

**DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION
MONTHLY SUMMARY - OCTOBER 2020**

IMPORTANT RESEARCH ACHIEVEMENTS

Varietal Improvement/Promotion:

- Seventeen (17) biofortified varieties of 8 crops developed by ICAR were dedicated to the nation by the Prime Minister, Shri Narendra Modi on 75th Anniversary of the Agriculture and Food Organization (FAO) of United Nations on 16th October 2020. Among these varieties, rice variety CR Dhan 315 has high zinc; wheat variety HI 1633 and MACS 4058 are enriched with protein, iron and zinc, while the wheat variety HD 3298 is enriched with protein and iron, while wheat varieties DBW 303 and DDW 48 are rich in protein. The maize hybrids LQMH 1, LQMH 2 and LQMH 3 are enriched with essential amino acid lysine and tryptophan, while the finger millet varieties CFMV 1 and CFMV 2 are rich in calcium, iron and zinc. The CLMV1 variety of little millet is rich in iron and zinc. The Pusa Mustard 32 is enriched with low Erucic acid, while Girnar 4 and Girnar 5 varieties of groundnut are rich in increased oleic acid and two yam varieties Sree Neelima and DA 340 are enriched with anthocyanin, iron, zinc and calcium. While applauding the efforts of the scientists, Prime Minister stressed that the improved varieties of crops will change the normal Indian Thali (food plate) into a nutritious one. Shri Modi emphasized on promoting the biofortified varieties of crops by linking them with the several government programmes namely - Mid-Day Meal, Anganwadi, etc., to make India free from malnutrition. He stressed that this will ensure good income for the farmers along with opening new avenues of entrepreneurship for them.
- A potato variety HT/7-1329 tolerant to high temperature (tuberization at 20°C night temperature) for early (15 September) planting in North Indian Plains was identified for cultivation.
- Marker assisted backcrossing (MABC) derived wilt resistant introgression line of chickpea named as BGM 20211 was identified for release for Central Zone for cultivation.

Agricultural biotechnology:

- Seventy-five (75) pigeonpea genotypes were screened for anti-nutritional factor, trypsin inhibitor at ICAR-NIPB, New Delhi. Trypsin inhibitor activity was in the range of 0.109 to 6.71mg Trypsin Inhibitor Unit (TIU)/g seed sample, and pigeonpea genotypes with highest and lowest trypsin inhibitor content were identified.
- *In-silico* characterization for 11 genes (7 up-regulating, 4 down regulating) showing response to charcoal rot of soybean was carried out by the ICAR-IISR, Indore.
- ICAR-IARI, New Delhi experimented on Abscisic acid (ABA), a plant stress hormone perceived by ABA receptor and then imparts stress tolerance. Rice genome encodes 14 ABA receptors. One of the ABA receptors, *OsPYL6*, by constitutive and stress inducible over expression, and RNAi silencing in an *indica* rice cv. Pusa Sugandh 2. *OsPYL6* over expression enhanced the expression of stress responsive genes and dehydration tolerance. *PYL6* transgenics used about 25% lesser water as compared with WT plants under drought. *PYL6* over expression significantly reduced grain yield under non-stress conditions due to reduction in height, biomass, panicle branching and spikelet fertility. RNAi silencing of *OsPYL6* also significantly reduced the grain yield under drought. These results showed that

OsPYL6 is a key regulator of plant development and drought tolerance, and fine tuning of its expression is critical for improving yield and stress tolerance in rice.

- A putative activator MYB related transcription factor *CIMYB 1R1* showing positive correlation with curcumin content was identified in turmeric.
- Sequencing based confirmation of mating type genes in four germplasm of paddy straw mushroom and elution of ITS genes of three germplasm of *Morchella* mushroom was completed.
- ICAR-IVRI evaluated Development of a synthetic antisense Locked Nucleic Acid (LNA) as a substitute to Rabies Immunoglobulin (RIG) against rabies.
- Molecular identification of the brown trout *Salmo trutta* from the river Tons was made through 18S rRNA sequence and the phylogenetic tree analysis predicted that isolated GenBank Accession Number MN508429 is evolutionarily very close to *Salmo trutta* having NCBI GenBank accession number FJ710888 (Australia).

Conservation and management of genetic resources:

- Five hundred sixty-nine (569) accessions were added to the National Gene Bank bringing the gene bank holdings to a total of 447205. Additionally, regenerated material (290 regenerated accessions) was added to long-term conservation. One hundred fifteen (115) accessions along with the proposals for release of varieties were received for long-term conservation. Seed health testing of 1139 samples was carried out for its pest free conservation in National Gene Bank, by the Division of Plant Quarantine.
- Current status of National Genomic Resource Repository samples is 6447 belonging to 45 species.
- Two hundred and seventy-nine (279) accessions of various crop species - cereals (96), Pulses (6), fruits (47) and vegetables (110) were introduced from six countries.
- The current holding status of *In vitro* Gene Bank is 1902 accessions and that of Cryo Bank is 14033 accessions at NBPGR, New Delhi.
- ICAR-IISS, Mau is maintaining 19 wild accessions and 21 cultivated genotypes of genera *Eleusine* and 124 germplasm of rice.
- Bacteria having nitrous oxide reducing capacity (using for N₂O mitigation from crop fields) is being conserved at ICAR-IARI, New Delhi. Approximately 2,000 insect specimens were added to the existing. National Pusa Collection of 1.4 million insect specimens.
- At NBPGR, New Delhi, a total of 2475 accessions of imported exotic germplasm were processed for quarantine clearance and 2472 accessions were released to the indenters. A total of 1431 germplasm samples were processed for export and 1382 samples were released. 17 phytosanitary certificates were issued.
- Thirty (30) specimens were added to the National Herbarium of Cultivated Plants bringing the holdings to a total of 24326 specimens.
- One variant clone of pomegranate var. *Bhagawa* called *Sharad King* was collected from the farmers field.
- ICAR-NRC on Camel submitted five anaerobic cultures to VTCC-Rumen Microbes repository of ICAR-NAINP, Bangalore.

Management of natural resources:

- Prepared desertification map of Telangana at 1: 500 000 scale.

- In clayey soil of Navsari district, drip fertigation in Rabi Sorghum-Cowpea cropping system with irrigation at 0.60 pan evaporation fraction (PEF) and application of 100% recommended dose of fertilizer (RDF) could result in 42.5% increase in yield and 17.4% saving of water besides increasing the income of farmers by over 75 percent.
- Developed organic farming package for Turmeric (Var. *Pragati*) yielding of 22.1 t/ha with net income of Rs 4.84 lakhs/ha and net return per rupee invested as 2.70 in Kerala.
- A low-cost net house with 60% reduced fabrication cost was developed for multiplying early generation seed potato.
- Production technology for soil less cultivation of hybrid tomato under open field conditions was standardized.
- Vermicompost manure extract was used as nutrient media for microalgae culture to be used for biodiesel production. Combination of vermicompost extract and BG11 medium significantly improved the growth, biomass concentration and lipid production of *Chlorella* sp. Quality of biodiesel was of ASTM International biodiesel standard as evident from fatty acid profiling.

Management and improvement of Livestock & Fish Resources:

- Under Glanders surveillance programme a total of 1471 equine samples from seven states were tested. Out of which, six equines were found positive from Uttarakhand, Haryana, Delhi and Madhya Pradesh.
- ICAR- NRC on Pig made awareness programme for pig health management & production through phone calls and WhatsApp communication. Consultancy service regarding routine health care, biosecurity measures were provided to tribal farmers of Assam, Karnataka, Haryana, Punjab and Meghalaya. To make awareness among the farmers in regard to prevention of diseases, extension material in terms of leaflets were also provided.
- ICAR-NRC on Pig advised farmers to procure pigs/piglets from known sources having disease free status. It is also advised to screen the pigs against the important diseases such as Classical Swine Fever (CSF), Porcine Respiratory and Reproductive Syndrome (PRRS), Foot and Mouth Disease (FMD), Porcine Circovirus (PCV2), Porcine Parvo Virus (PPV) and Brucella prior to introduction in to the existing herd.
- Advisories for Veterinarians and Farmers with respect to African Swine Fever (ASF) has been issued and the same has been made available in the institute website (www.nrcp.in)
- ICAR-CSWRI, Avikanagar was awarded a patent for "Low cost, indigenous cradle for safe restraining of sheep for pregnancy diagnosis" Successfully accomplished artificial breeding of three endemic fishes of Kerala- Malabar labeo (*Labeo dussumieri*), Yellow catfish (*Horabagrus brachysoma*) and Valenciennes' Clariid (*Clarias dussumieri*) in hatchery conditions at Kochi.
- Achieved cage based multiple spawning of brackish water ornamental fish Orange chromide, *Etroplus maculatus* in floating cages (2 ×1×1 m) installed inside the pond. Maximum of 11 spawning achieved in cage with 10 pairs of brooders.
- ICAR-IIAB, Ranchi, developed a new combinatorial feed formulation for barramundi (*Lates calcarifer*) using varied non-fish meal ingredients.
- Natural Deep Eutectic Solvents (NDES) are novel solvents prepared by green chemistry principles which are completely biocompatible and have application in food and nutraceutical products. Synthesized 8 different NDES for extraction of biomolecules from marine resources.

- An improved cast net was designed and fabricated for operation in inland fishing systems of Eastern India.

Integrated Pest Management:

- Water extract from *Cynodon dactylon* demonstrated up to 80% larval mortality against *Spodoptera litura* (2nd instar) using surface diet contamination method under *in vitro* conditions at the ICAR-IIPR, Kanpur.
- At ICAR-VPKAS, Almora, Bioassay of spinosad, flubendiamide and indoxacarb at 50ppm against 3rd instar larvae of Bihar hairy caterpillar showed 100% mortality at 48 h after treatment. Whereas the 100% mortality of 3rd instar larva of *Helicoverpa* was achieved at 750, 750 and 1000 ppm of the insecticides, respectively.
- ICAR-NRRI, Cuttack has developed *Bracon* card which is able to parasitize more than 70% of leaf folder larvae. Price is fixed at Rs. 70/- per card.
- Light trap based IPM for South American Tomato moth (*Tuta absoluta*) in tomato was successfully demonstrated.
- An antagonistic bacteria *Bacillus amyloliquefaciens* was identified, characterized and evaluated against *Fusarium oxysporum* f. sp. *Vanilla* causing root and stem rot disease.

International Cooperation/recognition

- Under the VAIBHAV (Vaishwik Bharatiya Vaigyanik) Summit 2020 of Government of India, a session under "Precision agriculture" horizontal, was organized on "*Sensors and Sensing for Precision Agriculture*" on 05 Oct 2020 by ICAR-Indian Agricultural Research Institute (IARI) in Webex platform with total participation of 1019 and 9 panellists, out of this 6 were foreign panellists. Under the Vertical- Agro Economy and Food Security, and Horizontal-16 of the summit (hosted by ICAR- CIFA, Bhubaneswar), Modern Fisheries, Aquaculture and Seed production (V16H1S3) for the empowerment of stakeholders and developing need-based collaborative programmes including faculty upgradation and exchange of personnel and students were deliberated.
- On World Statistical Day, 20th Oct. 2020, ICAR-Indian Agricultural Statistics Research Institute, New Delhi organized a *Symposium* on "*Relevant and Quality Data for Agricultural Research and Policy Planning*". Padma Shri, Dr. Bimal Kumar Roy, Chairman, National Statistical Commission, Government of India & Formal Director, Indian Statistical Institute, Kolkata highlighted the statistical challenges in Analysis of Crowd Source Data. Dr. Michael Steiner, Chair, Committee on Agricultural Statistics, International Statistical Institute, The Netherlands & Senior Consultant, World Bank, Rome shared his experiences on the Agricultural Statistics System in the global perspective and associated challenges in generating reliable and timely data under the broad heading Assessment of the Agricultural Information System. More than 125 participants including the participants from World Bank, FAO of United Nations, different Departments and Ministries of State and Central Governments, Indian Statistical Institute, ICAR Institutes, Universities, Scientists and students from the Institute virtually participated in the Webinar.
- The ICAR-Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala organized an *International Webinar* on "*Harnessing the Potential of Tropical Tuber Crops under Changing Climate (HPTTC) - 2020*" on 27th Oct 2020. The Webinar was aimed at having an insight into the Tropical Tuber Crops' role as food security crops under the variable climates. Lead talk on the occasion was delivered by Dr. Jan W. Low, World Food Prize Laureate &

Principal Scientist, International Potato Centre, CIP, Nairobi Centre, Kenya who highlighted the potential of tubers in combating the hidden hunger and malnutrition and uplifting the socio-economic status of the people. A total of 958 participants, 890 from India and 68 from 21 outside India registered for the event of which over 300 participated in the Webinar.

Farm Implements, machinery and post-harvest technologies developed:

- Developed smart sprayer for young pomegranate orchards.
- Developed integrated system for harvesting and conveying of bunch crop.
- Developed thermal degradation and bio-polymeric transitions of pigeon pea stalk in torrefaction.
- Developed fortified flaxseed oil with probiotics by nano encapsulation.
- Developed the phase change material based assembled type fruit ripening chamber.
- Developed biodegradable wound dressing pad with antimicrobial properties.
- Evaluated the milling outturn of major pulses stored in warehouses.
- Postharvest management and value addition of *Ker* and *Sangri* for their commercial exploration.
- Standardized technology for shelf stable pre-cut beans using browning inhibitors and edible coatings. The treated pre-cut beans retained good visual appeal and could be kept safely for 11 days under low temperature storage conditions.

Technology Promotion and Commercialization:

- Technologies of "Mechanized System for Primary Roasting of Raw Makhana Seeds and Process Thereof" licensed to M/s Unitech Technocrats, Vill. Meerpur Gurudwara, Kala Amb, Sirmour for commercialisation.
- Two numbers of technology of ICAR-CIAE "Hand Held Vegetable Transplanter (Model-I Single row and Model-II two row)", licensed for commercialisation to M/s Shree Ganesh Engineering Works, Maharashtra.
- Technologies of ICAR-CIAE "Manually Operated Portray Type Nursery Seeder" licensed for commercialisation to M/s Shree Ganesh Engineering Works, Maharashtra.
- Two numbers of technology of ICAR-CIAE "Manually operated Pull Type Three Row Planter for Millets- Multi- Crops (Model I-Inclined Plate Type and Model II-Vertical Plate Type)" licensed for commercialisation to M/s Shree Ganesh Engineering Works, Maharashtra.
- Technology of ICAR-Directorate of Cashew Research (ICAR-DCR), Puttur "Rotating drum roasting machine for raw cashew nuts" licensed for commercialisation to M/s Abhay Engineers, Mangaluru, Karnataka.
- Nutri Bar Technology of ICAR-CIAE licensed for commercialisation to M/s DiTriRu, (Disabled, Tribal and Rural Manufacturer), Thane, MH.
- Non-exclusive license for seed production and marketing of *Bhima Shakti* & *Bhima Super* varieties of onion were granted to two agencies one each in Maharashtra and Madhya Pradesh.

Efforts made by DARE/ICAR to tackle COVID-19 pandemic:

- The guidelines issued by the GOI/respective state govts from time to time were followed by all ICAR institutes/establishments/ subordinate field offices to contain the spread of COVID 19. e-office has been implemented in all ICAR institutes. ICAR research institutes and KVKs continued their efforts to disseminate national and state-specific advisory for farmers, translated into different regional languages through various digital platforms like m-kisan

portal, WhatsApp groups, Online Apps & Expert Systems, newspapers, radio and TV channels Facebook and other ICT platforms. Advisories and technologies for processing/ value addition and marketing of vegetables, fruits and fruit products, and flowers continued to be extended to entrepreneurs, private firms and state governments. Testing of human samples (257896 till now) was continued the 4 ICAR Research Institutes.

- As part of the Gramin Kalyan Rojgar Abhiyan being organised by the Ministry of Rural Development, Govt of India in partnership with ICAR, from 20th June up to 23rd Oct 2020, KVKs under ICAR organised 1890 trainings in 6 states viz; Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, Rajasthan and Odisha benefitting 66,912 migrant labourers who were imparted various entrepreneurship skills in agriculture and related areas.
- ICAR has provided all e-resources of CeRA (Consortium for e-Resources in Agriculture) to the researchers, faculty and students of 152 ICAR institutions and Agricultural Universities through remote access facility during prevailing Corona pandemic, to enable the users to make optimal use of this facility. Through this facility all the students, researchers and faculty members can access all the scientific literature of CeRA 24X7 from anywhere.

Farmers/Public Outreach:

- Frontline demonstrations on oilseed and pulses were taken up all over the country covering an area of 7929.17 ha and involving 21520 farmers.
- Organized 512 field-days with the participation of 13644 farmers and 552 *Kisan Goshties/Melas* with the participation of 21448 farmers.
- A total 4052 training courses for 108505 farmers, 552 trainings for 11153 rural youths and 494 trainings for 17718 extension functionaries and in-service personnel were organized in the frontline areas of technology development.
- KVK scientists undertook 8974 visits to the farmers' fields for diagnosing various problems and to sensitize them on location specific recommendations during the month.
- In *Mera Gaon Mera Gaurav* program, 605 scientists visited 540 villages and organized 1029 demonstrations benefitting 20328 farmers. A total of 4590.76 quintals of seed and 22.19 lakh planting materials were also distributed to 12199 and 182177 farmers respectively.
- The ICAR-IIOR, Hyderabad retailed 112 q seed of safflower variety ISF-764 to farmers of different states.
- Four weather forecast based weekly grape advisories for disease and pest management were uploaded on Institute website and link shared through *KRISHI* web portal.
- The Decision Support System on disease and pest risk and management advisory in grapes was provided to 1,800 registered farmers.
- Demonstrated 65 climate resilient natural resources management (NRM) interventions under Technology Demonstration Component (TDC) of National Innovations in Climate Resilient Agriculture (NICRA) benefiting 1205 farmers.
- New online database on "Vespidae of India" with checklist of 288 species and fact sheets of 75 species has been developed which is now hosted in NBAIR website: https://www.nbair.res.in/Databases/Vespidae/vesp_index.html.
- A live video demonstration on "Threshing of Soybean for Seed Purpose" was shown through institute Facebook page of the ICAR-IISR, Indore.

Agromet Advisories:

- The data generated at the satellite data reception centre established at IARI, New Delhi is being used to monitor crop health and drought condition in all the districts of the country. This information is regularly updated in the web portal <http://creams.iari.res.in>, which is available to all stakeholders for their own decision making.
- Agro-met advisory bulletins are prepared by IARI, New Delhi on every Tuesday and Friday. A total 8 agro-advisory bulletins were prepared in Hindi as well as in English and SMS were sent to the farmers through farmers *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).
- E-Atlas on inland waterbodies of 18 States of India is made available for public use through Institute website (<http://cifri.res.in/UR/ls/index.html>).
- ICAR-IARI, New Delhi, a spatial wheat yield prediction prototype framework was developed wherein remote sensing derived leaf area index on multiple dates were assimilated in the crop simulation model InfoCrop to improve the accuracy of prediction using different assimilation techniques. Provision was also made to make use of weather forecast in the framework. The prototype framework showed a decrease in error in wheat yield prediction from 20% to 7%. Efforts are on to develop a Graphical User Interface (GUI).

Other important activities:

- To commemorate 150th Birth Anniversary of Mahatma Gandhi, ICAR including all Institutes and subordinate offices under it organized 150th Gandhi Jayanti Saptah from 25th/26th September to 2nd October 2020. Wide array of programmes organized during the weeklong celebrations organized all over the country included, Swachhta related activities, distribution of masks and sanitizer to the slum dwellers, organizing painting competition among school children and staff members, display of famous Gandhian Quotations, invited talks, webinars on 'Reinventing Gandhian Philosophy in improving livelihood' and other such aspects. Special programmes were organized on 2nd October during which the winners of various competitions organized during the week were felicitated. A special publication "Mahatma Gandhi's Vision of Agriculture- Achievements of ICAR" was also brought out by the ICAR on this occasion.
- Meeting of ICAR Regional Committees No. II consisting of the states of West Bengal, Odisha, AP, Telengana and the UT of Andaman & Nicobar, Island was organised 8th October 2020 through Video Conferencing from ICAR, New Delhi. The meeting was inaugurated by Shri Shri Parsottam Rupala, Hon'ble Minister of State for Agriculture & Farmers Welfare. Shri Kailash Choudhary Hon'ble Minister of State for Agriculture & Farmers Welfare participated as the guests of Honour. The Regional Committee provides a forum for liaison and coordination among the institutes of ICAR, State Agricultural Universities and State Departments of Agriculture, Horticulture, Animal Husbandry and Fisheries. Ministers and Secretaries/senior officers of various agriculture & allied departments of the concerned states, members of ICAR Governing Body, senior officials from ICAR Headquarters, Vice-Chancellors of SAUs, Directors and Scientists of ICAR Institutes participated in the meeting. The researchable issues of importance in the areas of agriculture and allied fields and the technology options/ potential solutions were

discussed threadbare and actionable points were identified and assigned to the respective ICAR Research Institutes/ Agricultural Universities/KVKs to be resolved in a targeted time frame. The action taken on the issues raised in the previous Regional Committee Meetings were also reviewed.

- The ICAR-IARI, New Delhi carried out field demonstration for Delhi Govt. for managing paddy straw using Pusa decomposer. Using 2000 capsule kits (8000 capsules) the inoculum has been scaled up and spraying in farmers' fields has started from 13th Oct, 2020. Supplied 2500, 200, 100 and 50 Pusa Decomposer kits to UP, Punjab Telangana and West Bengal Govt Agriculture Deptt, for managing paddy straw. Also supplied 100 Pusa Decomposer kits to "FARMER" NGO for straw management in farmers' fields in Ghaziabad and neighbouring areas besides supplying to individual farmers.
- The ICAR-IIOR, Hyderabad has developed its new website and compiled market prices for major APMCs for castor and sunflower oilseed crops.
- National Virtual meeting on "Biopesticides - Registration and Quality Assurance: Issues and Way Forward" was organized on 6th October 2020, by ICAR-NBAIR along with Entomological Society of India (ESI) and Society for Biocontrol Advancement (SBA).
- ICAR-IIRR, Hyderabad organised a Webinar on "Direct-seeded rice (DSRC) for economic and environmental sustainability of rice production" on October 15, 2020. The expert talk on thgis occasion was delivered by Dr. Virender Kumar, IRRI, Philippines.
- The ICAR-Central Institute for Research on Cotton Technology, Mumbai, Maharashtra signed a Memorandum of Understanding (MoU) with the Bhabha Atomic Research Centre (BARC), Mumbai, Maharashtra on 29th October 2020. The MoU is aimed at boosting the collaborative research in quality improvement of cotton cellulosic biopolymer by gamma irradiation through collaborative research programmes for the benefit of cotton farmers, food processing and packaging and pharmaceutical industries.
- Sri Pratap Chandra Sarangi, Hon'ble Minister of States, of Fisheries, Animal Husbandry & Dairying and MSME, Government of India visited ICAR-CIFRI Pen demonstration site at Rishia reservoir, Balasore on 30 September 2020 and interacted with Director and fishers of the reservoir. The minister applauded the efforts of ICAR in enhancing livelihood of the tribal and poor fishers of Odisha.

एफ सं सम. (तक.) ४(१)/२०२०

भारत सरकार

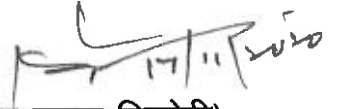
कृषि एवं किसान कल्याण मंत्रालय

कृषि अनुसंधान एवं शिक्षा विभाग

कृषि भवन, नई दिल्ली-११०००१

दिनांक: 17/11/2020

अधोहस्ताक्षरी को अक्टूबर, २०२० माह के लिए कृषि अनुसंधान एवं शिक्षा विभाग के मासिक सार की प्रति इसके साथ परिचालित करने का निर्देश हुआ है।


(शिव प्रसाद किमोठी)

सहायक महानिदेशक(समन्वय)

सेवा में:

मंत्री परिषद के सभी सदस्य

प्रधान सूचना अधिकारी, सूचना एवं प्रसारण मंत्रालय, शास्त्री भवन, नई दिल्ली

सार की प्रति के साथ निम्नलिखित को अग्रेषित :

1. महामहिम राष्ट्रपति, भारत सरकार के सचिव, राष्ट्रपति भवन, नई दिल्ली-110004
2. महामहिम उप-राष्ट्रपति, भारत सरकार के सचिव, 6, मौलाना आज़ाद रोड, नई दिल्ली
3. निदेशक, मंत्रिमंडल सचिवालय, राष्ट्रपति भवन, नई दिल्ली-110004
4. सचिव, भारत सरकार, सभी मंत्रालय/ विभाग
5. अध्यक्ष, संघ लोक सेवा आयोग, शाहजहाँ रोड, नई दिल्ली
6. अध्यक्ष, नीति आयोग, नीति भवन, नई दिल्ली
7. सचिव (डेयर) एवं महानिदेशक (भाकृअप) के प्रधान स्टाफ अधिकारी
8. अपर सचिव (डेयर) एवं सचिव (भाकृअप) के वरिष्ठ प्रधान निजी सचिव
9. अपर सचिव एवं वित्त सलाहकार (डेयर / भाकृअप) के प्रधान निजी सचिव
10. निदेशक (डी के एम ए), भाकृअप, पूसा, नई दिल्ली को भाकृअप की वैबसाइट (www.icar.org.in एवं www.dare.gov.in) में मासिक सार को अपलोड करने के अनुरोध के साथ प्रेषित।

कृषि अनुसंधान एवं शिक्षा विभाग
मासिक सार - अक्टूबर, 2020

महत्वपूर्ण अनुसंधान उपलब्धियां

किस्मों का सुधार/प्रोत्साहन

- प्रधानमंत्री, श्री नरेंद्र मोदी द्वारा 16 अक्टूबर, 2020 को संयुक्त राष्ट्र के कृषि एवं खाद्य संगठन (एफएओ) की 75^{वीं} वर्षगांठ के अवसर पर भाकृअप द्वारा विकसित, 8 फसलों की सत्रह (17) जैव-प्रबलित किस्मों को राष्ट्र को समर्पित किया गया। इन किस्मों में से, चावल की किस्म सीआर धान 315 में जिंक की मात्रा अधिक है; गेहूं की किस्म एचआई 1633 एवं एमएसीएस 4058 में प्रोटीन, आयरन एवं जिंक की मात्रा अधिक है जबकि गेहूं की किस्म एचडी 3298 में प्रोटीन एवं आयरन अधिक है तथा गेहूं की किस्म डीबीडब्ल्यू 303 एवं डीडीडब्ल्यू 48 में प्रोटीन की मात्रा अधिक है। मक्का के संकर एलक्यूएमएच 1, एलक्यूएमएच 2 एवं एलक्यूएमएच 3 में आवश्यक अमीनो अम्ल लायसीन एवं ट्रिप्टोफेन अधिक हैं जबकि बाजरा की किस्मों सीएफएमवी 1 एवं सीएफएमवी 2 में कैल्शियम, आयरन एवं जिंक की मात्रा अधिक है। पूसा सरसों 32 में न्यून इरुसिक अम्ल की मात्रा अधिक है जबकि मूंगफली की किस्मों गिरनार 4 वं गिरनार 5 में ओलिक अम्ल की अधिक मात्रा तथा रतालू की किस्मों, श्री नीलिमा एवं डीए 340 में एंथोसायनिन, आयरन, जिंक एवं कैल्शियम की मात्रा अधिक है। वैज्ञानिकों के प्रयासों की सराहना करने के साथ-साथ, प्रधानमंत्री जी ने इस बात पर जोर दिया कि फसलों की उन्नत किस्में साधारण भारतीय थाली (फूड प्लेट) को पौषणिक थाली में बदल देंगी। श्री मोदी ने फसलों की जैव-प्रबलित किस्मों को कई सरकारी कार्यक्रमों नामतः - मिड-डे-मील, आंगनवाड़ी आदि के साथ जोड़ने पर जोर दिया ताकि भारत को कुपोषण से मुक्त किया जा सके। उन्होंने इस पर बल दिया कि इससे किसानों के लिए उद्यमिता के नए रास्ते खुलने के साथ-साथ उनकी अच्छी आमदनी भी सुनिश्चित होगी।
- उत्तर भारत के मैदानों में अगेती (15 सितम्बर) रोपाई के लिए, आलू की एक उच्च तापमान सहनशील (20° सें. रात्रि तापमान पर कंदों का बनना) किस्म एचटी/7-1329 की, खेती के लिए पहचान की गई है।
- मार्कर की सहायता से बैक क्रॉसिंग (एमएबीसी) से व्युत्पन्न चना के म्लानि रोगरोधी अंतर्वेशित वंशक्रम जिसे बीजीएम 20211 नाम दिया गया है, की मध्य क्षेत्र में खेती के लिए जारी करने हेतु पहचान की गई है।

कृषि जैव-प्रौद्योगिकी:

- भाकृअप-एनआईपीबी, नई दिल्ली में पोषण-विरोधी कारक, ट्रिप्सिन संदमक के लिए अरहर के पचहत्तर (75) जीनप्ररूपों की स्क्रीनिंग की गई। ट्रिप्सिन संदमक सक्रियता 0.109 से 6.71 मि.ग्रा. ट्रिप्सिन संदमन इकाई (टीआईयू)/ग्रा. बीज नमूना की सीमा में थी तथा अधिकतम एवं न्यूनतम ट्रिप्सिन संदमक मात्रा वाले अरहर के जीनप्ररूपों की पहचान की गई।
- भाकृअप-आईआईएसआर, इंदौर द्वारा सोयाबीन के चारकोल रॉट रोग के विरुद्ध अनुक्रिया दर्शाने वाली 11 जीनों (7 अप-रेग्यूलेशन करने वाली और 4 डाउन - रेग्यूलेशन करने वाली) का *इन-सिलिको* अभिलक्षण किया गया।
- भाकृअप-आईएआरआई, नई दिल्ली ने एबसीसिक अम्ल (एबीए) जो एबीए रिसेप्टर द्वारा कथित और तत्पश्चात प्रतिबल सहनशीलता प्रदान करने वाला एक पादप प्रतिबल हॉर्मोन है के संबंध में प्रयोग किया। चावल जीनोम 14 एबीए रिसेप्टर्स को कोडिंग करता है। एबीए रिसेप्टर्स में से एक ओएसपीवाईएल 6 एक *इंडिका* चावल कृषिजोपजाति पूसा सुगंध में, संरचनात्मक और प्रतिबल प्रेरक अतिअभिव्यक्ति तथा आरएनएआई साइलेंसिंग द्वारा ऐसा करता है। ओएसपीवाईएल 6 की अतिअभिव्यक्ति, प्रतिबल अनुक्रियात्मक जीनों की अभिव्यक्ति तथा निर्जलीकरण-सहनशीलता में बढ़ोतरी करती है। सूखे के अंतर्गत, डब्ल्यूटी पौधों की तुलना में पीवाईएल 6 ट्रांसजीनिक पौधों ने लगभग 25% कम जल का उपयोग किया। पीवाईएल 6 की अतिअभिव्यक्ति से प्रतिबलरहित परिस्थितियों के अंतर्गत पौधे की ऊंचाई, जैवमात्रा, पुष्पक्रम शाखाओं, स्पाइकलेट फर्टिलिटी में कमी होने के कारण दाना उपज में महत्वपूर्ण रूप से कमी हुई। इन परिणामों ने दर्शाया कि ओएसपीवाईएल 6, पादप विकास एवं सूखा सहनशीलता का एक प्रमुख नियामक है तथा इसकी अभिव्यक्ति की फाइन ट्यूनिंग, चावल की उपज एवं प्रतिबल सहनशीलता के लिए क्रांतिक है।
- हल्दी में, कुक्यूमिन की मात्रा के साथ धनात्मक सहसंबंध दर्शाने वाले एक तथाकल्पित एक्टिवेटर एमवाईबी संबंधी ट्रांस्क्रिप्शन कारक *सीआईएमवाईबी 1आर1* की पहचान की गई है।
- धान पराल खुम्ब के चार जननद्रव्य में मेटिंग टाइप जीनों की अनुक्रमण आधारित पुष्टि तथा *मोर्केला* मशरूम के तीन जननद्रव्य की आईटीएस जीनों के निक्षालन (इल्यूशन) का कार्य पूरा किया गया है।
- भाकृअप-आईवीआरआई ने रैबीज के विरुद्ध रैबीज इम्यूनोग्लोब्यूलिन (आरआईजी) के एक प्रतिस्थानिक के रूप में एक संश्लेषित ऐंटीसेंस लॉकड न्यूक्लिक अम्ल (एलएनए) के विकास का मूल्यांकन किया है।
- रिवर टन्स से प्राप्त ब्राउन ट्रॉट *साल्मो ट्रट्टा* की, 18 एसआरआरएनए अनुक्रम के माध्यम से आण्विक पहचान की गई तथा जातिवृत्तीय वृक्ष विश्लेषण ने पूर्वानुमान दिया कि विलगित जीन बैंक एकसेशन संख्या एमएन 508429, विकासीय रूप से *साल्मो ट्रट्टा* के बहुत निकट है जिसकी एनसीबीआई जीन बैंक एकसेशन संख्या एफजे 710888 (ऑस्ट्रेलिया) है।

आनुवंशिक संसाधनों का संरक्षण एवं प्रबंधन

- राष्ट्रीय जीन बैंक में पांच सौ उनहत्तर (569) वंशक्रम जोड़े गए जिससे जीन बैंक में वंशक्रमों की कुल संख्या 447205 हो गई। इसके अतिरिक्त, दीर्घावधि संरक्षण हेतु पुनरुज्जीवित सामग्री (290 पुनरुज्जीवित वंशक्रम) जोड़ी गई। किस्मों को जारी करने के प्रस्ताव सहित एक सौ पंद्रह (115) एक्सेशंस, दीर्घावधि संरक्षण हेतु प्राप्त किए गए। पादप संगरोध संभाग द्वारा राष्ट्रीय जीन बैंक में उनके नाशीजीवमुक्त संरक्षण के लिए 1139 नमूनों की बीज स्वास्थ्य जांच की गई।
- राष्ट्रीय जीनोमिक संसाधन आधानी में वर्तमान में 45 प्रजातियों के 6447 नमूने हैं।
- छह देशों से विभिन्न फसल प्रणालियों - अनाजों (96), दलहनों (6), फलों (47) एवं सब्जियों (110) के दो सौ उन्यासी (279) वंशक्रम मंगाए गए।
- एनबीपीजीआर, नई दिल्ली में पात्रे जीन बैंक में वर्तमान में 1902 वंशक्रम हैं तथा क्रायो बैंक में वर्तमान में 14033 वंशक्रम हैं।
- भाकृअप-आईआईएसएस, मऊ, जीनस *इल्यूसीन* के 19 वन्य वंशक्रमों और 21 कृष्य जीनप्ररूपों तथा चावल के 124 जननद्रव्यों का रख-रखाव कर रहा है।
- भाकृअप-आईएआरआई, नई दिल्ली में नाइट्रस ऑक्साइड का अपचयन करने की क्षमता रखने वाले जीवाणुओं (फसलयुक्त खेतों से N₂O के उपशामन हेतु उपयोगी) का संरक्षण किया जा रहा है। 1.4 मिलियन कीट नमूनों के वर्तमान राष्ट्रीय पूसा संग्रह में लगभग 2000 कीट नमूने जोड़े गए।
- एनबीपीजीआर, नई दिल्ली में, आयातित विदेशज जननद्रव्य के कुल 2475 वंशक्रमों का संगरोध शुद्धता के लिए प्रसंस्करण किया गया और 2472 वंशक्रम, मांगकर्ताओं को जारी किए गए। निर्यात के लिए, कुल 1431 जननद्रव्य नमूने प्रसंस्कृत किए गए और 1382 नमूने जारी किए गए। 17 पादप स्वच्छता प्रमाणपत्र जारी किए गए।
- कृष्य पौधों के राष्ट्रीय हर्बेनियम में तीस (30) नमूने जोड़े गए जिससे वहां नमूनों की कुल संख्या 24326 हो गई।
- किसान के खेत से अनार की किस्म *भगवा* का एक वेरिएंट क्लोन जिसे *शरद किंग* कहा जाता है, एकत्रित किया गया।
- भाकृअप-ऊंट पर एनआरसी ने भाकृअप-एनएआईएनपी, बेंगलोर की वीटीसीसी-रूमेन माइक्रोब्स रिपोजिटरी (रोमंथियों के प्रथम आमाशय के सूक्ष्मजीवों की आधानी) में पांच अवायवीय संवर्ध (एनएयरोबिक कल्चर) जमा किए।

प्राकृतिक संसाधनों का प्रबंधन

- 1: 500 000 स्केल पर तेलंगाना का मरूस्थलीकरण नक्शा तैयार किया गया।