

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

INTERNATIONAL COOPERATION:

- (i) Dr. Trilochan Mohapatra, Secretary, Department of Agricultural Research and Education (DARE) & Director General, Indian Council of Agricultural Research (ICAR) visited Marrakesh, Morocco during 14th April, 2018 to 16th April, 2018 to receive the Stewardship Award Ceremony which was bestowed upon ICAR on 14th April, 2018 during the 2018 BGRI Technical Workshop in Marrakesh, Morocco. He also participated in the Borlaug Global Rust Initiative (BGRI) Executive Committee Meeting on 16th April, 2018.
- (ii) An international training programme on “Cutting edge on molecular diagnostic techniques for viruses affecting bananas and plantains” sponsored by Ministry of External Affairs, GoI and ICAR under Indo-Africa Forum Summit-III was conducted from 15th March to 29th March 2018. Nine trainees from five African countries participated in the 15 days long programme. The trainees were also taken to banana growing regions.

MAJOR RESEARCH ACHIEVEMENTS

Varietal Improvement:

- (i) Nine soybean varieties viz. VLS-89, SL-1074, SL-1028, PS-1572, JS-20-116, JS-20-94, RSC-10-46, RVS-2007-6, NRC-127 were identified for release in cultivation of soybean growing areas.
- (ii) Rapeseed & Mustard varieties viz. *Kesri 5111* (Hybrid), DRMR-1165-40 were released for cultivation in mustard growing areas.
- (iii) A new variety of salt tolerant Indian mustard (CS 60) released and notified for cultivation in Haryana, Punjab, Uttar Pradesh and Rajasthan.
- (iv) Finger millet variety VL *Mandua 376* was notified for cultivation.

Agricultural Biotechnology:

- (i) Efficacy of host-delivered RNAi technology for development of transgenic crops resistant to notorious polyphagous insect pest, *Helicoverpa armigera* (known as cotton boll worm and pod borer) was demonstrated and successfully tested. Transgenic tobacco plant delivered artificial microRNA, targeting acetyl choline sterase gene, disrupted growth and development, and caused considerable mortality of the targeted pest, *H. armigera*.
- (ii) GM detection of 25 cotton samples was carried out through RCGM for herbicide tolerance. Ten samples of cotton (*Gossypium* spp.) and 4 samples of *Arabidopsis thaliana* were tested for ensuring absence of embryogenesis deactivator gene (terminator gene technology) using PCR-based markers. Adventitious presence (AP) of transgenes was checked in 40 *ex situ* accessions of *Brassica juncea* employing PCR-based markers targeting CaMV 35S promoter and nos terminator. Based on the tests conducted, none of these accessions showed AP of transgenes.
- (iii) Expression profiling of annexin gene family were performed in potato under heat stress conditions reveal strong up-regulation of StAnn1 indicating it as the key signaling molecule under heat stress conditions. By considering its importance the

StAnn 1 was cloned from the heat tolerant potato cultivar, K. Surya for exploiting its potential for providing heat stress tolerance in other susceptible potato cultivars.

- (iv) Salt stress induced differential gene expression studied in 13-1 rootstock indicated upregulation of DREB (dehydration responsive element binding), Treh -6-phosphate and downregulation of YABBY and Aldehyde dehydrogenase.
- (v) Process developed for identification of putative host proteins in Blue tongue infection. Amplification of NS3 and NS4 region of Blue tongue virus (BTV-10) virus was done for cloning in yeast two-hybrid compatible pGBKT7 vector for creating the bait constructs for mating with the prey library, in attempt to find the putative host proteins interacting with NS3 and NS4 segments of BTV-10.

Conservation of Genetic Resources:

- (i) One thousand and sixty eight accessions comprising of cereals, oilseeds, vegetables, forages, fibres, tubers, medicinal and potential crop were introduced from 10 different countries. The promising accession introduced was *Siratia* accession, best known for its fruit extract which is nearly 300 times sweeter than sugar and has been used as a natural sweetener in China for nearly a millennium due to its flavor and low calories (EC938819).
- (ii) Fifty six specimens were added to the National Herbarium of Cultivated Plants bringing the holdings to a total of 23,158 specimens.
- (iii) Fifty DNA samples of wheat were conserved during the month in the National genomic resources repository.
- (iv) One hundred and twenty six accessions were added to the National Genebank bringing the genebank holdings to a total of 4, 35, 264.

Natural Resource Management:

- (i) An organic farming package of practice for groundnut (*kharif*)-sorghum (*rabi*) system with B: C ratio of 2.1 at Dharwad (Karnataka) is developed.
- (ii) At Pantnagar, Uttarakhand in sandy loam soil, drip irrigation and fertigation in vegetable pea resulted in 50% of irrigation water saving and 25% fertilizer savings with green pod yield of 12.7 t/ha.
- (iii) For effective biological management of cowpea defoliators, foliar application of *Beauveria bassiana* @ 5g/l was recommended.
- (iv) Border cropping with two rows of maize followed by Silver mulching and spray of Acephate @ 1.5 g/ltr, Imidacloprid @ 0.5ml/L or Beniveyan @0.3ml/L in rotation with neem oil @ 2.0 ml/L at weekly interval upto flowering and fruit formation was found to be very effective in reducing the virus incidence and two to three-fold increase in the yield of chilli.
- (v) In tomato, drip fertigation with 100% NPK through water soluble fertilizers (18:18:18) recorded maximum fruit yield of 68.86 t/ha with nutrient use efficiency of 2.375kg yield/kg NPK/ha. This treatment registered 83.1% higher fruit yield over surface irrigation with soil application of fertilizers.

Development of Farm Implements, Machinery and Post - Harvest:

- (i) Developed a power operated sugarcane rind removing equipment for juice making.

- (ii) Developed a tractor drawn three row automatic vegetable transplanter for potted seedlings of tomato and chilli.
- (iii) Developed a grape de-buncher for separation of intact berries from the bunch.
- (iv) Developed a single locking cotton feeder for enhancing ginning efficiency of double roller gin.
- (v) Developed a process of colour removal from reactive dye bath effluent using adsorption technique.

Public Outreach:

- (i) Frontline demonstrations on oilseed and pulses were taken up all over the country covering an area of 24542.16 ha and involving 40768 farmers.
- (ii) 659 field-days with the participation of 25778 farmers and 525 *Kisan Goshties/Melas* with the participation of 118142 farmers were organized.
- (iii) Over 3092 training courses for 77444 farmers, 416 trainings for 7799 rural youths and 404 trainings for 11112 extension functionaries and in-service personnel were organized in the frontline areas of technology development.
- (iv) Besides, KVK scientists undertook 6832 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 672 scientists visited 652 villages and organized 664 demonstrations benefitting 45005 farmers. A total of 5952.72 quintals of seed and 9.80 lakh planting materials were also distributed to 5783 and 42432 farmers respectively.
- (vi) 63000 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 32400 doses of *Ranikhet* Disease (RD), 3400 doses of Infectious Bursal Disease (IBD), 5300 doses of *Marek's disease* and 2100 doses of fowl pox were carried out in broiler, layer, turkey, guinea/*desi* fowl/emu.
- (viii) In Manipur and similar situations of NEH region, application of 50% recommended dose of fertilizer 'RDF' (10:20 kg NP) and 2 tonne poultry manure / ha is recommended for higher yields (400 q green, 70q dry and 9.75 q crude protein) of fodder rice bean. The technology can generate net return upto Rs. 50000/- with B:C ratio of 2.10.
- (ix) In Manipur and similar situations of NEH region, for dual purpose oat, application of 80:40:40 of NPK/ha (40% as basal, 20% at 30 DAS, 20% at 60 DAS and 20% at 90 DAS) with 7.5 t FYM/ha and cutting for fodder at 60 DAS and then leaving the crop for seed is recommended. The technology results in production of up to 240 q green fodder in addition to 21q seeds with net return of up to Rs. 90000 with B: C Ratio of 2.70.
- (x) In Kerala state, application of 80 kg MgSO₄ along with RDF (200: 50:50 kg NPK and 25 t/ha of FYM) to Bajra x Napier hybrid is recommended for higher fodder yield and better quality fodder. The technology resulted in production of up to 2100 q green fodder with higher crude protein content and net return of up to Rs. 94000, with B:C Ratio of 2.35.

Application of Space Technology:

- (i) One Indian Regional Navigation Satellite System (IRNSS) through ISRO as a part of Ministry of Earth Science project entitled "To explore the potential application of

Infrasonic supported by Ionosonde, GPS and Sodar for Earthquake Precursor Studies" is regularly being used for data collection. Weekly data files till 10.04.2018 have been sent to NPL Delhi.

- (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 February 20, 2018 - March 19, 2018, 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.