Production of food-Grade Nutraceuticals for Use of Antioxidants and food Colorants

(i) Project Code : 20031
(ii) Sanctioned date : 13.02.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 629.6962
iii) Consortia P.I. and Lead Institute : Dr Suresh Walia  
(Name, designation and full address) IARI, New Delhi 
011-25841390, 9868723959  
suresh_walia@yahoo.com  
sureshwalia@gmail.com 

(iv) Partners:  
● Dr YS Parmar University of Horticulture and Forestry, Solan (Himachal Pradesh)  
● Agri Food Park Ltd., Pune  
● Ozone Biotech Limited, Faridabad  
● Balaji Crop Care Pvt. Limited, Hyderabad 

(v) Website: www.iari.res.in/nutraceuticals 

(vi) Objectives:  
1. Protocol optimization for extraction and processing of food grade nutraceuticals and food colorants from vegetables, fruits, non-food crops and microalgae  
2. Isolation, chemical characterization, analysis and evaluation of active ingredients for anti-oxidant and other nutritional properties  
3. Development of analytical protocols for quantification of nutraceuticals in technical materials and finished products  
4. Development of innovative nutraceutical formulations with extended shelf life  
5. Scale-up, transfer and sharing of know-how with industry and other stakeholders 

(vii) Research Progress:  
● Vegetable crops (tomato, black carrot, red carrot, chilli) rose in IARI farms and in the farmers’ fields in different village clusters to get sufficient quantity of vegetables for extraction and processing.  
● Method has been standardized for efficient extraction of steviosides from Stevia, and natural concentrate from paprika.  
● Five strains of carrot (red, yellow and black) have been identified as promising cultivars with respect to total carotenoids, β-carotene and lycopene.  
● Process for the extraction of lycopene from tomato, and anthocyanins from jamun/pomegranate standardized.  
● Method has been standardized for the extraction of polyphenolics from outer-coverings of pomegranate fruits.  
● Composition of media for Spirulina culture, incubation time and salt concentration has been studied for mass production of Spirulina rich in phycobilin and carotenoids.  
● β-carotene, the major nutraceutical in carrot, and curcumin—the yellow pigment from Curcuma longa (turmeric) has been successfully incorporated in polymeric matrix to develop water soluble micro/nano particles.  
● Analytical protocols standardized for estimation of lycopene, carotenes, and anthocyanins in vegetables/fruits.  
● 30 genotypes of carrot (red, yellow, orange) evaluated for nutraceutical composition. Five promising lines rich in lycopene, carotene and lutein have been identified.
Viscozyme-assisted extraction resulted in increased black carrot juice yield with increased anthocyanin content.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IARI, New Delhi</td>
<td>548.26</td>
<td>398.64</td>
<td>200.54</td>
<td>50</td>
</tr>
<tr>
<td>YSPUF, Solan</td>
<td>53.06</td>
<td>25.15</td>
<td>23.62</td>
<td>94</td>
</tr>
<tr>
<td>Ozone, Faridabad</td>
<td>9.45</td>
<td>3.15</td>
<td>3.15</td>
<td>100</td>
</tr>
<tr>
<td>Agri Food Park, Pune</td>
<td>9.45</td>
<td>3.33</td>
<td>32.04</td>
<td>962</td>
</tr>
<tr>
<td>Balaji Crop Care, Hyderabad</td>
<td>9.45</td>
<td>3.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>629.70</strong></td>
<td><strong>433.42</strong></td>
<td><strong>259.35</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

45. Sub-project: A Value Chain on Selected Aromatic Plants of North East India

(i) Project Code: 20034
(ii) Sanctioned date: 13.02.2009
Completion date: 30.06.2012
Budget (₹ in lakh): 398.539
(iii) Consortia P.I. and Lead Institute: Dr. P.K. Srivastava
(Name, designation and full address) CAU, Imphal
0385-2415933, 09434711030
dean.caepht@gmail.com
prabhat410@rediffmail.com
(iv) Partners:
- NRC, Orchid
- ICAR Research Complex
- FFDC, Kannauj, Uttar Pradesh
(v) Website: www.iari.res.in/nutraceuticals
(vi) Objectives:
1. Protocol optimization for extraction and processing of food grade nutraceuticals and food colorants from vegetables, fruits, non-food crops and microalgae.
2. Isolation, chemical characterization, analysis and evaluation of active ingredients for anti-oxidant and other nutritional properties.
3. Development of analytical protocols for quantification of nutraceuticals in technical materials and finished products.
5. Scale-up, transfer and sharing of know-how with industry and other stakeholders
(vii) Research Progress:
- Bench mark survey of selected villages of Sikkim.
- Propagation technology for mass multiplication of Citronella, Patchouli, Lemon grass and scented orchids standardised.
Mass multiplications of 5,000 plants of scented orchids of five varieties have been propagated by tissue culture method and are at hardening stage.

Estimated oil content of Patchouli, Lemon grass and Citronella by Hydro distillation method.

Area under production extended to different sites, viz. 3 sites at farmer’s field at Assam Lingzey, Lower Sumin and Rey Mindu (East Sikkim); Demonstration plots at KVK farm (Saramsa) and KVK office (Marchak), East Sikkim; Demonstration plot at Lingdong village, Dzongu, North Sikkim.

**Innovations**

- Studies showed that spraying of NPK (19 : 19 : 19) @ 1 gm/litre of water for 20 plants improved vegetative growth of scented orchid.
- Growing of Aerides odoratum, on wooden log with moss improved growth of plants as compare to pot.
- Growing of Coelogyne flacidda, and Coelogyne nitida in pot with media comprised of leaf mould, brick bits, coco chips, coco peat (1 : 1 : 1 : ¼) improved overall growth.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAU, Imphal</td>
<td>160.52</td>
<td>105.88</td>
<td>86.50</td>
<td>82</td>
</tr>
<tr>
<td>NRC Orchid</td>
<td>92.9</td>
<td>49.56</td>
<td>34.97</td>
<td>71</td>
</tr>
<tr>
<td>ICAR Res. Comp</td>
<td>75.22</td>
<td>32.19</td>
<td>9.80</td>
<td>30</td>
</tr>
<tr>
<td>FFDC</td>
<td>70.41</td>
<td>36.51</td>
<td>36.79</td>
<td>101</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>398.54</strong></td>
<td><strong>224.14</strong></td>
<td><strong>168.05</strong></td>
<td><strong>75</strong></td>
</tr>
</tbody>
</table>

46. Sub-project: A Value Chain on Composite Dairy Foods with Enhanced Health Attributes

(i) Project Code : 20038
(ii) Sanctioned date : 01.03.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 283.076
(iii) Consortia P.I. and Lead Institute : Dr Ashish Kumar Singh
(Name, designation and full address) : NDRI, Karnal
0184-2252800, 09416292406
aksndri@gmail.com
(iv) Partners:
- Central Institute of Post-harvest Engineering and Technology (CIPHET), Ludhiana
- ARPANA Research and Charities, Madhuban, Karnal
- M/S New Millennium Foods Pvt. Ltd., Noida
(v) Website: www.compositedairy.net
(vi) Objectives:
1. To harness the nutritional and therapeutic potential of milk by-products (whey and skim milk) and underutilized plant species (pearl millet & barley) for development of functional foods.
2. To develop technological package for composite dairy foods (complementary foods, fortified convenience foods and probiotic milk-cereal foods) with enhanced health attributes.
3. To validate the consumer acceptability and targeted health benefits composite dairy foods.
4. To assess the techno-economic feasibility of the newly developed technologies through linkages with industry, marketing personnel and Self-help groups.
(vii) Research Progress:
● Pearl millet was dehulled at different moisture content (10, 15 and 20%) for its process optimization and for this cleaned raw material was conditioned for different moisture content (10, 15 and 20%).
● Dehulling efficiency was lowered with the increased speed of the main shaft of the dehuller yielding higher broken per cent.
● Maximum dehulling efficiency (77.05%) was observed at speed of 570 rpm of rotor and for moisture content 15% (wb).
● Developed low cost complementary food using milk by-products (whey and skim milk) and malted grains or flours of pearl millet and barley as per specified standards of PFA.

Innovations/Success Stories
● Whey-milk + cereal based complementary food developed and standardized as high protein complementary diet.
● The primary processing technologies for pearlmillet and barley were standardized.
● Developed low cost complementary food using milk by-products (whey and skim milk) and malted grains or flours of pearl millet and barley as per specified standards of PFA was done.
(viii) The status of the utilization of the budget under this sub-project up to March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDRI, Karnal</td>
<td>206.97</td>
<td>106.47</td>
<td>70.95</td>
<td>67</td>
</tr>
<tr>
<td>CIPHET, Ludhiana</td>
<td>64.77</td>
<td>40.31</td>
<td>32.30</td>
<td>80</td>
</tr>
<tr>
<td>ARPANA, Karnal</td>
<td>5.15</td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NM Foods, Noida</td>
<td>6.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>173.346</strong></td>
<td><strong>146.78</strong></td>
<td><strong>103.71</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>
47. Sub-project: A Value chain on wild honey bee

(i) Project Code : 20039
(ii) Sanctioned date : 18.02.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 351.9525
(iii) Consortia P.I. and Lead Institute : Dr N.S. Bhat
(Name, designation and full address) UAS, Bangalore
080-23332442, 09480423686
nshankarbhat@gmail.com
(iv) Partners:
- University of Agricultural Science, Bangalore
- National Chemical Laboratories, Pune
- Tamil Nadu Agricultural University, Coimbatore
- Vivekananda Sevakendra-o-Sishu Uddyan, Ullon
(v) Website: (URL): wild honey bee
(vi) Objectives:
1. Extraction, isolation, testing and identification of bio-active compounds from selected plant species with calming ability of wild honey bee species.
2. Training of tribals in different states on sustainable harvest methodology of wild bee honey using available and newer technique.
3. Processing, testing, grading, packing of wild bee honey obtained at tribal areas and its evaluation and organic certification
4. Utilizing honey in making of value-added bakery, dairy and fruit products.
(vii) Research Progress:
- Developed 22 money based bakery products and 12 fruits products.
- Imparted training on sustainable honey harvest to tribals of the project area.
- Training on value-added fruit products with honey was imparted to tribal women.
- Five plants that are used by honey hunters have been identified and are under multiplication for further evaluation and distribution.
- Sixteen volatiles in Ammomom spp were recorded.
(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAS, Bangalore</td>
<td>179.74</td>
<td>86.81</td>
<td>72.21</td>
<td>83</td>
</tr>
<tr>
<td>TNAU, Coimbatore</td>
<td>74.57</td>
<td>42.09</td>
<td>36.09</td>
<td>86</td>
</tr>
<tr>
<td>VSSU-WB, Ullon</td>
<td>28.41</td>
<td>19.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCL, Pune</td>
<td>69.23</td>
<td>50.59</td>
<td>33.33</td>
<td>66</td>
</tr>
<tr>
<td>Total</td>
<td>351.95</td>
<td>199.08</td>
<td>141.63</td>
<td>71</td>
</tr>
</tbody>
</table>
48. **Sub-project: A Value Chain on Castor and Its Industrial Products**

(i) **Project Code**: 20042  
(ii) **Sanctioned date**: 01.03.2009  
**Completion date**: 30.06.2012  
**Budget (₹ in lakh)**: 387.0685  
(iii) **Consortia P.I. and Lead Institute**: Dr S.S. Solanki  
**Name, designation and full address**: SDAU, Sardarkrushinagar 09726674151 solanki.ss@hotmail.com  
(iv) **Partners**:  
- Jayant Agro-Organics Ltd., Mumbai/Vadodara  
- Royal Castor Products Ltd., Sidhpur  
(v) **Website**: www.sdau.edu.in  
(vi) **Objectives**:  
1. **Production**: To increase farmer’s income and castor productivity through popularization of latest high yielding castor hybrid and its agronomic practices and innovative farming.  
2. **Processing**: To develop post harvest handling and processing technology to improve quality of produce and reduces losses.  
3. **By-product value-addition**: To develop products from castor cake (by products of castor oil extraction) for higher benefit of castor oil extraction units and farmers.  
4. **Specific to value chain**: To develop higher generation castor oil based derivatives for promotion of export and benefit of all stakeholders.  
(vii) **Research Progress**:  
- Synthesis of Ester based on 2-octanol, viz. DCP which can be used in place of DOP having similar properties.  
- Modification in esterification operation in order to reduce the batch time by two folds.  
- Synthesis of ester using acid catalysts develops the impurities during the esterification reaction, viz isomers of ethers. These ethers can be used in different applications.  
- Application of higher dose of orgono-metallic catalyst than the dose recommended by catalyst manufacturer enhances the rate of reaction.  
- To attain the reaction temperature in short period for the synthesis of ester was optimized by reducing the mole ratio of reactants.  
(viii) **The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:**

### Statement Budgetary Position as on 31 March 2010

(₹ in lakh)  

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDAU, Sardarkrushinagar</td>
<td>261.58</td>
<td>144.12</td>
<td>33.84</td>
<td>23</td>
</tr>
<tr>
<td>Jayant Agro Organics Ltd</td>
<td>39.21</td>
<td>6.49</td>
<td>4.12</td>
<td>64</td>
</tr>
<tr>
<td>Royal castor product, Sidhpur</td>
<td>24.58</td>
<td>4.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IICT, Hyderabad</td>
<td>61.71</td>
<td>35.22</td>
<td>24.74</td>
<td>70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>387.07</strong></td>
<td><strong>189.86</strong></td>
<td><strong>62.71</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>
49. **Sub-project: A Value Chain on Aloe Vera Processing**

(i) **Project Code:** 20044  
(ii) **Sanctioned date:** 15.04.2009  
**Completion date:** 30.06.2012  
**Budget (₹ in lakh):** 385.657  
(iii) **Consortia P.I. and Lead Institute:** Dr P.P. Srivastav  
**(Name, designation and full address):** IIT, Kharagpur  
03222-282037, 09434043426  
ppsrivastav@gmail.com  
(iv) **Partners:**  
- 1. UAS, Raichur  
- 2. M/s SWARD, Raichur  
- 3. M/s MCWA, Midnapore  
(v) **Website:** http://sites.google.com/site/aloeveravaluechain  
(vi) **Objectives:**  
1. Characterization and selection of suitable genotype(s) for processing.  
2. Development of mechanized systems for gel extraction.  
4. Development of pilot scale processing facility and economic analysis.  
5. Capacity building and skill development to the stake holders for improvement of value chain.  
(vii) **Research Progress:**  
- Single channel filleting machine was developed using would steel.  
- Developed aloe based fruits juices incorporating amla and pineapple and jam with pineapple.  
- Spray drying of aloe gel optimized.  
- Conceptualized Aloe vera leaf filleting machine.  
(viii) **The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:**

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Fund Utilized up to March 2010 (₹ in lakh)</th>
<th>Fund Utilized up to March 2010 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fund Released up to March 2010 (₹ in lakh)</td>
<td></td>
</tr>
<tr>
<td>IIT, Kharagpur</td>
<td>287.86</td>
<td>138.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>UAS, Raichur</td>
<td>79.95</td>
<td>38.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>M/s MCWA, Midnapore</td>
<td>8.93</td>
<td>2.36</td>
</tr>
<tr>
<td>M/s SWARD, Raichur</td>
<td>8.93</td>
<td>1.18</td>
</tr>
<tr>
<td>Total</td>
<td>385.66</td>
<td>180.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>87.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td>49</td>
</tr>
</tbody>
</table>
50. Sub-project: A Value Chain on Enhanced Productivity and Profitability of Pomegranate

(i) Project Code : 20045
(ii) Sanctioned date : 08.04.2009
Completion date : 30.06.2012
Budget (₹ in lakh) : 423.36
(iii) Consortia P.I. and Lead Institute : Dr T. V. Reddy
(Name, designation and full address) AFPL, Bangalore
22107400, 09902067830
drtvreddy@yahoo.com
(iv) Partners:
   University of Agricultural Sciences (UAS), Bangalore
   Institution of Agricultural Technologists (IAT), Chitradurga
(v) Website: www.pomegranatethesuperfruit.com
(vi) Objectives:
1. To enhance productivity and quality of pomegranate varieties namely Ganesh and Bhagwa through adoption of GAP, control of bacterial blight disease, blackening of arils and fruit cracking (Production).
2. Develop suitable technology and protocols for post harvest management of pomegranate fruit to maintain the quality, extend shelf life and reduce overall post harvest losses (Post-harvest).
3. Explore and demonstrate appropriate methods and technologies for processing and value-addition for complete utilization of pomegranate fruit including by-products namely fruit juice, seed oil, colour and flavour extraction (Processing and by-product utilization).
4. Conduct market research, analyse and create database for market intelligence on to enable better returns to stakeholders across the supply chain and facilitate advance marketing (Marketing).
5. Dissemination and demonstration of results of the project across the value chain., promotion of commercial projects and development of Hiriyur as the “Hub for pomegranate value-addition” (Dissemination and scale-up).
(vii) Research Progress:
   Assessed existing PHM practices followed and recommended in India as well as abroad by various institutions and farming organizations.
   Adopted cost effective PHM practices for pomegranate to reduce overall post harvest losses and improve the shelf life of pomegranate.
   Modified existing cold store for CA storage.
   Developed process technology for flavoured anardhana.
   Conduct market research on supply and demand (domestic and exports), price trends, demand trends, export quality requirement, etc.
   Deviced a mechanism to identify best markets and seasons for supply.
● Ensured advance marketing arrangement by establishing market links with processors, distributors and exporters.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead Centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized up to March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFPL, Bangalore</td>
<td>114.66</td>
<td>10.21</td>
<td>16.68</td>
<td>163</td>
</tr>
<tr>
<td>UAS, Bangalore</td>
<td>296.65</td>
<td>152.06</td>
<td>49.07</td>
<td>32</td>
</tr>
<tr>
<td>IAT, Chitradurga</td>
<td>12.04</td>
<td>3.62</td>
<td>3.48</td>
<td>96</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>423.36</strong></td>
<td><strong>165.89</strong></td>
<td><strong>69.23</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

51. **Sub-project:** A Novel food chain using By-products of milling Industry for Enhancing Nutritional security

(i) **Project Code:** 20048
(ii) **Sanctioned date:** 24.02.2009
(iii) **Completion date:** 30.06.2012
(iv) **Budget (₹ in lakh):** 267.973
(v) **Consortia P.I. and Lead Institute:**
   - Dr R. Jaganmohan
   - IICPT, Thanjavur
   - 04362-226676, 09750968402
   - jaganjaya@yahoo.com

(vi) **Partners:**
   - Tamil Nadu Agricultural University, Tiruchirapalli
   - Avinashilingam Deemed University, Coimbatore

(vii) **Website:** www.iicpt-naip.org

(viii) **Objectives:**

1. **Production:** To improve the marketability and market value of rice and pulse milling by-products by identifying suitable technologies for safe handling, classification and by establishing their the functional and phytochemical qualities for further processing.

2. **Processing and Value-addition:** To develop products with two layers of product portfolios, one for the resource poor community for nutrition uptake and the other for the affordable consumer to gain access to balanced food, and to identify technologies and equipments for making, handling and packaging of these products.

3. **Specific to Value Chain:** To determine the performance of the developed products by nutrition intervention studies with the target group for certification and popularization.

4. **Market:** To create linkages with public, business and user groups for commercializing the products in the market through training, incubation, systematic licensing to promising entrepreneurs, promoting in government noon meal scheme programs and voluntary organizations.
(vii) Research Progress:

- Identified indigenous methodologies followed for the preparation of *idli* and *dosa* and bio chemical analysis for starch, fat, fibre and amylose content of rice varieties.
- Standardized a method to identify the compounds with medicinal value present in the coconut toddy samples using GC-MS.
- Selected tribe of four North Eastern States was surveyed to collect traditional processing method of Rice beer Production to find out the regional differences and to screen out the best methods and origin of ingredients, raw materials and starter for production of rice beer were documented and samples collected.

(viii) The status of the utilization of the budget under this sub-project upto March, 2010 is presented below:

<table>
<thead>
<tr>
<th>Lead centre/Partners</th>
<th>Total Sanctioned Budget</th>
<th>Fund Released up to March 2010</th>
<th>Fund Utilized upto March 2010</th>
<th>Fund Utilized to Released (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IICPT, Thanjavur</td>
<td>195.00</td>
<td>109.83</td>
<td>57.60</td>
<td>52</td>
</tr>
<tr>
<td>APU, Coimbatore</td>
<td>24.79</td>
<td>8.53</td>
<td>2.11</td>
<td>25</td>
</tr>
<tr>
<td>TNAU, Tiruchirapalli</td>
<td>42.72</td>
<td>11.34</td>
<td>5.78</td>
<td>51</td>
</tr>
<tr>
<td>SAGA</td>
<td>5.46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>267.97</strong></td>
<td><strong>129.71</strong></td>
<td><strong>65.49</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>
After slow start of the sub-projects particularly by private partners/NGOs, as they were not familiar with the ICAR/ World Bank guidelines. It has now picked up and all the sub-projects under this component have been grounded well. Ten sub-projects have been working very well and about 30 sub-projects are working equally well. Remaining 11 sub-projects, mostly from Call-3 except one or two from Call-1 and Call-2 needs to be expedited and PIU-NAIP in association with M&E consultant will be monitoring closely to accelerate their progress. The important learning from the implementation of first phase is that private partners which constitute 26% of total participating partners, now understand the importance of public sector R&D organizations and upscaling technologies generated for commercial application. At the same time R&D institutes do understand the requirements of private sector. This arrangement has been working very well and that’s how technologies which were lying on the shelf are now being commercialized.

This is the first time ICAR has provided budgetary allocation to private partner for their recurring expenditure and also provided non-recurring fund to their public sector partner for procurement of equipment and civil work to them. This equation has shown positive impact on the performance of sub-projects.

With regard to observations of World Bank during MTR-I for non-covering of sub-projects on cereals, pulses, poultry and vegetable oils, it is to mention that some of the sectors have been covered in Call-2 and Call-3 sub-projects and few sectors could not be addressed as good proposals were not received because in this component all sub-projects were approved under competitive mode.

As far as technical output is concerned, sub-projects from Call-1 and Call-2 have started yielding results and these are upscaled at pilot level through private industrial sector and providing income and employment opportunities to poor people working in respective clusters. Having learned from the implementation of phase 1, monitoring of weak consortia will be the priority and suitable action would be initiated if they do not perform as per expectations.