

**DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION  
MONTHLY SUMMARY - JUNE 2018**

**INTERNATIONAL COOPERATION:**

- (i) Work plan on fish agri- food system for the period 2018-19 signed between ICAR and World Fish Centre in the gracious presence of Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR) and Dr. Gareth Johanstone, Director General, International Center for Living Aquatic Resources Management (ICLARM) also known as the World Fish of the CGIAR signed on May 03, 2017 at Krishi Bhawan, New Delhi. Under this work plan both parties have mutually agreed to promote and accelerate collaborative efforts for fisheries and aquaculture research and development. By addressing the three interlinked challenges of sustainable aquaculture, sustainable small scale fisheries, and enhancing the contribution of fish to nutrition and health of the poor in priority geographies of Africa, Asia and the Pacific.
- (ii) Work Plan between Indian Council of Agricultural Research (ICAR) and International Water Management Institute (IWMI) was signed on 25<sup>th</sup> June, 2018 in accordance with the Memorandum of Agreement (MoA) signed on 25<sup>th</sup> November, 1996 between ICAR and the International Irrigation Management Institute which aims to develop, promote, and accelerate close collaboration in the fields of water management research. The Work Plan has been developed through mutual consultations between the scientists and officers of ICAR (including Ministry of Water Resources, River Development and Ganga Rejuvenation) and IWMI for the period April, 2018 – March, 2022.

**MAJOR RESEARCH ACHIEVEMENTS**

**Varietal Improvement:**

- (i) Finger millet variety, VL *Mandua* 379, notified for release in the state of Uttarakhand, Bihar, Jharkhand and Madhya Pradesh.
- (ii) A new multiple stress tolerant wheat variety (KRL 283) tolerant to stripe rust/ brown rust/ stem rust/Karnal bunt/aphid/ shoot fly developed for salt affected soils of Uttar Pradesh.
- (iii) A high yielding coconut variety, suitable for tender nut, copra and inflorescence sap production developed by selection from IND 010.

**Agricultural Biotechnology:**

- (i) Thermostable RuBisCo activase enzyme, heat-responsive microsatellite markers, miRNA based molecular markers for screening germplasm for thermotolerance were developed in wheat.
- (ii) Technologies for the silicon based modulation of thermotolerance under terminal heat and methods for the enhancement of thermostability of wheat RuBisCo activase enzyme through site-directed mutagenesis were developed.
- (iii) SSR marker RM-316 has been found to differentiate 15 paddy varieties and DRRH-3. This marker can be used for hybrid purity testing.
- (iv) A novel micro RNA-induced gene silencing strategy was devised for development of pest and disease tolerant cotton. Conserved nucleotide sequences

targeting *AC1* and *AC2* genes, and  $\beta C1$  gene from beta-satellite were identified from cotton leaf curl disease (CLCuD) associated Gemini viruses. These sequences were synthesized along with sequences from *flp-14* and *flp-18* genes of root knot nematode (RKN) and *vATPase* and *COP $\beta$*  genes from cotton leaf hopper (CLH). A MIGS construct was developed based on the sequence information of these genes, and *Nicotiana benthamiana* was transformed with this MIGS construct.

- (v) Fourteen cabbage samples were fingerprinted using 10 SSR primers. Ninety six genomic resources of sunflower were added to the genomic resources repository.
- (vi) A total of 2456 EST-SSR primer pairs were designed from the publically available ESTs; of which 366 having relevance to various stresses and other functional unigenes were PCR validated using 11 diverse peanut genotypes.
- (vii) To understand the genomic regions associated with agro-morphological traits, Genome Wide association study (GWAS) was done using a set of about 400 Indian wheat genotypes.
- (viii) Mining Curcuma transcriptome for the key rate limiting enzyme of the curcumin biosynthetic pathway viz., Phenylalanine ammonia lyase (*pal*). The expression of identified 'pal' correlated well with high curcumin content and was on par with the novel gene *clpks 11*, indicating that the identified transcript is a part of the 'pal' gene putatively involved in curcumin biosynthesis.

#### **Conservation of Genetic Resources:**

- (i) Two explorations were undertaken and germplasm was collected of barley (21), wheat (15), buckwheat (7), *Brassica* (12), *Allium* spp. (21) from Uttarakhand and minor fruits (chironji -6, *Garcinia* -15, karonda -9 and others- 9).
- (ii) Fifty three specimens were added to the National Herbarium of Cultivated Plants bringing the holdings to a total of 23,251 specimens.
- (iii) Seventy accessions were added to the National Genebank bringing the Genebank holdings to a total of 4,3,895.
- (iv) Three thousand and thirty-nine accessions (3039) comprising cereals, vegetables, oilseeds, forages, fibres and fruits were introduced from 13 countries. The important accessions introduced were heritage wheat varieties with excellent grain quality from Canada namely, Ladoga, Bishop, Marquis and Red fife (EC946384-946387).

#### **Natural Resource Management:**

- (i) Developed organic farming package of practice for maize-chickpea system with B: C ratio of 1.27 at Dharwad (Karnataka).
- (ii) Foliar application of 100 ppm B or 100 ppm Zn was found equally effective in enhancing the yield of bottle gourd as compared to combined application of 100 ppm each of Zn, B, Cu, Fe, Mn and 50 ppm Mo.
- (iii) The incidence of *Tuta absoluta* in tomato grown in greenhouse was noticed in Sunkiya, Dhari, Bhagartola and Jageshwar villages of Uttarakhand. A team of scientists visited these villages for a survey and management of *Tuta absoluta*. Polyhouses where tomato was grown were surveyed and pest incidences of about 5-10% were noticed. Severely infested polyhouses were sprayed with the pesticide (chlorantraniliprol Coragon @ 0.3 ml/l). The pesticide was distributed to the farmers for further use for pest management.

- (iv) A new biopesticidal -biogels or composites based on a natural gum (BP-1) and carboxymethylcellulose (BP-2) cross-linked with prestandardized organic acid (OA-1) were synthesized.
- (v) More than 132 pathotypes of wheat, barley, oat and linseed were maintained as live cultures as well as cryo-preserved. Nucleus inocula were also multiplied and cryo-preserved.
- (vi) The parasitoid recovered from *Phenacoccus solenopsis* infesting brinjal was identified as *Aenasius ariozensis*.

#### **Development of Farm Implements, Machinery and Post - Harvest:**

- (i) Developed a Real-time uniform rate spraying system for field crops.
- (ii) Developed a manually operated gladiolus planter for planting gladiolus corms.
- (iii) Developed a mechanized system for bulk storage of onion having 1 tonne storage capacity.
- (iv) Developed a portable briquetting machine for soybean straw and cotton stalk.
- (v) Developed an ECF bleaching protocol for banana fibres for producing banana pulp based quality paper and textile materials.
- (vi) A community based solar panel operated green house type dehydrator was designed and fabricated for hygienic and efficient drying of raw mango slices.
- (vii) Developed "prayer mat" from jute & yak blended fibre.
- (viii) Synthesized jhingan gum-based AgNPs with 2% and 6.0% gum concentration.
- (ix) Developed Nano cellulose based packaging material and Nano based paint formulation with improved efficacy.

#### **Public Outreach:**

- (i) Frontline demonstrations on oilseed and pulses were taken up all over the country covering an area of 4491.47 ha and involving 10997 farmers.
- (ii) 235 field-days with the participation of 8447 farmers and 1014 *Kisan Goshties/Melas* with the participation of 59265 farmers were organized.
- (iii) Over 2439 training courses for 58392 farmers, 322 trainings for 5929 rural youths and 338 trainings for 5847 extension functionaries and in-service personnel were organized in the frontline areas of technology development.
- (iv) Besides, KVK scientists undertook 5553 visits to the farmers' fields for diagnosing various problems and to sensitize them on location specific recommendations during past one month.
- (v) In *Mera Gaon Mera Gaurav* program 740 scientists visited 700 villages and organized 449 demonstrations benefitting 47632 farmers. A total of 3653.1 quintals of seed and 6.79 lakh planting materials were also distributed to 6209 and 13892 farmers respectively.
- (vi) 50000 frozen semen doses of Frieswal bulls were produced for insemination of crossbred cattle at Military Farms and farmers' herd.
- (vii) During the month, vaccinations with 35000 doses of *Ranikhet Disease (RD)*, 3500 doses of Infectious Bursal Disease (IBD), 5200 doses of *Marek's disease* and 2500 doses of fowl pox were carried out in broiler, layer, turkey, guinea/*desi* fowl/emu.

- (viii) National Collection of Dairy Cultures (NCDC) supplied 28 nos. freeze dried cultures to 7 cooperative dairy and milk plants in private sector for fermented milk and cheese; and microbial strains to 5 educational institutes for teaching and research purposes.

#### **Application of Space Technology:**

- (i) A unique satellite data reception centre has been established in the Division of Agricultural Physics at IARI, New Delhi. These data are being used for monitoring crop health and drought condition in all the districts of the country. This information is regularly updated in the webportal <http://creams.iari.res.in> , which is available to all stakeholders for their own decision making.
- (ii) Automatic Weather Station (AWS) installed at ICAR-VPKAS, Almora through department of space ISRO and Indian Institute of Remote Sensing (IIRS), Dehradun is being regularly used for weather data collection (average Temperature, maximum and minimum temperature, RH, wind speed, wind direction, solar radiation, rainfall, dew point) as well as transmission to IIRS.
- (iii) Agro-met advisory bulletins were prepared on every Tuesday and Friday at IARI, New Delhi based on the past weather data, current weather data and weather forecast received for next five days on different weather parameters viz. maximum and minimum temperature, rainfall, cloud cover, wind speed and wind direction from Regional Meteorological Centre, India, Meteorological Department, Agromet Advisory Unit, Safdarjung, New Delhi in Hindi as well as in English.

#### **OTHER MAJOR ACTIVITIES:**

- (i) ICAR Headquarters as well as Research institutes and KVKs arranged for viewing of the live broadcast of Hon'ble Prime Minister Shri Narendra Modi's interaction meeting with farmers across the country related to doubling of farmers' income by 2022 on June 20, 2018 from 9.30 to 11.00 AM. All scientists, staff members and research scholars of the institute and Headquarters participated in the programme. 78467 farmers viewed/participated in the live interaction with Hon'ble Prime Minister covering 654 KVKs from 32 States and UTs.
- (ii) The 4th International Yoga Day was observed at NASC Complex New Delhi. Employees from Indian Council of Agricultural Research (ICAR) Headquarters assembled in the morning and performed yoga under the guidance of instructors of the Morarji Desai National Institute of Yoga, New Delhi. Similarly, all the research institutes and KVKs also observed the Yoga day and about 24259 employees attended these programmes.