

**DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION
MONTHLY SUMMARY - APRIL 2019**

MAJOR RESEARCH ACHIEVEMENTS

Varietal Improvement:

- (i) Rice varieties namely CR Dhan 204, CR Dhan 205, CR Dhan 306, CR Dhan 309 (IET 25345), CR Dhan 311, CR Dhan 510, CR Dhan 511, CR Dhan 801 and CR Dhan 802/ *Subash* were released and notified for cultivation.
- (ii) Two climate smart rice varieties from above released varieties viz., CR Dhan 801 and CR Dhan 802 with in-built drought and submergence stresses tolerance are unique and first in rice research in which submergence tolerance quantitative trait loci (QTL), Sub1 and drought yield QTLs, qDTY1.1, qDTY2.1, and qDTY3.1 are stacked in the background of *Swarna* variety through marker-assisted backcross breeding.
- (iii) Fourteen varieties of fodder crops have been identified for release. These include eleven varieties of Pennisetum hybrid (S-25, TNCS 265, IGFRI-96-706, IG-67-365, TSFM-15-5, TSFB-15-4, TSFB-15-8, TND 1308, TSLH-1, PBN-351, VTPH-3) and three of Bajra Napier Hybrid (TNCN 1280, BNH-14 & BNH-11).
- (iv) Four maize hybrids viz., APH 27, APQH 5, APQH 7, and ASKH 1 with improved quality were identified for release.
- (v) *Kufri Karn* (SM/00-42) is a medium maturing multiple disease resistant hybrid recommended for cultivation in Indian hills & plateau areas. This hybrid has resistance to multiple diseases viz., late blight, apical leaf curl virus, potato virus Y, potato virus S, potato leaf roll virus, potato virus A, potato virus M with moderate resistance to potato cyst nematode.
- (vi) *Kufri Sahyadri* (OS/01-497) is highly resistant to both the species of potato cyst nematode viz., *G. rostochiensis* and *G. pallid* and moderately resistant to late blight was released for cultivation at Tamil Nadu hills.

Agricultural Biotechnology:

- (i) The candidate gene WA352 for WA-CMS trait in rice was identified and validated wherein a PCR-based functional marker, targeting the in-del region in WA352, named RMS-3-WA352 has been developed and its utility in identification of impurities in WA-CMS seed lots has been demonstrated.
- (ii) Zymograph of Pullulanase enzyme assay was developed to establish a correlation with Resistant Starch (RS), an easy tool to screen high resistant starch varieties of rice.
- (iii) The database on spermatozoa transcriptogram of Frieswal crossbred bull was developed. Full length of CDS (Coding sequence) of heat shock protein 70 was characterized in crossbred cattle. Identified SNPs at two exotic region of bovine Kisspeptin gene among Kankrej and Gir Cattle breeds.
- (iv) Designed and validated multiplex microsatellite marker panels to ascertain population genetic structure of yellow fin tuna, *Thunnus albacares* and seer fish, *Scomberomorus commerson*.

Conservation of Genetic Resources:

- (i) A total of seven hundred forty seven accessions including were introduced from eight different countries. The important accessions introduced were maize lines resistant to stem borer especially fall army worm (EC977839-977867) from CIMMYT, Mexico and improved cultivars with high TSS in Kiwifruit from USA (EC977548-977574).
- (ii) A total of nine hundred forty four samples of imported exotic germplasm were processed for quarantine clearance and released to indenters. *Stenocarpella maydis* on *Zea mays* imported from USA was an important pathogen interception. For export, 10474 samples were processed for quarantine clearance and 10468 samples were released. Seven phytosanitary certificates were issued.
- (iii) A fish species, red cornet (*Fistula riapetimba*) from inland waters of Cauvery estuarine mouth at Poompuhar was recorded for the first time.

Natural Resource Management:

- (i) Developed organic farming package of practice of Scented rice – vegetable pea-sorghum (fodder) system at Jabalpur (Madhya Pradesh).
- (ii) At Palampur, strawberry crop grown under protected cultivation with drip fertigation at 0.6 PE (Pan Evaporation) and 75% NK resulted in fruit yield of 381.97 g/m² with 25% saving of NK and 40% water saving compared to crop fertigated at 1.0 PE and 100% NK.
- (iii) Identified a three tier silvopastoral system comprising of mulberry/calliandra plus hybrid Napier plus stylosanthes/desmanthus to cater the fodder demands of small scale farmers of Kerala for profitable milk production.
- (iv) Severe incidence of thrips was recorded and agro-advisory issued for the management of thrips for the benefit of mango growers/ stake holders in Uttar Pradesh.
- (v) A botanical pesticide i.e. Prabal (*Opuntia* sp. + *Oryza sativa*) @ 0.1% was observed promising against wet bubble disease of mushroom under field conditions.

Development of Farm Implements, Machinery and Post - Harvest:

- (i) Developed automatic control system for tractor implements combination.
- (ii) Developed tractor operated intra row-cum-inter row weeder for orchards.
- (iii) Developed seed metering mechanism for high speed seeding or planting.
- (iv) Developed improve flaking system for small scale production of rice flakes.
- (v) Developed tractor cabin using the criteria of optimum space layout for improvement of visibility of operators.
- (vi) Developed a solar-powered cooler for storage of fresh fish at chilled temperatures of 1-3°C in retail markets. Electric power generated by solar panels is stored in a battery which in turn supplies power to the cooler. The cooler can hold up to 50 kg of fish.
- (vii) Developed fruit waste and plant extracts in developing antimicrobial coatings for extending shelf-life of fruits followed by clove oil and grapefruit oil.
- (viii) Developed conductive yarn using core yarn spinning machine.
- (ix) Developed spore based kit for detection of antibiotic residues in milk at dairy farm.

- (x) Technology of sour *dahi* preparation using prolific acidifying lactic cultures was developed.
- (xi) Technology for *Misti Doi* with fast acidifying high sugar tolerating lactic culture(s) was developed.
- (xii) A fortified health drink with 10% Oyster mushroom, malted ragi flour, whey protein powder, milk powder, sugar & cocoa with overall good acceptability score was prepared.
- (xiii) Process technology for Palada Payasam mix preparation by dry crystallization method in a mechanical unit was developed.

Public Outreach:

- (i) Frontline demonstrations on oilseed and pulses were taken up all over the country covering an area of 14419.18 ha and involving 39563 farmers.
- (ii) 743 field-days with the participation of 26181 farmers and 487 *Kisan Goshties/Melas* with the participation of 81655 farmers were organized.
- (iii) A total 2843 training courses for 61752 farmers, 1125 trainings for 9687 rural youths and 540 trainings for 6346 extension functionaries and in-service personnel were organized in the frontline areas of technology development.
- (iv) In *Mera Gaon Mera Gaurav* program, 854 scientists visited 632 villages and organized 1054 demonstrations benefitting 43352 farmers. A total of 3882.21 quintals of seed and 07.03 lakh planting materials were also distributed to 10799 and 30472 farmers respectively.
- (v) During 20 March– 19 April, 2019, total 9 agro-advisory bulletins were prepared in Hindi as well as in English and SMS 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).

Application of Space Technology:

- (i) 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.
- (ii) One Indian Regional Navigation Satellite System (IRNSS) through ISRO as a part of Ministry of Earth Science project is regularly being used for data collection by VPKAS, Almora and the weekly data files till 15.04.2019 have been sent to NPL Delhi.
- (iii) ClimGen climate model was validated with historical weather data of IIRR and simulated values were in agreement with recorded values from weather station at IIRR farm. A software was developed for integrating map and ClimGen model and Grid wise temperatures were estimated.

OTHER MAJOR ACTIVITIES:

- (i) A digital android based mobile application 'AVIMEGH' developed by ICAR-CSWRI for community-based breeding in Malpura sheep project. It enable instant entry in the database by breeder/shepherd/data enumerator.

- (ii) National referral laboratory at ICAR-Central Institute for Research on Goat (CIRG) for testing of animal products awarded Certificate of Accreditation by NABL (National Accreditation board for testing and calibration laboratories).