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FARMER-PROOFING AGRICULTURAL RESEARCH
Current trends in India

AN INTRODUCTION

South Asia has an agricultural history spanning several millennia. Every region of the sub continent has gifted the civilization with its own inspiring models of agriculture. The Kandian Home Gardens of Sri Lanka have been an iconic example of what the shape of ecological agriculture can be. In the same league are the breathtaking terrace farming in the Himalayan region of Nepal, the rice and fish farming of Bangladesh and the multiple cropping systems of the dryland belt of peninsular India. All these systems had proved that the smaller the scale the higher the productivity. This ran totally counter to the post green revolution theory propounded by the corporate science that small farms are unviable.

All these farming systems were based on three critical principles: vibrant biodiversity, ecological practices and soil health. When the reductionist thinking of the Green Revolution technology and the modern institutional science marginalised this complex, multidimensional traditional agricultural science, the birth of soil degradation began. And its relentless march has compounded the problem ever since, turning agriculture from a fountain of hope to a face of despair.

One major principle that bound all these systems together was the role of traditional knowledge in their design and operation. Such a foundation of local knowledge made this form of agriculture amazingly alive and life affirming. It ensured that its shape and contours are determined by the farmers themselves by placing the control in their hands. The Green Revolution changed all this. It not only snatched the control away from farmers and placed it in the market place but also brought a science that was impervious to its ecological consequences. Thus for the first time in the South Asian farming history it gave birth to the phenomenon of loss of soil fertility and nutrients which has become now the singlemost menace to farming in the region.

Analysts term the Green Revolution as just a Grain Revolution that led to the poverty of the soil and the people. Punjab in India which is the epitome of the success of Green Revolution has turned into a toxic land with "severe micronutrient deficiency in soil". The truth hidden from the people is that at the height of Green Revolution, Punjab recorded a four fold increase in the suicide rate of farmers within ten years. Punjab was a victim of the agricultural agenda set by the institutional science and the state policies blindly guided by this science. What began in Punjab has spread to the entire country. Aiding and abetting this situation is the agricultural research which has decisively moved away from farmers and has become imprisoned in the formal scientific laboratories.

The era of globalization since the early 1990s has changed the scenario even further. It has allowed for a systematic engagement of the corporates in agricultural research. Many universities are being directly funded by international and Indian corporations to carry out research. Government of India institutions like ICAR or DARE have also got into bilateral and

multi-lateral agreements with governments, universities and private research institutions in countries like the United States of America, France, Argentina, China, Brazil, United Kingdom and so on. In some instances collaborations are directly undertaken with specific private corporations for various agricultural research related projects. India's agreement with the United States under the Knowledge Initiative in Agriculture, unmistakably advances the private sector involvement in technical assistance and funding related to agricultural research in India. Companies like Wal Mart and Monsanto were put on the Board governing the priority areas under this agreement.

Such a situation across the globe, has given rise to a huge alarm that agriculture might eventually be snatched away completely from farmers by the corporate science and colluding policy makers. The recent international initiative that amplified this growing discomfort was the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), which is a global assessment of agricultural practices in five regions. However there is a sizeable opinion that this World Bank and FAO envisaged effort has traveled half way and has not included farmers directly into this dialogue on agricultural research.

Today, there is an increased emphasis on the need for a Farmer First approach to agricultural research is building up steadily to counter this newly constructed distorted reality.

It is this context that has given birth to the IIED initiative on Democratising Agricultural Research. The South Asian part of the initiative being led by the Deccan Development Society, India decided to undertake a pilot study on the current trend of agricultural research in some of the leading agricultural academia of the country. This little booklet ***Farmer-proofing Agricultural Research in India: a look at current trends*** *is a fact sheet on the issues that the agricultural academia are embracing and the clear corporate control embossed on these trends.*

As this Fact Sheet brings out, the focus of research decisively shifting on to biotechnology (Genetically Engineered Seeds or Livestock), biofuels or changing farming into Pharming. There is a huge gamut of information tucked away in the closets of agribusiness, and designs of private interest waiting to unfold. Many universities are being directly funded for research by international and Indian corporations. Government of India institutions such as ICAR or DARE have also got into the act with with their own bilateral and multi-lateral agreements with governments, universities and private research institutions in countries like United States of America, France, United Kingdom and so on. In some instances collaborations are directly undertaken with specific private corporations. India's knowledge agreement with the United States emphatically advances the private sector role in technical assistance and funding for agricultural research. Companies such as Wal Mart and Monsanto are today on the Board governing the priority areas under this agreement.

It is a critical task to democratize research and recover it from corporate agendas it has been snowed under.

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INDO US KNOWLEDGE INITIATIVE IN AGRICULTURE

"Recalling the active participation of the United States Land Grant Universities in helping lay the foundation of an agricultural education and research system in India which dramatically improved productivity, including key food grain crops, India and the United States mutually resolve to initiate a new agricultural partnership that reflects their current relationship. These parties believe that this tradition of collaboration in knowledge exchange helped launch India's Green Revolution, strengthen food security, and also enriched American campuses with international insights and networks"

[*Source:* Joint Declaration on India-United States Knowledge Initiative on Agricultural Education, Research, Service and Commercial Linkages, 12th November 2005].

India-America Private Agreement:

India-United States Knowledge Initiative on Agricultural Education, Research, Service and Commercial Linkages

The signing of the Knowledge Initiative on Agriculture (KIA) agreement brought in a new era where the collaboration between India and the USA— research which was sanctioned in ink by the two governments. The details of this text unfold the priorities of what the Indian government wants to promote for the country's agricultural sector and how they perceive farming today.

The agreement clearly establishes:

"…A key feature of this initiative will be public-private partnership where the private sector can help identify research areas that have the potential for rapid commercialization with a view to develop new and commercially viable technologies for agricultural advancement in both countries"

The nexus could not have been made more explicit.

Who is taking Decisions?

Since the signing of the agreement there have been six meetings of the **Knowledge Initiative Board (KIB)***, set up to guide the process from the very outset. The KIB was to consist of two co-chairs, and seven individuals selected by the United States Department of Agriculture (USDA) which includes representatives from the government, agricultural universities and the private sector.*

As it stands today, the KIB comprises of six members from the Indian side. Apart from three Government of India representatives, the Board has Vice Chancellors of the GB Pant University of Agriculture and Tamil Nadu Agriculture University. The private sector is represented by Masani Farms and ITC Ltd. In the **April 2008** *meeting of the KIB, it was informed that the* **Indian side of the Board was reconstituted to include representatives of CII and FICCI***.*

From the US side the KIB has an Administrator of the USDA as a co-chair with the Secretary DARE, ICAR, India. Alongside are senior representatives of the National Association of State Universities and Land Grant Colleges (NASULGC), Ohio State University, and Tennessee State University. The big agri-business giants on the Board include Monsanto, Wal-Mart and Archer Daniels Midland Company. **Monsanto and Wal-Mart were brought on to the board in February 2006.**

> *"India and United States agree that biotechnological tools can make an important contribution to the sustenance of the "Evergreen Revolution". We share a common goal of translating the results of research in the lab into beneficial products that could be delivered to farmers…"*
> Work Plan of India-US Knowledge Initiative on Agriculture

Key Decisions Taken

With the KIB being heavy on private sector associations or large biotechnology giants, it is not a surprise then as to what kinds of decisions have been taken, programmes proposed, developed and implemented. From the information available on the last three meetings of the Board i.e. from November 2006 to April 2008, it is evident the KIB has led the KIA into achieving what it set out to do. The activities are clearly directed towards biotechnology or commercial agriculture thrust, be it in Human Resource Development, Training, and Fellowships etc. A few programmes related to cellulosic research in Biofuels have also been developed.

As a latest development, the USAID has solicited a call for concept papers under their Partnership for Innovation in Knowledge in Agriculture (PIKA) program. The proposal requests are towards supporting the four thematic areas under the KIA which include Human Resource Development; Agro Processing and Marketing, Biotechnology and Water Management. It is proposed to grant five awards before September 2008. These focus areas were agreed upon in the first meeting of the KIB in Washington D.C. in December 2005. Several proposals were deliberated and discussed at length during the second meeting, after which a Work Plan was prepared.

Presented in the table below are key decisions and programmes drawn from three meetings of the KIB.

Focus Areas: Key Developments/Decisions[1]

Board Meeting	Human Resources	Food (Agro)Processing and Marketing	Biotechnology	Water Resources Management
6th Meeting (April 2008)	- *15* **Borlaug fellows, including 3 in biotechnology.**[1] - *Two* **internships by Bharti-Wal-Mart** *to NIAM students.* - *Additional* **public-private internships mandated to be explored***for students and faculty of ICAR universities. Modalities to be presented by May 2008* - *Project on IPM of insect-borne viral diseases in Indian Vegetable Production to be finalized* [1] *The Borlaug fellowship has been constituted in the honor of Norman Borlaug, hailed as the father of the green revolution*	- **Cochran Fellowship** *to continue for 17 fellows with the primary focus on* **agro processing and marketing** - *Two* **joint projects on Extrusion Technology and Biofuels from lingo-cellulosic** *agricultural residues for second half of 2008* - *Online Resource Book on Contract farming to be finalized by May 2008* - *Planning for* **workshop in Agribusiness:** *Linking Farmers to Markets. US side to* **share revised draft proposal with USIBC, CII, FICCI, USAID, ICAR** *etc for comments.*	- *Project on* **Pigeonpea Genomics Initiative** *to continue* - *Follow up to Harnessing Biotechnology workshop in March 2008, follow up on projects related to* **abiotic stress (drought, salinity, high temperature); virus resistance in important horticulture crops (potato, papaya, banana, tomato); Diagnostics and vaccines for animal diseases; Functional genomics in Casava; mapping to link markers with genes for nutrient use efficiency in wheat and rice** - *Partnership opportunities to work on rust disease resistance in wheat and introducing C4 photosynthetic pathway in rice*	

Note:

[1]This table does not highlight all the deliverables identified by the KIB, but some critical and specific ones

[2] The information has been sourced from data available on all the KIB meetings on the ICAR website

Board Meeting	Human Resources	Food (Agro)Processing and Marketing	Biotechnology	Water Resources Management
5th Meeting (June 2007)	- *12 Borlaug fellows traveled to the USA. In addition* **5 Borlaug fellows on biotechnology** *to travel to the USA for 6 weeks.* - *A project on knowledge and operational* **linking of National Agricultural Library, USA with (National) IARI Library,** *New Delhi* - *Workshop on SPS Capacity Building and Science based Risk Analysis (August 2007)* - *International conference on* **Avian Viral Diseases and Animal Biotechnological Applications** *at Madras Veterinary College, Chennai (August 2007)* - *Distance learning from Iowa State University at UAS, Bangalore; PAU, Ludhiana and GBPAUT*	- *India-US SPS Seminar in at Washington took place* - **Corchan Fellowship** *Program to continue for 12 fellows with focus on* **agro processing and marketing** - *Two* **joint research projects** *on processing and value added products including formulated and fabricated foods etc and* **Biofuels**, *by products/waste management, residue recycling* - *Online contract farming "Resource Book"*	- **Collaborative research projects on drought tolerance in rice and wheat; salt tolerance in rice; thermo tolerance in wheat; virus resistant papaya, potato and banana; and diagnostic and vaccines for important diseases in livestock and fish** - *Scientist to Scientist workshop on harvesting benefits of biotechnology* - **Biotech Research partnership** *between a US biotech company and Indian private or public sector to develop new rice varieties with traits of drought and salt tolerance* - **Gold rice varieties being backcrossed** *into local rice varieties and proposed to he field tested* - *Additional funding to support* **field trials and market release of Bt resistant eggplant***in collaboration with Indian public and private sector partners* - **Field trials and safety for late blight resistant potato** *varieties to continue* - *Development of Viral Chip diagnostics project*	- *University of Florida and Washington State University working with Indian counterparts to conduct survey on gender and social issues in watershed management.* - *Project on remediation including bioremediation of heavy metal/arsenic etc in soil and water to be jointly developed*

Banking on Private Innovation:
World Bank-GoI National Agricultural Innovation Project

A 2006 Project Appraisal Document of the National Agricultural Innovation Project (NAIP) of the ICAR lays down the objective of the project, "to contribute to the sustainable transformation o f the Indian agricultural sector from primarily a food self-sufficiency to more o f a market orientation in support o f poverty alleviation and income generation. The specific objective is to accelerate the collaborative development and application o f agricultural innovations between public research organizations, farmers, private sector and other stakeholders.". The implementing agency of the same is the Department of Agricultural Research (DARE), ICAR, and it is funded through the International Bank for Reconstruction and Development of the World Bank.

Two thrusts are clear. First, market as an instrument for poverty alleviation and acceptance of the link between private sector and public research organizations. The project draws its mandate from the National Agriculture Policy and the World Bank's Country Assistance Strategy (CAS), 2004 and presents itself as a logical next step of the National Agricultural Technology Project (NATP). The Bank's CAS, 2004 states clearly its intenstion of "strengthening the agricultural research and extension system, with efforts to promote demand-driven, decentralized public agricultural research and extension systems, greater public-private partnerships, and closer linkages with various domestic and international sources o f technologies and knowledge."

Components 2, 3 and 4 of the NAIP are related to the creation of **Research consortia** *to support agricultural transformation in India. The total allocation for this is US$ 214 million, with US$ 56 million being earmarked for research on basic and strategic research in the frontier areas of agricultural science. The appraisal document also talks about dovetailing the above three components with the Indo-US Knowledge Initiative on Agriculture.*

The Research and Development priorities of the project include: Agricultural Diversification, *to make Indian agriculture profitable, sustainable and competitive;* **Livestock and Fisheries Production** *focusing on genetic upgradation, nutrition, management, disease surveillance and control, production of feeds, diagnostic kits and vaccines, post-harvest handling etc;* **Genetic Resources and Bio-prospecting** *towards improvements in germplasm including that of fish and microbes and nutritional value of staple foods;* **Natural Resource Management** *around soil health, global warming and organic agriculture;* **Integrated Pest Management; Value-addition and Post-harvest Processing;** *Research on policy analysis and* **market Intelligence** *to develop models of forecasts, integration with world markets, supported by "appropriate policies" [Source: http://www.naip.icar.org.in/research&develop.htm].*

1. THE VALUE CHAIN FUNDA: SANCTIONED NAIP PROJECTS IN COMPONENT 2 (Research on Production to Consumption Systems)

It is interesting to note that most of these projects are being implemented using what is known as the value chain approach. This entrepreneurship model of the USAID isused "to create wealth in poor communities and to promote equitable economic growth.".

Seventeen projects are listed under this component as per the NAIP website. Several of these projects involve private companies as part of the research consortium; some of which are distilleries investing in **ethanol production** *like RUSNI Pvt Ltd or Merino Industries which has*

agro-biotechnology *as part of its social commitment mandate. There are also consortium partnerships in research with Jaya Foods or Chandan Foods for value addition and marketing of millets as* **neutracueticals.***(check spelling of this word) There are also instances where a veterinary pharmaceutical company is part of the development technology and vaccine for carp and prawn production.* **Value addition and marketing** *is central to each one of the projects.*

Presented below are highlights of these projects with a clear private sector involvement towards biotechnology, biofuels or technological and market enhancement of products. In three instances NGOs are part of the process including those related to tree genetics.

S.No.	Consortium Involved	Research Area	Funds (in Rs.)	Thematic Area
1.	Central Institute of Fisheries Technology (CIFT), Kochi with Karnataka Fisheries Development Corporation and local panchayats	Harvesting and Utilisation of Selected Marine SmallPelagics and Freshwater Fishes	971.10 lakhs	Improving fishing craft and technology
2.	Central Institute for Research on CottonTechnology (CIRCOT), Mumbai with CICR, Nagpur and M/s Super Spinning Mill, Coimbatore	Value Chain for Cotton Fibre, Seed and Stalks	903.11 lakhs	Economic benefits through Promotion of good quality cotton genotypes and modern milling
3.	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) with public research institutes like CRIDA and distilleries like RUSNI Pvt Ltd	Bio-ethanol production from sweetsorghum in rainfed areas	913.32 lakhs	Biofuel/ Ethanol production
4.	National Research Centre for Sorghum(NRCS), Hyderabad, with Agricultural Universities in Andhra and private companies like M/s ITC Ltd.,	Creation for Demand for Millet Foods through PCS Value-chain	580.00 lakhs	Improving nutritional and economic value of millets with use of technology
5.	Central Marine Fisheries Research Institute (CMFRI), Kochi	Oceanic Tuna Fisheries In Lakshadweep Sea: A Value Chain Approach	638.54 lakhs	Increase Production and technological improvements/ transfers
6.	Central Plantation Crops Research Institute(CPCRI), Kasaragod	Value chain in Coconut,	444.68 lakhs	Technology development and market facilitation
7.	Central Potato Research Institute (CPRI), Shimla, with Central Institute of Post HarvestEngineering and Technology (CPHET), TERI, New Delhi; M/s. Merino Industries Ltd., Hapur, M/s. United Phosphorus Ltd., Mumbai	Value chain in potato and potato products	583.572 lakhs	Alternate seed propagation and development of technology

S.No.	Consortium Involved	Research Area	Funds (in Rs.)	Thematic Area
8.	National Research Centre for Meat (NRCM),Hyderabad, with Sri Venkateshwara Veterinary University (SVVU), Tirupathi and WASSAN, an NGO	Value Chain for Clean Meat Production from Sheep	584.77 lakhs	Increased meat production and packaging for marketing
9.	Sardarkrushinagar Dantiwada AgriculturalUniversity, Sardarkrushinagar with National Research Centre on Seed Spices, Ajmer; Central Institute of Agricultural Engineering,Bhopal; VIKSAT, Ahmedabad; Krishak Vikas Sansthan Ajmer	Value Chain in Major Seed Spices for Domestic and ExportPromotion	530.16 lakhs	Enhancement of productivity, profitability and quality; technology transfer; market linkage
10.	Central Institute of Agricultural Engineering(CIAE), Bhopal; Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu; SPRERI, Vallabh Vidhya Nagar, Gujarat	Value Chain On Biomass Based Decentralized Power GenerationFor Agro Enterprises	599.069 lakhs	Mechanisation of agro-residue management practices; development of technology for value addition
11.	Navsari Agricultural University, Navsari; with Central Institute for Research on Cotton Technology (CIRCOT); Man Made Textile Research Association (MANTRA), Surat, Gujarat; J.K. Paper Ltd., Songadh, Gujarat	Value Chain on Utilization of Banana Pseudostem for Fibre	581.56 lakhs	Use of nanotechnology to improve garment quality and marketing of pseudostem based products
12.	CSK Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV), Palampur with Field Research Laboratory, Leh; AIIMS; L&S SeabuckthornCooperative Society and MUSE, NGO	Value Chain on Seabuckthorn	411.42 lakhs	Seabuckthorn value addition and branding, develop export potential; fine tuning technology
13.	Acharya N.G. Ranga Agricultural University (ANGRAU), Hyderabad with ShyamalHandlooms and Department of Tribal Welfare,Govt. of A.P	Value Chain in Natural Dye	345.95 lakhs	Develop natural dyes for the global, international market
14.	University of Agricultural Sciences (UAS), Dharwad with KLE's Medical Research Centre, Belgaum; BAIF, Jaya Food Products, Bangalore; Chandan Food Products, Gadag	Enrichment and Popularization of Potential Food Grains for Neutraceutical Benefits through PCS Chain	385.98 lakhs	Remunerative market for foxtail and little millet

S.No.	Consortium Involved	Research Area	Funds (in Rs.)	Thematic Area
15.	*Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU), Mangalore with Central Institute of Freshwater Aquaculture; College of Fishery Science, Nellore; Karnataka Cooperative Fisheries Federation; M/s Tetragon Chemie Pvt.Ltd.; M/s Millennium Exports etc*	*Value Chain on Production and Utilization of Indian MajorCarps and Prawn from Aquaculture System*	*321.34 lakhs*	*Artificial feed to boost production; Use of Biofilm vaccine; technology development*
16.	*Central Institute of Fisheries Education (CIFE), Mumbai with College of Fisheries,Shirgaon, Ratnagiri; Vatsalya Mandir (NGO),*	*Value Chain on Fish Production in Fragile Agricultural Landsand Unutilized Aquatic Resources in Maharashtra*	*385.104 lakhs*	*Increased productivity of saline affected soils through aquaculture; and increase in fish production*
17.	*Tamil Nadu Agricultural University (TNAU), Coimbatore with Institute of Forest Genetics and Tree Breeding (IFGTB); M/s. Tamil Nadu Newsprint and Paper Limited (TNPL); M/s. Seshasayee Paper and Boards Ltd. (SPB) etc*	*Value Chain on Industrial Agroforestry in Tamil Nadu*	*307.905 lakhs*	*Contract Tree Farming; Alternate genetic resources for pulp and match wood.*

The NAIP project is intended to go up to June 2012.

The ICAR has recently issued a **Third Call** *for research proposals and concept notes for the NAIP through it website. This is primarily for two components, i.e.* **C***omponent 2: Research on Production to Consumption Systems (PCS) and Component 4: Basic and Strategic Research in the Frontier Areas of Agricultural Sciences (BSR). Under the Component-4, the call states,* **"higher priorities will be given to the Concept Notes submitted under the thrust areas of Genetic Enhancement (GE) of fishes, Natural Resources Management (NRM) of plants, animals and fishes and Post Harvest Technologies & Value Addition (PHT & VA) of plants, animal and fishes."**

The last date for submissions for this was **30th May, 2008.**

2. THE NEW AGE AGRICULTURE: SANCTIONED PROJECTS IN COMPONENT 4 (Basic and Strategic Research in Frontier Areas of Agricultural Science)

This component of the NAIP is evidently and explicitly directed towards molecular based, DNA related research with the involvement of premier agricultural universities, Indian Institutes of Technology (IIT)s and the private sector as part of the consortiums. Biotechnology and genetic applications are central to the frontier agricultural research in the arenas of both seeds and aromatic/medicinal plants.

S.No.	Consortium Involved	Research Area	Funds (in Rs.)	Thematic Area
1.	Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur with D.N. Guharmazumdar Research Foundation (DNGMRF), Kolkatta; WB Agricultural University; Indian Veternirary Research Institute, Kolkatta	Study of genetics of arsenic in rice and food chain: cause, effect, mitigation in West Bengal	623.788 lakhs	Developing rice genotypes with low arsenic uptake; mitigation of arsenic pollution
2.	NRC on Plant Biotechnology, IARI, with National Bureau of Plant Genetic Resources, New Delhi; Institute of Himalayan Bioresources and Technology, Palampur, Himachal Pradesh and National Research Centre on Medical and Aromatic Plants, Anand	Molecular processes involved in adventive polyembryonytowards genetic engineering in citrus and guggul	606.97 lakhs	Plant Biotechnology in citrus and guggul (ayurvedic medicinal herb)
3.	International Centre for Genetic Engineering and Biotechnology, New Delhi, with IARI, New Delhi; Department of Biotechnology, University of Delhi; University of Agricultural Sciences, Dharwad; J.K.Agrigenetics Ltd	Genomics of cotton boll and fiber development	757.95 lakh	Genetic Engineering around cotton bollworm and pink bollworm
4.	CIPHET, Ludhiana with CIAE Bhopal, IARI, New Delhi and IMTECH. Chandigarh	Development of Nondestructive Systems for Evaluation of Microbial andPhysico-Chemical Quality Parameters of Mango	630.2458 lakhs	Post harvest technology for mango through biosensors and infrared
5.	IIT, Kanpur with National Research Centre on Plant Biotechnology, New Delhi; IARI, New Delhi; and Central Institute of Pulses Research	Understanding plant-nematode interactions using RNAi	546.2334 lakhs	Functional Genomics: nematode in root specific plant promoters
6.	Indian Rubber Manufacturers Research Association, Thane with CIRCOT, Mumbai; WTCER, Bhubaneshwar; and Kusumgar Corporates, Mumbai	Design and Development of Rubber Dams for watersheds.	539.99 lakhs	Developing Rubber Dams and other irrigation applications
7.	National Dairy Research Institute, Karnal with Central Institute for Research on Buffalos, New Delhi; National Institute of Animal Nutrition and Physiology and Indian Institute of Science, Bangalore	Elucidating the physiological and genomic regulation process of follicularDevelopment (menstrual cycle), etc in buffalo	602.691 lakhs	Animal Biotechnology related to follicular development pattern in buffalo

S.No.	Consortium Involved	Research Area	Funds (in Rs.)	Thematic Area
8.	Indian Agriculture Research Institute (IARI), New Delhi	Profiling of Resistance and Avirulencegenesin Rice for Development of Race Non-Specific DiseaseResistance	582.78 lakhs	Genetic Enhancement of plants, specifically rice; developing new lines in rice
9.	National Bureau of Animal Genetic Resources (NBAGR), Karnal and BAIF	Identification of Quantitative Trait Loci for Milk yield, Fat and Protein Percentin Buffaloes	829.10 lakhs	Buffalo genomics and genetic improvement
10.	IIT, Kharagpur with Bose Institute, Kolkatta; NBPGR, Acharya NG Ranga Agricultural University, Hyderabad, and Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur	Exploitation of Heterosis, Yield and Oil quality in Sesame; Development of marker free male sterile	654.62 lakhs	Genetic enhancement and gene transfer protocol in Sesame
11.	BITS, Goa and Punjabi University, Patiala	Development of Biosensors and micro-techniques for analysis of pesticideresidues, aflatoxin, heavy metals and bacterial contamination in milk	687.19 lakhs	Novel value addition, processing and storagemethods for agricultural products and by products; specifically for Milk

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National Agricultural Technology Project (NATP) and Agricultural Technology Management Agency (ATMA)

The ICAR has initiated the National Agricultural Technology Project (NATP) with financial assistance from the World Bank. This project has three components, one of them being the Innovation in Technology Dissemination (ITD), which is to be piloted and operated with the setting up of district level autonomous registered societies called Agricultural Technology Management Agency (ATMA). These were to be tested in seven states (and four districts each) Andhra Pradesh, Orissa, Bihar, Maharashtra, Punjab, Himachal Pradesh and Jharkhand (added in 2002). The original Outlay was Rs.124.4 Cr which was revised to Rs. 136.3 Cr.

(Source: http://www.manage.gov.in/ATMAKANGRA/achieve.htm; *Presentation by Dr.K.M.Singh, Director, State Agricultural Management and Extension Training Institute, Bihar, R.A.U, Pusa at the Agriculture Summit 2006, 18-19 October 2006, Vigyan Bhawan, New Delhi*).

Initiated in 1998, the NATP has amongst other things a clear agenda to **"improve the efficiency of agricultural research and improve its relevance to farmers and agribusiness."** (*http://www.icar.org.in/natp/Thrustareas.htm*)**. Today,** *NATP has been replaced by another programme in the name of "Support to State Extension Programmes for Extension Reforms" by the Government of India. The ATMA model pilot-tested between 1998-2005 and now the Government is implementing a "market-driven" extension or ATMA model in 252 districts, nationwide in the X Plan period (Source: Presentation by Dr.K.M.Singh, Director, State Agricultural Management and Extension Training Institute, Bihar, R.A.U, Pusa at the Agriculture Summit 2006, 18-19 October 2006, Vigyan Bhawan, New Delhi and http://pib.nic.in/release/release.asp?relid=9092).*

The above mentioned presentation at the Agriculture Summit 2006, also highlights the encouragement given to public/private partnership even at the district level. Companies like Pepsi and Hindustan Levers are engaged in contract farming for basmati rice and processing of vegetables.

It is important to understand the activities being carried out through various ATMAs. This fact sheet does not exhaust the entire range, but only highlights the broad trend.

S.No.	State	Activity	Source of Information
1.	Andhra Pradesh	Identification of alternative remunerative crops to groundnut (crop grown for the last 20-30 years) in Chittoor District by ATMA due to pests and diseases	http://www.atmachittoor.com/Research%20-Extension.htm
2.	Bihar	Partnerships with various agencies like World Bank, Bihar Chamber of Commerce, Bihar Industries Association, CII and also companies such as Pamer Agro Ventures (P) Ltd; Amrapali Foods, Ltd., Patna, Samrat Mushrooms, Patna; Micro Tech Nutracueticals, Patna, Raj Agrico, Patna; Decent Enterprises (I) Pvt.Ltd in Aromatic crops, potato cultivation, exotic vegetables, baby corn, organic farming of rice etc.	www.ficci.com/media-room/speeches-presentations/2006/oct/agri/SessionIII/Singh.pdf (Presentation by Dr.K.M.Singh, Director, State Agricultural Management and Extension Training Institute, Bihar, R.A.U, Pusa at the Agriculture Summit 2006, 18-19 October 2006, Vigyan Bhawan, New Delhi).
3.	Himachal Pradesh	Fund allocation for crop improvement and agriculture mechanisation among others things in the state. Integrated nutrient management and providing farmers with High Yielding Varieties (HYVs) of seeds.	http://economictimes.indiatimes.com/News/Economy/Agriculture/Centre_approves_Rs_1333_cr_for_agriculture_in_Himachal/rssarticleshow/3133896.cms; http://info.worldbank.org/.../library/51025/ZipAgExtension1/ag_extension1/Materials/May6Session1/ATMAShimla.pdf

S.No.	State	Activity	Source of Information
4.	Jharkhand	In Garhwa district several activities undertaken/proposed including: Substitution of upland Rice with Pulses; Increasing Crop Intensity, having assured Irrigation facility; Introduction of Commercial Floriculture; Promotion of Commoditybased Farmers Group; Breed Up-gradation of Dairy Animals.For these and other activities in agriculture, horticulture, sericulture, animal husbandry the idea is to popularize latest technology through promotion of success stories.	www.atmagarhwa.org/ATMA_Garhwa_07-08.pdf
5.	Tamil Nadu	ATMA, Vellore has sought to encourage wheat cultivation in areas of less availability of water as paddy cannot cultivated with the lowering of the groundwater table in the area. ATMA organized a five-day exhibition cum seminar on "Agriculture and farmers' development" for farmers to know the latest technology in crop management and advanced strategy on marketing agricultural produce with adequate value-addition. Stalls set up by the government departments and private agencies on agricultural inputs, sprayers, sprinklers, fertilisers, pesticides and other agro-based products. HYV of agricultural produce also displayed.	http://www.thehindu.com/2007/10/09/stories/2007100951550300.htmhttp://www.hindu.com/2008/06/16/stories/2008061657210600.htm

An IFPRI Discussion Paper 00729 of November 2007 titled How to Make Agricultural Extension Demand-Driven? The Case of India's Agricultural Extension Policy, while talking about ATMA and its thrust, points to "contracting and the increased roles of the private sector, the media, and information technology; the framework stipulates that the public extension service should be made "leaner and professional. It is envisaged that approximately 100,000 public extension functionaries will gradually lose the support of the other two arms of services providers"

The process and spread goes on.

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TECHNICAL ASSISTANCE IN RESEARCH AND COLLABORATIVE RESEARCH PROJECTS TO ICAR INSTITUTIONS

(Information Collected through Right to Information Act as received on 4.7.2008 for a period of 2000-2008)

Presented below is a summary of the information that has been sent by the Indian Council for Agriculture Research (ICAR) in response to a Right to Information application filed in May 2007. The period, for which details of collaborative research projects and foreign/private funding details were sought, was 2000-2008.[1]

[1]

Note:

The data under every institute/centre does not reflect the entire range of research being done there. It is essentially the information that has been provided in response to the RTI application. While some institutions have provided exhaustive details, other have given very little information. The tabulation in this section reflects this.

The information relates to the various kinds of research on legumes, groundnut, citrus fruits, spices, potato, jatropha and pongamia being carried out in these institutions. Most of these projects look at increasing productivity, technological advancements or genetic improvement of the germplasm of the crop type. Some projects rely on information technology— for instance, establishing online monitoring systems for pest management specifically for Bt Cotton or the use of ICTs and digital documentation of farming knowledge methods.

Many of the institutions have received funding under Government of India (GoI) schemes from ICAR, the Department of Biotechnology, the Department of Science and Technology, Bhaba Atomic Research Centre (BARC), the Directorate of Oilseeds Research, the Andhra Pradesh Netherlands Biotechnology Programme (APNBP) and so on.

*However there is a clear indication that there is substantive assistance and f***unding by agencies like Asian Development Bank; World Bank; AVRDC-The World Vegetable Centre; Underutilized Tropical Fruits in Asia Network (UTFANET); UK, International Atomic Energy Agency (IAEA); International Rice Research Institute (IRRI); USAID; Indo French Centre for Promotion of Advanced Research- IFCPAR; Food and Agriculture Organisation(FAO); (United Nations Development Programme-UNDP); Australian Centre for International Agricultural Research;**
International Fund for Agricultural Development (IFAD); International Centre for Agricultural Research in Dryland Areas (ICARDA), Syria; International Plant Genetic Resources Institute-(IPGRI-CGIAR), Rome;

Collaborations or contract research has also been carried out with private corporations like Bayer India Ltd, Raj Borax Ltd and so on. Where direct funding has not been procured, contract research has been carried out by agencies like the Indian Institute of Horticultural Research for private companies like Soham and Hass Pvt. Ltd; Global Agri Systems Pvt. Ltd (efficacy of SmartFresh℠), Excel Crop Care Ltd (for Cel-Fresh tablet), Sugar companies etc. Evaluation related research in agencies like National Dairy Research Institute (NDRI) has received specific funding from companies like M/s Methalix Life Sciences Pvt Ltd and M/s Summit Seeds (India) Limited

Presented below is a summary of the information received:

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
1.	*National Research Centre for Ground-nut (NRCG), Junagadh*	*a) Mega project on seed production to produce quality seeds of groundnut (***ICAR***)* *b) Farmer's Participatory Groundnut Improvement in Rain Fed Cropping System-drought tolerant groundnut (***Integrated Scheme of OilSeeds, Pulses, Oilpalm and Maize-** *ISOPOM)* *c) Characterisation and diversification of Bambara Groundnut in Arid and Semi Arid regions (***EU***)* *d) Model Seed System and Quality Seed Production of major legumes* **(ISOPOM)** *e) Basic Strategic Research in Agricultural Sciences for Gene Based Genetic Maps and Molecular Markers for Biotic Stress Tolerance* **(NAIP)**	*ICAR: Rs.87 lakhs + Rs.70 lakhs + Rs.12 lakhs;* *ISOPOM (TMOP): Rs.50.04 lakhs + Rs.90.2 lakhs;* *EU: Rs. 21.1 lakhs;* *NAIP: Rs.42.25 lakhs + Rs.94.9 lakhs;* *Raj Borax Ltd: Rs.10 lakhs;*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		*e) Microbial diversity in Kuchchh region and use salt tolerant strains for agriculture and industry (***ICAR through NBAIM-AMAAS project)** *f) Biofertiliser application in Diverse Cropping System* **(ICAR)***f) Testing and Evaluation of Agricol and its product as a Boron source in groundnut* **(Raj Borax Ltd, Mumbai)** *g) Evaluation of groundnut germplasm for drought tolerance and resistance, identify traits etc* **(NAIP)** *h) Development of transgenic resistance to Bud and Stem Necrosis Virus in Groundnut (Department of Biotechnology-* **DBT)** *i) Breeding of* **S***tem Rot Resistant Genotypes of Groundnut through Mutation Breeding to develop groundnut cultivar* **(BARC)**	*DBT: Rs.31.45 lakhs* *BARC: Rs.17.94 lakhs*
2.	*National Research Centre for Citrus, Nagpur*	*a) Production of Virus Free Planting material for Nagpur Mandarin (***NHB)** *b) Effect of Gamma Radiation on shelf life of Nagpur mandarin, sweet orange and kagzi lime* **(DRDO-ICAR interface for studies on gamma radiation)** *c) Conservation and Use of diversity in Mango, Citrus and Litchi in India* **(Asian Development Bank and IPGRI, Rome)** *d) Site specific nutrition management in Nagpur mandarin* **(Potash and Phosphate Institute of Canada)** *e) Large Scale production and demonstration of virus free planting material by micrografting* **(DBT)** *f) NATP projects: diagnostics of virus like diseases affecting citrus and potato etc* **(World Bank)** *g) Testing of Confidor 200 SL against insect pest of citrus* **(Bayer India Ltd, Mumbai)** *h) Evaluation of Agricol and Chemiebor-P for growth yield of Nagpur Mandarin* **(Raj Borax Ltd, Mumbai)**	*Information on amounts not supplied*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
3.	*Indian Institute of Horti-cultural Research, Bangalore*	***Contract research with private agencies (no funding from national or international private agencies):*** *a) Evaluation of 1-Methyl Cyclopropene (Agrofresh) in horticulture crops* **(M/s Rohm and Haas (India) Pvt Ltd** *b) Efficacy of SmartFresh (I-MCP) for extending storage life of mango at low temperature:* **M/s Global Agri Systems Pvt Ltd** *c) Evaluation of Cel-Fresh Tablet (0.18% 1-MCP) in extension of shelf life of roses and tomato:* **M/s Excel Crop Care Ltd** *d) Market potential of medicinal and floricultural plantations in Nigiri District: Hill Area Development Project* *e) Development of high yielding, disease resistant chilly or targeted countries in Asia* **(AVRDC- The World Vegetable Centre)** *f) Application of molecular markers to broaden the genetic based on tomato (AVRDC German Fund)* *g) Integrated Pest Management inn fruit flies in India* **(DFID-UK)** *h) Effect of Pretreatments Freezing and Storage Condition on nutritional quality of frozen vegetables* **(UNU-Kirin, Japan)** *i) Germplasm evolution, propagation and management of jackfruit, monosteen and pummelo in Asia (Underutilised Fruits in Asia Network- UTFANET-UK)* *j) HORTIVAR- database on performances of horticulture cultivars* **(Food and Agriculture Organisation-FAO Rome)**	*ICAR (since 2000): Rs.148.3 lakhs;* *Private Sector contracts: amount not specified* *Hill Area Development Project: Rs.1.5 Lakhs* *AVRDC: Rs.70 lakhs + Rs.53 lakhs* *DFID UK: Rs.462.4 lakhs* *UNU-Kirin, Japan: Rs.3.07820 lakhs* *UTFANET, UK: 14004 GBP* *FAO, ROME: $800*
4.	*National Institute of Tuber Crops Research Institute (CTCRI), Thiruananth puram*	*International collaboration with International Potato Centre (CIP), Peru; International Centre for Tropical Agriculture (CIAT), Columbia; ILTAB, Missouri, USA; National Research Institute, UK; CIRAD, France and EMBRAPA, Brazil; IAEA Vienna* *No collaboration with private parties*	*FAO/International Atomic Energy Agency-IAEA, Vienna): US$ 18,000* *USDA/USIF: Rs.601 lakhs*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		*a) Overcoming key constraints to productivity and utilization by genetic improvement of under utilized and neglected crops(***FAO/International Atomic Energy Agency-IAEA, Vienna)** *b) Potential of Bemisia tabaci Genn. as biocontrol component IPM* **(US Department of Agriculture-USDA/USIF)** *c) Inbreeding of elite cassava clones* **(CIAT, Columbia)** *d) Identification and promotion of cassava clones with higher nutritional quality* **(CIAT, Columbia)** *e) Genetic improvement of YAM using DNA markers* **(Indo French Centre for Promotion of Advanced Research- IFCPAR, France)**	*CIAT: US$ 22,500 + US$ 36,000* *IFCPAR: Rs.2,11,80,000*
5.	*Sugarcane Breeding Institute (SBI), Coimbatore*	*Various research activities related to germplasm, biological control, precision N application technology, maintenance of world sugarcane germplasm, maintenance of active germplasm site etc.* **SBI has collaborations with 15 sugar factories** *for identification of location specific varieties. These include Dharani Sugars; Nava Bharat Ferroy Alloys Ltd., Davangere Sugars; Sakhti Sugars etc.* *Another project on Exchange of sugarcane germplasm to member countries under bilateral programmes through NBPGR and ICAR* **(ICCST)**	*No financial figures provided through RTI*
6.	*National Research Centre on Seed Spices, Ajmer*	*a) <u>Genetic Resources and Crop Improvement:</u> Collection, evaluation and conservation of spices such as fenugreek, ajowan, dill, nigella, anise, celery and caraway, coriander, cumin, fennel and fenugreek. This includes breeding of high yielding varieties* *b) <u>Crop Production and Soil, water management:</u> response to sheep manure, biofertilisers; standardization of seed spices; nutrient influx efficiency etc* *c) <u>Seed technology and plant physiology:</u> enhancing seed germination and crop stand through seed priming, pelleting etc; standardization of suitable maturity stage; post harvest management; screening of seeds for temperature tolerance in cumin etc*	*No funding agencies or fund allocation information provided.*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		d) Crop Protection: survey and monitoring of seed spices diseases; epidemiology and seed forecasting etc	
7.	*Water Technology Centre for Eastern Region, Bhubaneshwar*	*a) Water harvesting, enhancing recharge and efficient/optimum utilization in Dengei Pahad Watershed, catchment area of Chilika Lagoon (***Chilka Development Authority-CDA)** *b) Popularising water chest nut cultivation in small and medium water harvesting structures in Bolangir, Phulbani and Gajapati districts (***CARE-India)** *c) Distillery Effluent utilization in agricultural perspectives of Sakhti Sugars* **(Sakthi Sugars Limited, Dhenkanal)**	*CDA: Rs.6 lakhs* *Care-India: Rs.63,000* *Sakthi Sugars: Rs.2 lakhs*
8.	*Central Potato Research Institute, Shimla*	*Engineering late blight resistance in susceptible commercial Indian Potato Cultivars. Relevant RB Gene to be made available from University of Wisconsin, USA as part of the* **Agricultural Biotechnology Support Project (ABSP-II***) of Cornell University, USA. Public Private Partnership between CPRI/ICAR and ABSP-II*	*Fund amount not specified*
9.	*National Research Centre for Grapes, Pune*	*a)* **15 ICAR projects relating to:***- Management of genetic resources of table, wine, raisin, juice and rootstock grape varieties- Germplasm utilization and genetic enhancement (breeding for high production and quality including promising varieties clones/hybrids* *- Application of Biotechnological research in grapes* *- Development and propagation and nursery technology* *- Use of rootstocks for grapes* *- Horticultural practices for quality and yield in table and wine grapes* *- Nutrient and soil management in grapes* *- Water management in grapes* *- Grape physiology including bioregulators* *- Studies on viticulturally important microorganisms* *- Integrated disease, insect, mice, pest management in grapes* *- Management of agrichemical residues and environmental contamination* *- Development of post harvest technologies* *- Information and documentation systems*	*Fund amount not specified*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		b) **Externally Aided projects:** **-** *National Network for drip irrigation systems in perennial horticulture crops* **(ICAR)** *- Augmentation and evaluation of grape germplasm under multi institutional project* **(NATP)** **-** *Introduction of Downy Mildew Resistance in commercial cultivars of grapes through cross breeding and in-vitro methods (***NATP)** **-** *Survey and surveillance in Western India for infestation of oriental fruit fly* **(Agricultural and Processed Food Products Export Development Authority -** ***APEDA*****)** **-** *Introduction, multiplication etc of grape varieties suitable for export* **(APEDA)** *- Micro-propagation of selected grape varieties and DNA finger printing of grape germplasm (* **Department of Biotechnology-DBT)** **-** *Molecular tagging of Downy Mildew Resistance in Grape* **(DBT)** **-** *National Referral Laboratory for Monitoring Pesticides Residues for export of fresh grapes* **(ICAR)** **-** *National Integrated fruit fly surveillance programme* **(APEDA-MOA)** *- Indentification of drought and salt stress inducible genes in grape rootstocks (***BARC—BRNS)**	
10.	*Project Directorate of Cropping Systems Research, Modipuram*	*a) Applied research and sharing of data related to Water management in no-till, direct-seeded rice for higher yield and water use efficiency* **(IRRI)** *b) Applied research and sharing of data through On farm evaluation of site-specific nutrient management for rice-wheat cropping system* **(IRRI)** *c) Developing and evaluating new resource use efficient production systems and techniques in rice-wheat system* **(IRRI)** *d) Characterisation of bio-physical and socio-economic environment of existing farming system in Indo-Gangetic plain of U.P. (***UP Council of Agricultural Research)** *e) Cropping system analysis of India using remote sensing, GIS and ground based data* **(Space Application Centre-ISRO)** *f) Acceleration of tillage revolution in Indus-Ganges Basin: fostering adoption of resource*	*IRRI: US$ 1000 per annum + US$ 20,000 per annum + US$ 6,000 per annum* *UP Council of Agricultural Research: Rs.8.57 lakhs* *ISRO: Rs.30 lakhs* *USAID: Rs.16 lakhs* *THDC: Rs. 18 lakhs per year*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		*conserving technologies to promote economic growth, resource conservation and food security (*USAID) *g) Study of crop pattern and increase in agricultural production due to release of water from Tehri Reservoir for irrigation* (Tehri Hydro Development Corporation-THDC)	
11.	*Indian Institute of Pulses Research, Kanpur*	a) GoI *- Conducting frontline demonstrations* (DARE) *- Use of entomopathogenic nematodes as a tool of biological control for lepitdopteron borer complex in early pigeonpea* (DBT) *- Development of extra large seeded kabuli chickpea varieties* (ISOPOM- DARC) *- Enhancing the yield and stability of pigeonpea through heterosis breeding* (ISOPOM-DARC) *- Development and popularization of model seed system for quality seed production of major legumes* (ISOPOM) *- Taxonomy, distribution and biology of entomopathogenic nematodes infesting insect pests of pulses in Uttar Pradesh* (Department of Science and Technology-DST) *- Technological empowerment of pulses growing women farmers of UP* (DST)*- Management of pests in stored seeds/grains of cereals and pulses* (DBT) *- Tagging genes for resistance to wilt in lentil* (DBT) *b) Increasing pulses production through on* *-farm demonstrations and training* (United Nations Development Programme-UNDP) *c) Regional promotion of mungbean research and development* (AVRDC-Taiwan) *d) Traits for yield improvement of chickpea in drought prone environments of India and Australia (*Australian Centre for International Agricultural Research- ACIAR) *e) Training on data management and statistical analysis* (ACIAR) *f) Farmer participatory improvement of grain legumes in rainfed Asia* (International Fund for Agricultural Development-IFAD)	*UNDP: Rs.33.55 lakhs* *AVDRC: Rs.72,203* *ACIAR: Rs.37.68974 lakhs + Rs. 3.33942 lakhs* *DBT: Rs. 78,900 + Rs.10,300 + Rs. 25.035 lakhs + Rs. 9 lakhs + Rs. 4.91 lakhs* *DARE: Rs.230.41250 lakhs* *UPCAR: Rs. 8.00756 lakhs* *IFAD: 1.698 lakhs*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		g) South Asian Traveling Workshop on kabuli chickpea. Lentil and lathyrus **(International Centre for Agricultural Research in Dryland Areas-ICRADA, Syria)** *h) Biological control of gram pod in chickpea, pigeonpea and sunflower* **(DBT)**	
12.	*CRIDA, Hyderabad*	**a) Division of Resource Management: (GoI/ICAR schemes)** *- Low till farming strategies and integrated plant nutrient supply for rainfed semi-arid tropics* *- Organic management for sustainable production of medicinal and aromatic plants* *- Viability of organic production of pigeonpea and sorghum in drylands* *- Efficient management of gliricidia on field bunds* *- Effect of different nutrient management practices and agroforestry systems on productivity and soil quality of rainfed regions* *- Standardisation of agri-techniques of perennial castor* *- Tank silt as an orgsni amendment for improving soil and water productivity* *- Development of field kit for estimating labile soil quality under different land use system* *- Assessment and improvement of soil quality and resilience in a watershed using GIS and remote sensing- National Network Project on integrated development of Jatropha and Pongamia* *- Genetic improvement of Jatropha for oil yield and adaptability* *- Collection and evolution of germplasm, standardization of agro* *-techniques and pilot demonstration of jatropha curacas in rain shadow districts of Andhra Pradesh* *- Improving the productivity of Leucaena leucocephala for industrial biomass production* *- On farm evaluation of CRIDA Rotary tiller for biomass incorporation* *- Land Management strategies for conservation, weed control and carbon sequestration of castor* *-pigeon pea system- Assessment of water yield in water harvesting structure and its productivity in vegetable and oilseed production in Alfisols*	

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
1.	*National Research Centre for Ground-nut (NRCG), Junagadh*	*- Rainfall-Runoff and water use characterization of different crop/cropping systems* *- Development and performance evaluation of tractor drawn Low till planter for rainfed maize* **b) Division of Crop Science** *- Genetic transformation of greengram for enhancing abiotic stress tolerance* *- Mechanism of drought tolerance in rainfed short duration pulses* *- Impact on elevated CO_2 on important rainfed crops* *- Evaluation of chlorophyll fluorescence as an indicator for drought tolerance in selected dryland crops* *- Nutrient and hormonal management for manipulation of flowering, fruiting and seed set in Pongamia pinnata* *- Evaluation of horsegram mutants in multi-locational AICRP trials* *- Drought management practices in castor- Utilisation of candidate microbial isolates for management of dryland insect pests* *- Sustainable Cotton Initiative in Warangal district of Andhra Pradesh* *- Organic farming in rainfed production systems* *- Application of micro-organisms in Agriculture and allied sectors* *- Integrated disease management in groundnut based production systems* *- Impact of elevated CO_2 on Bt Cotton and boll worms* *- Development and evaluation of Low External Input IPM modules on pigeon pea and castor* *- Studies on root characteristics of greengram and horsegram crops in relation to resource use.* *- Vegetable cultivation as a source of livelihood option in watershed areas of Ranga Reddy District* *- Studies on tree-tree interactions in conjunction with water management in fruit crops* *- Collection, evaluation of standardization of agro*	*ICAR*: Rs.87 lakhs + Rs.70 lakhs + Rs.12 lakhs; *ISOPOM (TMOP)*: Rs.50.04 lakhs + Rs.90.2 lakhs; *EU:* Rs. 21.1 lakhs; *NAIP:* Rs.42.25 lakhs + Rs.94.9 lakhs; *Raj Borax Ltd*: Rs.10 lakhs;

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
1.	*National Research Centre for Ground-nut (NRCG), Junagadh*	*-techniques and pilot demonstrations of jatropha and pongamia* *- Soil and crop management options for managing zinc deficiency in rainfed areas* *- Candidate gene approach for improvement of drought tolerance and yield in drylands.* *- Evaluation of forage sorghum cultivars for different soil conditions* *- Organic cultivation of fruits in drylands* **c) Transfer of technology** *- Critical evaluation of conservation furrows in semi arid Alfisols* *- Performance of sheep reared under different management systems* *- Development of strategies of sustainable livestock production in rainfed regions in India* *- Strategies for enhancing breeding efficiency of dairy animals under rainfed conditions* *- Identification and digital documentation of dryland technologies* *- Critical evaluation of ICTs as a tool for agricultural extension for technology dissemination* *- Leveraging access to ICTs for improved livelihoods development* *- Understanding farmer's indigenous knowledge and adaptation strategies to climate change in Mehboobnagar district of Andhra PradeshOther than the above CRIDA has* **research going on under their Socio Economic and Policy Research Cell as well as through Krishi Vigyan Kendras.** *These include studies related to gender or understanding impact of different programs as well as some specific ones like development of read-to-eat nutrient rich value added products from coarse grains etc. There are also three research projects under* **All-India Coordinated Research Project on Agro Meteorology (AICRPAM)** *funding.*	*ICAR: Rs.87 lakhs + Rs.70 lakhs + Rs.12 lakhs;* *ISOPOM (TMOP): Rs.50.04 lakhs + Rs.90.2 lakhs;* *EU: Rs. 21.1 lakhs;* *NAIP: Rs.42.25 lakhs + Rs.94.9 lakhs;* *Raj Borax Ltd: Rs.10 lakhs;*
13.	*National Research Centre for Oil Palm (NRCOP), Pedaveg*	*35 ongoing research projects funded by ICAR, four funded by Technology Mission on Oilseed, Pulses and Maize (TMOP&M), Government of India, and one revolving fund scheme.* **a) Crop Improvement**	

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
1.	National Research Centre for Ground-nut (NRCG), Junagadh	- *Collection, conservation, characterization and evaluation of oil palm germplasm* (including widening genetic base, evaluation performance of accessions, using superior palms for crop improvement, DNA fingerprinting, hybridization etc) - *Marker assisted selection for desirable traits* (including developing molecular markers for desirable traits like shell thickness, dwarfness as well as mapping) - *Evolving hybrid with FFB yield and superior oil quality, drawfness, stress tolerance and disease resistance* (including production of oil palm hybrids and interspecific hybrids) - *Improvement on seed production technology and quality planting material production* (rejuvenating existing seed gardens and selection of more mother palms for seed production enhancement; new seed gardens and conducting progeny testing trials) - *Development of tissue culture protocol for micro propagation of elite palms* (development of invitro regeneration protocol and mass multiplication of elite palms) **b) Crop Production** - *Studies on growth and yield of oil palm under irrigated conditions* (including understanding biochemical, physiological basis and environmental monitoring) - *Development and improvement on existing practices for oil palm under rainfed and irrigated conditions* - *Integrated water an nutrient management for higher and sustainable productivity* (including studies, fertigation on oil palm plantations and nutrient indexing) - *Development of oil palm based mixed farming systems under irrigated conditions* (including characterization of light transmission and studies on intercropping and mixed farming in oil palm plantations) **c) Crop Protection** - *Integrated disease and pest management including studies on insect, avian and mammalian pests*	*ICAR*: Rs.87 lakhs + Rs.70 lakhs + Rs.12 lakhs; *ISOPOM (TMOP)*: Rs.50.04 lakhs + Rs.90.2 lakhs; *EU:* Rs. 21.1 lakhs; *NAIP:* Rs.42.25 lakhs + Rs.94.9 lakhs; *Raj Borax Ltd*: Rs.10 lakhs;

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		d) Post Harvest Technology *- Mechanisation in oil palm plantations and efficient processing technologies* *- Post harvest management and value addition of oil palm products and byproducts* *- Studies on ecofriendly disposal and utilization on plantation and industry wastes* **e) Transfer of Technology** *- Including Training of extension, research workers and farmers; demonstrations on farmer's fields; database management and development of yield production models.* *- Multidisciplinary approaches for TOT and area expansion in relation to oil palm (including identification of potential areas, conducting feasibility studies and dissemination of technologies)*	
14.	*National Centre for Integrated Pest Management (NCIPM), New Delhi*	*National Information System for Pest Management (Bt Cotton) (**GoI**): including Online pest monitoring system for Bt Cotton and share information on pest scenario with state and central agencies etc.* *Assistance has been received from DFID, UK but no details given about the same.*	*GoI (online pest management): Rs.1.2 crores* *ICAR: Rs. 2.50615 lakhs*
15.	*Directorate of Oilseeds Research*	*a) Development of transgenic castor for resistance to lepidopteran pests* **[Andhra Pradesh Netherlands Biotechnology Programme (APNLBP), Hyderabad]** *b) Production of Bacillus thuringeinsis for the management of castor semilooper ad identification of serotypes of local isolates of Bacillus thuringeinsis etc including toxicity tests* **(APNLBP)** *c) Development of improved bio control agent for castor wilt management and characterization and registration of fungal bio control agent, Trichoderma viride for commercialization* **(APNLBP)** *d) Collection, evaluation of germplasm, standardization of agro-techniques and pilot demonstrations fro Jatropha in rain shadow districts* **(Govt. of Andhra Pradesh)**	*APNLBP: Rs. 57.55 lakhs + Rs. 36.73 lakhs + Rs. 33.47 lakhs* *Govt. of Andhra Pradesh: Rs.14.70 lakhs* *DST: Rs.7 lakhs* *DBT: Rs. 7.51 lakhs + Rs.44.79 lakhs*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		e) Reduction of endosperm toxic proteins, rich in in castor through PTGS technologies **(Dept. of Science and Technology-DST)** *e) Molecular and generic analysis of transgenic male sterile and restorer lines in safflower* **(DBT)** *f) Validation of RNAi constructs and restoration in male sterile transgenic tobacco plants as prelude to their utilization in safflower (***DBT)**	
16.	*National Dairy Research Institute, Karnal*	*No ongoing research programme related to technical assistance or collaboration of ICAR in the crop related research. NDRI provides technical assistance on nutritional evaluation of fodders/ crop residues for dairy animals.* *IN the past assistance has been provided to: M/s Methalix Life Sciences Pvt Ltd for evaluation of Bt Cotton Seeds , Bangalore and M/s Summit Seeds (India) Ltd, Chandigarh for evaluation of fodder varieties of Bajra.*	*Methalix: Rs.6.47475 lakhs* *Summit Seeds: Rs.10 lakhs*
17.	*National Research Centre for Medicinal and Aromatic Plants, Anand*	*a) Survey. Collection, evaluation, maintenance, documentation and conservation of medicinal and aromatic plants* **(NATP- Plant Biodiversity)** *b) Post harvest management of safed musli (Chlorophytum Borivilianum)* **(NATP)** *c) Selection for high andrographolide content herbage yield in Andrographis paniculata (Ness)* **(ICAR-CESS Adhoc scheme)** *d) Biotechnological approaches for production and cultivation of Patchouli* **(DBT)** *e) Mass multiplication and molecular characterization of two important medicinal plants (***ICAR-CESS)** *f) Karyotype analysis of Betelvine germplasm* **(ICAR-CESS)** *g) Digital Herbarium on medicinal and aromatic plants* **(ICAR-CESS)** *h) Development of DUS guidelines and strengthening of DUS Test centres for laboratory and field facilities* **(Protection of Plant Varieties and Farmer's Rights- PPVFR** *legislation)* *i) Networking of herbal gardens for quality planting material supply in India (***National Medicinal Plants Board-NMPB***)*	*NATP: Rs.9.72 lakhs + Rs. 27.35 lakhs + Rs. 15.75 lakhs* *ICAR-CESS: Rs.16.35 + Rs.9.69 + Rs. 24.85 lakhs + rs.9.58 lakhs* *DBT: Rs. 8.85 lakhs* *PPVFR: Rs. 10.55 lakhs* *NMPB: Rs.10.62 lakhs + Rs. 20 lakhs + R.48.5 lakhs* *NAIP: Rs.23.43 lakhs* *IPGRI: US$ 2000 + US$ 2000*

S.No.	ICAR institution	Details of Research, Research Programmes	Grant Amounts
		j) Development of Good Agricultural Practices for important medicinal plants **(NMPB)** *k) Network research project on Guggal (Commiphora mukul)* **(NMPB)** *l) Sustainable management of plant biodiversity* **(NATP)** *m) Unraveling molecular process involved in the adventives polyembryony towards genetic engineering for fixation of heterosis* **(NAIP)** *n) Inventory and Documentation of conserved medicinal plants of India* **(International Plant Genetic Resources Institute- IPGRI)** *m) E-descriptor Development Medicinal Plants of India* **(IPGRI)**	
18.	*Indian Institute of Natural Resins and Gums, Ranchi*	*a) Adoption of lac growers of Jharkhand for model upliftment through scientific Lac cultivation* **(Government of Jharkhand)** *b) Lac as a source of livelihood, technology intervention for sustained production in Khunti sub division (***PRADHAN)** *c) Primary research on Evaluation of bio-control agents and bio-rational approaches for management of lac insect predators* **(DBT)** *d) Primary research on Biological, Chemical and molecular characterization of lack insect-host plant relationship* **(DBT)** *e) Primary research on application of molecular fingerprinting for genetic characterization of races and species of lac insect* **(DBT)** *Apart from this the institute is also carrying out research related to marketing, integrated pest management etc with assistance from programmes such as AP CESS fund and agencies such as NABARD*	*Government of Jharkhand: Rs. 32.06 lakhs* *PRADHAN: Rs. 18.45 lakhs* *DBT: Rs. 21.84 lakhs + Rs.13.35 + Rs.16.87 lakhs*

RESEARCH AT ASSAM AGRICULTURAL UNIVERSITY

The Assam Agriculture University (AAU) undertakes research on "all the important agricultural commodities, natural resources and problems connected with their development to meet the diverse needs of the farming community of the state. The research strategy of the University has been to develop economically viable and ecologically sustainable crop production technologies which can be conveniently adopted by the farmers." The University has 124 projects in operation funded by the ICAR, the Department of Biotechnology and also by the NATP programme. AAU has two directorates of research related to Veterinary Science and Agriculture.

At the 52nd meeting of the National Development Council held in December 2006, the Chief Minister of Assam articulated the need for immediate upgradation of the infrastructure of Assam Agriculture University and sought assistance from the central government in the form of a one time grant. He indicated that the state government has already taken steps towards developing high yielding varieties of crops suitable for the state. The establishment of a Biotechnology institute under the Assam Agriculture University has also been initiated, which according to him will help the farming community through training in various aspects of seed technology.