

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

INTERNATIONAL COOPERATION:

- (i) MoU between Indian Council of Agricultural Research (ICAR) and Rwanda Agriculture and Animal Resources Development Board (RAB), Rwanda was signed on 23rd July, 2018 with objective to establish inter-institutional cooperation the field of livestock and dairy research, development by pooling technical, scientific, financial and human resources with the ultimate goal of building capacity in dairy research, milk production, sharing technology on milk processing, value addition and marketing, and improving yield and productivity of livestock in both countries.
- (ii) Organized international training on “Mass breeding and culture techniques of catfishes” at ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar during July 16-21, 2018 under funding support of SAARC Agriculture Centre. Training was attended by 14 participants.

MAJOR RESEARCH ACHIEVEMENTS

Varietal Improvement:

- (i) Two China aster varieties Arka Aadya & Arka Archana have been recommended to be released for cultivation.
- (ii) The cashew hybrid, H-130 highly suitable for ultra high density planting systems, recommended to be released for cultivation.

Agricultural Biotechnology:

- (i) Overexpression of *Abscisic Acid Receptor 11 (ABAR11)* gene confers cold and drought tolerance- ABA receptor 11 (ABAR11) gene cloned from drought tolerant rice cv. Nagina 22 was overexpressed in rice cv. MTU1010. *OsABAR11* overexpressing transgenic plants showed higher membrane stability, chlorophyll stability, less senescence, and significantly higher survival under cold stress. *OsABAR11* transgenics lose less water in Excised Leaf Water Loss (ELWL) assay and produced more roots under drought stress as compared with NT plants. These results showed the potential of ABAR11 gene for improving drought and cold tolerance in rice.
- (ii) Phenomics of diurnal and nocturnal transpiration in rice genotypes in 150 rice Genotypes with contrasting transpiration rates were identified. GWAS analysis was carried out and QTLs/Genes for transpiration were mapped in rice. 18 QTLs for mean day time transpiration and 12 QTLs for mean night time transpiration per unit leaf area were mapped. A Region on chromosome 6 appears to control whole plant transpiration.
- (iii) Microarray and real-time RT-PCR expression analysis were carried out to understand the regulation of root system architecture (RSA) and a root tissue-specific and osmotic stress *OsMYB TF* gene was cloned from rice.
- (iv) Gene copies of *hao*, a molecular marker for dehydrogenation of hydroxylamine to nitrite by hydroxylamine oxidoreductase, were between 10^7 and 10^8 ng⁻¹ soil DNA,

suggesting that bacterial ammonium oxidizers were dominant in the conventional flooded (CF) and direct-seeded rice field plots.

- (v) Cloning of OELCV Rep gene in TA vector for RNAi analysis in okra was done.
- (vi) Mechanism of Avian Reovirus-induced viral arthritis was established using microarray study, which signified the involvement of “osteoarthritis pathway” with z-score of 3.151 and “Role of IL-17A in arthritis pathway” enrichment.

Conservation of Genetic Resources:

- (i) Seventy-nine specimens were added to the National Herbarium of Cultivated Plants (NHCP) bringing the holdings to a total of 23,330 specimens (as on June 30, 2018).
- (ii) One hundred eighty nine accessions were added to the National Genebank bringing the genebank holdings to a total of 4, 38,084.
- (iii) Six thousand four hundred and ninety four accessions comprising cereals, vegetables, fruits and fibres etc. were introduced from 14 different countries for supply to various indenters across the country. The important accessions introduced were ditelocentric genetic stocks in wheat from Mexico (EC949682-949712), wild species of banana *Musa textilis* (EC949665) and *Musa jackeyi* (EC949666) from Belgium).

Natural Resource Management:

- (i) Developed GIS based fish species availability map of river Ganga by utilizing the data collected from 18 selected sampling stations located from origin to Ganga Sagar.
- (ii) In clay loam soil, drip fertigation with 75% of recommended dose of fertilizer (RDF) applications in garlic resulted in saving of irrigation water and fertilizer by 28 and 25% respectively with bulb yield of 15.41 t/ha at Kota, Rajasthan.
- (iii) Casing application of siderophore producing *Pseudomonads*, PCR_{s4} (14.13 kg/q), PGR_{s1} (13.34 kg/q), PBR_{s5} (13.22 kg/q) and NPR_p (13.09 kg/q) gave significantly higher yield of *Agaricus bisporus* than control (11.26 kg/q compost).
- (iv) Casing application of phosphate solubilizing *Pseudomonads*, *Pseudomonas fragi* CS11RH1 (14.18 kg/q) and *Pseudomonas* sp. CS11RP1 (15.36 kg/q) gave significantly higher yield of *Agaricus bisporus* in comparison to control (12.51 kg/q compost wt.).
- (v) Adoption of 150 x 90 cm planting geometry with application of 20 kg K₂O/ha in castor resulted in realizing higher seed yield and economic returns.

Development of Farm Implements, Machinery and Post - Harvest:

- (i) Developed a tractor mounted ginger planter and determined the field performance parameters (miss, multiple, QF Index etc.) at the various forward speed variations.
- (ii) Developed a process for extraction and utilization of pectin using steam jacketed kettle instead of present coil heating system.
- (iii) The storage life of Beans cv. Arka Sharath was found to be 12 days at 13°C without any chilling injury as compared to 3 days during storage at ambient temperature. The quality parameters were also maintained during storage.
- (iv) Developed a process of abrasive pre-treatment of grapes to enhance the drying rate during raisin making.

- (v) Developed dishware from banana fibre based value added product.

Public Outreach:

- (i) Frontline demonstrations on oilseed and pulses were taken up all over the country covering an area of 7019.15 ha and involving 20401 farmers.
- (ii) 211 field-days with the participation of 8416 farmers and 640 *Kisan Goshties/Melas* with the participation of 59390 farmers were organized.
- (iii) Over 3827 training courses for 106472 farmers, 374 trainings for 7347 rural youths and 277 trainings for 6617 extension functionaries and in-service personnel were organized in the frontline areas of technology development.
- (iv) Besides, KVK scientists undertook 6739 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 886 scientists visited 740 villages and organized 926 demonstrations benefitting 79644 farmers. A total of 1285.1 quintals of seed and 16.92 lakh planting materials were also distributed to 11724 and 23557 farmers respectively.
- (vi) Dissemination elite bull frozen semen of sahiwal cattle; Introgression of FecB: gene in on-prolific sheep and grading up of indigenous Pig using Landrace crossbreds were used for increasing the income of farmers.
- (vii) 34000 frozen semen doses of Frieswal bulls were produced for insemination of crossbred cattle at Military Farms and farmers' herd.
- (viii) Produced 809.44 lakh fish spawns of various freshwater, brackishwater and marine species till July, 2018.
- (ix) During the month, vaccinations with 32000 doses of *Ranikhet* Disease (RD), 3100 doses of Infectious Bursal Disease (IBD), 5500 doses of *Marek's disease* and 2200 doses of fowl pox were carried out in broiler, layer, turkey, guinea/*desi* fowl/emu.
- (x) National Animal Disease Referral Expert System V 2 (NADRES V 2) developed by NIVEDI, Bengaluru for forecasting of 13 economically important livestock diseases at block level in India
- (xi) National Collection of Dairy Cultures (NCDC) supplied 37 nos. freeze dried cultures to 4 cooperative dairy and milk plants in private sector for fermented milks and cheese; and microbial strains to 4 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. 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 are being prepared on every Tuesday and Friday 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. During June 20 – July 19, 2018, total 8 agro-advisory bulletins were prepared in Hindi as well as in English and SMSs were sent to the farmers through Kisan portal. These advisories are sent to IMD for preparation of national bulletins and uploaded on the IMD website (www.imdagrimet.gov.in) in both Hindi and English. These advisories and real time weather data along with medium range weather forecast was uploaded on the IARI website (www.iari.res.in).

OTHER MAJOR ACTIVITIES:

- (i) ICAR's 90th Foundation day and award ceremony was organised on 16th July, 2018 at New Delhi. On the occasion Union Minister of Agriculture and Farmers' Welfare Shri Radha Mohan Singh congratulated scientists and officials of the of Indian Council of Agricultural Research (ICAR) along with farming community of the country. Shri Singh said the efforts of the ICAR have not only helped India transform from an importing nation to an exporting nation but also provided self-sufficiency and nutritional security in foodgrains. Due to the efforts of our scientists and the hard work of the farmers, the country today has a large buffer stock of foodgrains. Also Shri Gajendra Singh Shekhawat, Union Minister of State for Agriculture and Farmers Welfare said ICAR gave special emphasis towards needs to develop skilled youth in the field of Agriculture as recommended by the Fifth Dean Committee already implemented in all Agricultural Universities. In the award distribution function awards were given for excellence in 16 different categories.
- (ii) GM Detection Research Facility at ICAR-NBPGR has been granted accreditation by the National Accreditation Board for Testing and Calibration Laboratories (NABL), a Constituent Board of Quality Council of India in the discipline of Biological Testing in accordance with ISO: IEC 17025:2005 *w.e.f.* 29 June 2018.