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National Agricultural Innovation Project

The National Agricultural Innovation Project (NAIP) has made good progress in approving and grounding 112 subprojects at an total outlay of Rs 658 crore. These subprojects have diverse partnerships with non-conventional partners like ICAR institutions and SAUs, General Universities, IITs, IIMs, CSIR laboratories, other Central and State government departments, private sector, NGOs, to an extent of 40 to 50%.

Seventeen approved subprojects under component-1 (*Strengthening ICAR as Catalyzing Agent of Management of Change*) will contribute to promote knowledge products like digital repository of about 10,000 Ph D theses, accessing titles of more than 1,000 journals, e-course in agriculture, horticulture, veterinary sciences, fisheries and home science, creating of a dynamic ICAR and Institute website, e-publishing of agricultural research journals, establishment of the Central Data Centre and securing NARS intranet, capacity-building in visioning and policy analysis, developing skills of about 3,500 personnel in project-proposal writing and reporting, research prioritization, monitoring and evaluation etc, establishment of Zonal Technology Management and business planning and development units, international training of about 500 scientists in 23 cutting-edge areas of agricultural sciences and training of about 1,000 NARS scientists by about 80 international experts from the Centres of Advanced Studies abroad, implementing on-line financial management system in the NAIP and the ICAR, and the online project management and tracking system under the NAIP.

Under component-2 (*Research on Production to Consumption Systems*), 28 approved subprojects will explore innovations in the utilization of sweet-sorghum for ethanol production, development of food products from millets (sorghum, pearl millet, foxtail and little millet), exploitation of multiple uses of cotton (stalk, cotton fibre for quantity yarn and fabric, oil protein) and of craft and gear for cost-effective and responsible fishing and processing for total utilization of small pelagic and freshwater fishes, clean meat production and utilization, oceanic tuna fisheries, coconut products, seed spices, potato and potato products, utilization of banana pseudostems for fibres and other value-added products, biomass-based decentralized power generation for agro-enterprises, value-chain on seabuckthorn for food, veterinary products, animal feed, natural dyes (indigo, bixa, and marigold), major carps and prawns, agroforestry with improved short-rotation clones (casuarina, eucalyptus and matchwood), clean vegetables, tomato, food products from small millets, murrel seed production, farmed-seafood production using cobia, flowers, novelty pork products and value-added products from *khejri (Prosopis juliflora)*, maize and maize products, coconut fibres and by-products and underutilized fruits.

Under component-3 (*Research on Sustainable Rural Livelihood Security*), 26 approved sub-projects aim at livelihood security by following integrated farming system approach with technological innovations relating to land-and-water management, seed and other input supply, cropping intensity, agro-processing and value-addition and institutional innovations in organizing youth and women self-help groups, producer groups, establishing village knowledge/resource centres, marketing arrangement, processing units, and bringing synergy with ongoing development programmes, capacity-building and entrepreneur-ship development.

Under component-4 (*Basic and Strategic Research in Frontier Areas of Agricultural Sciences*), 31 approved projects will contribute to mitigation strategy to control deadly arsenic problem in food chain, genetic engineering for

fixation of heterosis, genetic solutions for improved cotton boll and fibre development, enhanced yield and quality in buffalo milk, genetic solution for rice-blast management, development of bio-sensor for examination of quality of milk, mango and sesame, genetic enhancement in buffalo, developing wireless sensors for animal management, climate change and soil-organic carbon management, use of nanotechnology for enhancing performance of biodegradable polymers, development of single cell C-4 photosynthetic system in rice, development of decision-support system for insect-pest management in rice and cotton, new strategies for molecular diagnosis of plant viruses, assessment of quality and resilience of soil in different agroecosystems, bio-systematics of three important plant genera, risk assessment and developing insurance products for agriculture, stem cell research in cattle and buffaloes, identification of mammary bio-markers, genetic solutions for enhanced goat-meat production, utilization of bamboo in agricultural applications like rural housing, cattle-shelter, greenhouses, grain-silos, development of herbal acaricides for effective control of ticks, nanotechnology for higher utilization of native phosphorus in arid soils, utilization of rumen microbial diversity on methanogensis and higher use of poor quality feeds and integrating machine vision technology with satellite imagery to promote precision agriculture.

The NAIP is now processing the Concept Notes submitted under the competitive call and plans to complete the process by the end of February 2009. Aftewards, close monitoring and evaluation of all the approved subprojects will be taken up.

National Fund for Basic Strategic Research (NFBSRA)

The 21 projects under the National Fund for Basic and Strategic Research have now started yielding some tangible results in the frontier areas of agricultural sciences. A few salient achievements under the important themes are as follows.

Crop improvement and resistance to biotic and abiotic reverses in plants

- Two somatic embryogenesis receptor kinase (*SERK*) gene homologues have been isolated and cloned in sorghum, and an ovule-specific promoter has been cloned from *Arabidopsis* for sequence information as the first major step towards introducing apomixis in sorghum.
- In *Brassica juncea*, a methyl jasmonate inducible gene *Bjpep1* has been isolated. It is the member of the octadecanoid pathway involved in the first-line of defence of plants against insect pests and other damages
- Protocols based on zinc finger nuclease and homologous recombination for targeted gene integration have been developed. *Cry IF* gene has been integrated at the locus of the *cdn1* gene in cotton and *Cry 1 Aabc* gene at the locus *UGT* gene in rice.
- The occurrence of biovar-2 of *Agrobacterium tumefaciens*, which has potential for use in management of crown gall of stone-fruits, was found for the first time in India.
- For the first time involvement of pathogen-related protein genes in hyper sensitive research-mediated resistance against gall-forming insects in rice was observed.

Animal improvement and management

- A simple and highly sensitive enzyme (EIA) for determination of luteinizing hormone (LH) in goats within 24 hr of fertilization has been optimized and validated.
- Successful cloning and sequencing of *PAG1* (pregnancy associated glycoprotein gene) was achieved. Successful establishment of endometrial cell culture for the first time in buffalo was also achieved as a model to study prostaglandin production in *in-vitro*.
- *Methanomicrobium mobile* has been found the dominant phytotype among the rumen methanogens in buffaloes in India. An archea with 92-94% similarity with *Methanoculleous marisnigri* has also been isolated from buffalo rumen.

Plant biomass for alternate clean energy

Conversion of plant biomass into hydrogen (25%) and CO (24%) and rest into nitrogen has been tested by water-gas shift reactor by first producing CO from the biomass and then using it to produce hydrogen from moisture at 200°-200° C. A new catalyst (based on 1% Pt and CeO2) has been developed for this reaction, which is better than the ones known in the literature. A new method to coat this catalyst on ceramic honey-comb has also been developed, which goes into the reactor to produce hydrogen.