# ICAR Research Complex for Eastern Region

## भारतीय कृषि अनुसंधान परिषद का पूर्वी अनुसंधान परिसर, पटना

# ICAR RCER NEWS

Vol. 13 No. 1 & 2
January-December 2020

### Our Mandates

**Strategic and adaptive research for efficient integrated management of natural resources to enhance the productivity of agricultural production systems in the Eastern Region**

**Transform low productivity-high potential eastern region into high productivity region for food, nutritional and livelihood security**

**Utilization of seasonally waterlogged and perennial water bodies for multiple uses of water**

**Promote network and consortia research in the Eastern Region**

भाकृअनुप
ICAR

During these pandemic years, many sectors have been facing uphill challenges not only in our Country but in the entire world. Spread of Corona virus cripples the economy everywhere and at every level. Reverse migration and deprival of jobs at many places has largely affected the household economy. These situations have forced us to seek some logical solutions to pull socially disadvantaged farmers and landless labourers out of economic clutches and make them survive and prosper. One among the solutions is to search and explore alternative pathway. Agriculture is the few among the least affected sectors in the pandemic, providing hopes and opportunities of survival for the producers and sellers of agriculture commodities. Alternate income generating activities have been taken up for immediate cope up of the situation. Several health and agro-advisories have been released by government as well as research institutions. A large number of technologies related to agri-horti crops, vegetables, integrated farming, livestock, poultry and fisheries has been developed for this region. In order to enhance agricultural productivity and profitability, there is a need to make planned efforts for dissemination and adoption of these technologies in befitting manner so as to increase farmer's income to ensure sustainable food and livelihood security. It is imperative to strengthen the linkages with the development departments for wider up-scaling of the technologies developed by the Institute. At the same time it is also imperative to attract rural youth and uneducated masses toward agriculture by ensuring private investment in the sector. Focus should be on the development and promotion of farmer empowerment models (SHGs, CIGs, FOs, FPCs, PPPs, etc.), large scale ICT applications through IT Platforms, social media, farmer and farm women knowledge groups, Apps for various value chain operations, etc for better price realization by the farming community..

**Dr. Ujjwal Kumar**
**Director**

# RESEARCH HIGHLIGHTS

## Release and Notification of rice variety Swarna Shakti Dhan

An aerobic rice variety Swarna Shakti Dhan (IET 25640) has been released and notified by Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops, Govt. of India vide notification number S.O. 99 (E) dated 6th January 2020 for the cultivation in the states of Haryana, Odisha, Bihar, Jharkhand, Chhattisgarh, Gujarat and Maharashtra (Fig. 1). This rice variety is an early duration (115-120 days), semi-dwarf, high yielding (4.5-5.0 t/ha), multiple stresses (drought, disease and insect pest) tolerant, high micronutrient Zinc (23.5 ppm) and Iron (15.1 ppm)) content with desirable cooking quality traits. Swarna Shakti Dhan is suitable for cultivation under direct seeded aerobic condition in water limiting irrigated areas and rainfed shallow lowland to medium upland ecosystems. This variety showed desirable quality parameters like high hulling (76.3%), milling (66.36%), high head rice recovery (63.2%), intermediate amylose content (22.52%), alkali spreading value (ASV=4.0) and a soft GC with very occasionally chalky and short bold grain type.

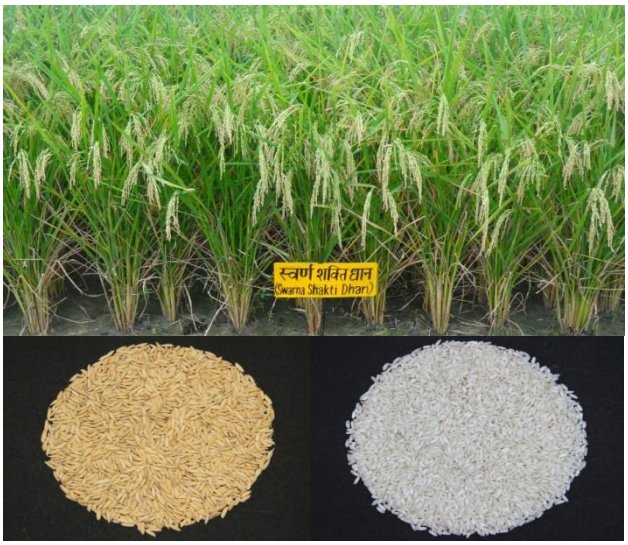


Fig. 1. Swarna Shakti Dhan

## Evaluation of rice genotypes for submergence tolerance

Twenty rice genotypes along with Swarna Sub 1, IR 64 *Sub1* and Sambha Mahsuri *Sub1* as tolerant and Swarna as susceptible checks were evaluated for submergence tolerance during *Kharif* 2020 (Fig. 2). After ten days of transplanting, the crop was completely submerged with 1.0 to 1.25 m water depth for twenty one days and thereafter water was drained out of the field. The maximum survival percentage was recorded in IR 102796-14-77-2-1-2 (59.5%), followed by IR 96321-315-294-B-1-1-1 (46.3%) and IR 96321-558-563-B-2-1-1 (40.5%). Rice genotypes IR 102796-14-77-2-1-2 (1.219 t/ha), IR 94391-131-152-3-B-3-1-1 (0.782 t/ha), IR 96321-558-563-B-2-1-1 (0.726 t/ha), IR 96321-315-323-B-3-1-3 (0.714 t/ha), IR 96321-315-294-B-1-1-1 (0.701 t/ha), IR 102777-18-64-1-2-6 (0.694 t/ha), and IR 96321-558-209-B-6-1-1 (0.671 t/ha) performed better as compared to Swarna Sub 1 (0.423 t/ha), IR 64 Sub1 (0.215 t/ha), Sambha Mahsuri Sub 1 (0.176 t/ha). Further, higher spikelet fertility percentage (70-89%) were recorded in identified promising genotypes as compared to check varieties (59-61%). The lowest (11%) spikelet sterility was recorded in IR 102796-14-77-2-1-2 followed by IR 96321-315-323-B-3-1-3 (21%).

Fig. 2. Evaluation of rice genotypes under submergence condition

## Assessment of leaching loss of nutrient in acidic soils of eastern plateau and hill region

The soils in most of the rainfed areas of eastern plateau and hill region are red and lateritic, moderate to highly acidic and sandy loam in texture. To enhance the productivity of such low fertile soils, it is imperative to apply organic manure and inorganic fertilizer in judicious combinations. However, because of the high permeability of the sandy soil, most of the applied fertilizers are susceptible to leaching loss through infiltrated water. Leaching losses of nutrients in winter crops of tomato and pea cultivated in acidic soils of eastern plateau and hill region were studied using non-weighing type lysimeters under different nutrient management practices involving the control ($T_1$), inorganic ($T_2$), organic ($T_3$) and integrated (organic + inorganic, $T_4$) sources of nutrients (Fig. 3). The leaching loss of nutrients varied significantly among various fertilizer management practices and the rate of loss differed among the nutrients. The treatment receiving 100% recommended dose of NPK as inorganic form ($T_2$) recorded highest N, and K leaching loss of 22.1, 14.8 kg $ha^{-1}$ in tomato accounting 13.7 and 21.1% of applied fertilizer, while in pea, it was 9.14 and 10.8 kg $ha^{-1}$, respectively, accounting 20.3 and 20.4% of applied fertilizer. The P-leaching loss was comparatively less and the differences among the treatments were statistically non-significant. The N-leaching loss in tomato could be minimized to the tune of 12.3 and 6 kg $ha^{-1}$ with simultaneous saving of K-fertilizer to the magnitude of 8.6 and 3.8 kg $ha^{-1}$ by adoption of organic ($T_3$) and integrated nutrient management ($T_4$) practices, respectively. Furthermore, adoption of organic ($T_3$) and integrated nutrient management ($T_4$) practices in pea reduced the N-leaching loss by 3.7 and 2.2 kg $ha^{-1}$, while K-leaching loss by 3.6 and 1.4 kg $ha^{-1}$, respectively.

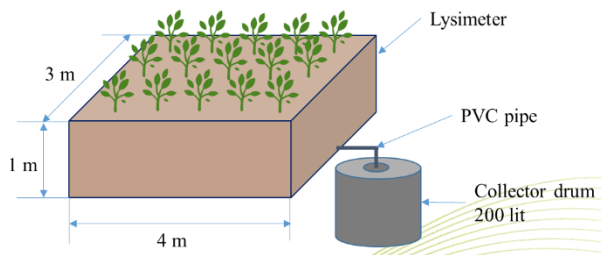


Fig. 3. Schematic of the non-weighing type lysimeter

## Collective farming: Better option for small and marginal farmers in eastern Gangetic plains

With the introduction of the collective farming, there had been remarkable changes in the perceptions of small and marginal farmers about the dry season farming. People have built mutual trust, carrying out the farm operations collectively, sharing their resources, maintaining the irrigation and farm infrastructure and are sharing the profits among themselves harmoniously. The groups collectively operated and maintained their solar pump sets and shared them among group members in turns (Fig. 4). These groups identified a key person for the purchase and marketing of agricultural inputs and produce which reduced the transportation cost to great extent. With the adoption of collective farming, farmers started cultivating contiguous plot of land rather than cultivating each plot individually.

Labour Sharing

Collective operations

Fig. 4. Collectivee activities

## Evaluation of Zero Budget Natural Farming

It is claimed that Zero-Budget Natural Farming (ZBNF) is a holistic alternative to the present paradigm of high-cost chemical inputs-based agriculture. An effort was made to comparatively evaluate the ZBNF and conventional farming in Eastern Plateau Hill Region. Performance of four major kharif season crops viz. paddy, cowpea, black gram and finger millet were evaluated. The zero budget natural farming gave comparatively higher yield of cowpea (6.6 t/ha) and finger millet (1.94 t/ha) than the conventional farming 5.2 t/ha and 0.89 t/ha, respectively (Fig. 5). Whereas, the yield of paddy (2.2 t/ha) and black gram (1.1 t/ha) was higher in conventional farming in comparison to the zero budget natural farming (1.3 t/ha and 0.7t/ha) during the initial years of experimentation (Fig. 6).

Fig. 5. Jivamrita application In ZBNF Paddy

Fig. 6. Conventional farming

## Extent of flood mapping in Bihar during 2020

Heavy rainfall in northern river basins in Bihar during monsoons causes rivers to overflow. The important rivers in north Bihar that cause floods are the Gandak, Bagmati, Kamla, Burhi Gandak, Kosi, and Mahananda. The flood inundation maps (FIMs) of monsoon months (June-October) in Bihar consist of flood inundated areas along with other layers such as majors cities, railroad networks, etc. are prepared by Bihar Flood Management Information System (BFMIS) and can be downloaded from http://www.fmis.bih.nic.in/. In this study, the FIMs were downloaded for the monsoon months from this website for the year 2020. After analyzing the FIMs of the monsoon months, it was observed that the maximum extent of the area flooded in Bihar was on 27th July 2020. The flooded areas on 27th July 2020 were classified from the FIM using the Maximum Likelihood classification method. This classified flood map of 27th July 2020 was overlaid on the district map of Bihar to show and quantify the district-wise spatial extent of flood in Bihar on 27th July 2020. Fig. 7 visualizes the district-wise spatial extent of flood on 27th July 2020 in Bihar. Interpretation of the figure further revealed that the districts most affected by the flood on 27th July 2020 were Darbhanga (0.073 Mha), followed by Madhubani (0.056 Mha), Purbi Champaran (0.054 Mha), Muzaffarpur (0.052 Mha), etc. District wise areal extent of the flood is shown in Fig. 8. Ground truthing of the flood occurred on 27th July 2020 at Ladaur village, Muzaffar district, Bihar, and its surrounding villages revealed that the depth of the floodwater in most of the places of the areas varied from 1 to 3 m, and the time was taken to recede the floodwater in the village was about 30 to 40 days.

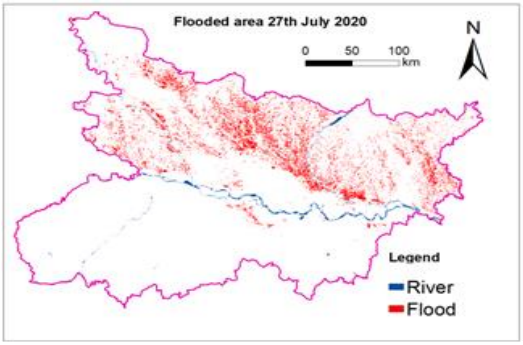


Fig. 7. District-wise spatial extent of flood on 27th July 2020 in Bihar

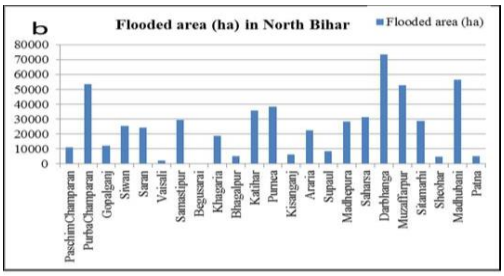


Fig. 8. District wise areal extent of the flood in north Bihar

## Basin enrichment of bael plants (*Aegle marmelos* Correa) through alley cropping of biomass producing plants

The research work was undertaken during 2014 to 2020 to identify suitable biomass yielding plant for basin enrichment of bael plants (Fig. 9). Among the biomass yielding plants, the maximum cumulative dry biomass yield during the six years was recorded in case of Tephrosia (141.87 t/ha). Accordingly, estimation of total quantity of nutrient recycled through biomass during 2014-15 to 2019-20 indicated highest values in Tephrosia (Nitrogen: 4.2 t/ha, Phosphorus: 0.2 t/ha and Potassium: 1.5 t/ha). At both the soil depths basin enrichments with biomass resulted in significantly higher content of soil organic carbon, available nitrogen over that of control. Mulching or Soil incorporation of Tephrosia biomass also resulted in significantly higher values of trunk diameter and plant height over that of control. Based on six years of results, alley cropping of Tephrosia and recycling of its biomass in the plant basin of bael was found to be an effective tool for improving soil fertility and plant growth bael under rainfed conditions of eastern plateau and hills.

Fig. 9. Basin enrichment of bael plants through alley cropping

## Impact of flood on natural and human resources in North Bihar, India

Bihar is one of the most susceptible flood prone states in India. North Bihar is divided in to two zones having 21 districts, where in around 76 percent population faces recurrent threat of flood devastation (Fig. 10). In order to study the impact of flood on natural and human resources in north Bihar, a study was performed based on secondary data (Disaster Management Department, Government of Bihar). District wise data were observed on four parameters i.e., cropped area (lakh ha), cultivable land area (lakh ha), population (lakh) and villages (no.) affected due to flood devastation during 2017 in north Bihar. Resources *i.e.,* crop area (3.45 lakh ha), cultivable land area (23.5 lakh ha), population (184.72 lakh) and villages (9157 no.) were affected due to flood in north Bihar during 2017. Data were analysed through Principal Component Analysis (PCA) and results revealed that villages and populations were affected more than the cultivable land area and cropped area. Population in the district of Katihar was affected maximum followed by Sitamadhi and West Champaran and others. While cultivable land and cropped area were affected maximum in Darbhanga followed by Madhubani and other districts in North Bihar. The relation between affected population and village was observed to be positive correlation (r = 0.91) and affected cropped area and agricultural area was also observed to be positive correlation (r = 0.46) for north Bihar. Hence out of four parameters, only two parameters *i.e.,* cropped area and population were selected and further mapped through Arc GIS showing around 29% population and 7 % cropped area affected in north Bihar during 2017.

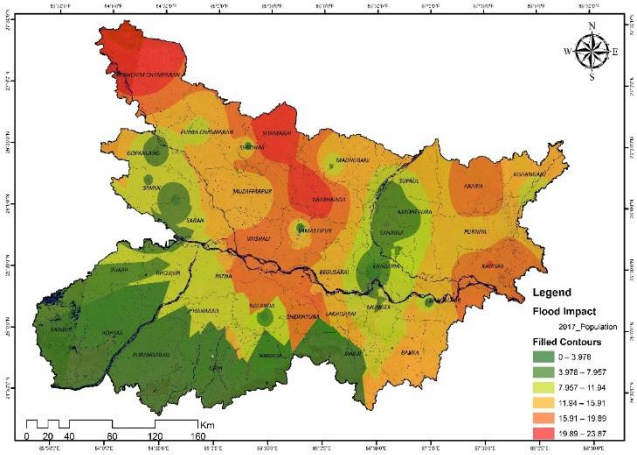


Fig. 10. Flood affected populations in north Bihar

## Establishment of 100m$^2$ and 200m$^2$ Nutri-garden model in ICAR-RCER, Patna

A Nutri-garden layout of model 100 m$^2$ and 200 m$^2$ (Fig 11) was developed and established at ICAR-RCER, Patna during *rabi* 2019-20. Standardization and validation of the model to fulfill the ICMR recommendations of vegetable intake (200g fruit vegetables, 50g leafy vegetables and 50g root vegetables) was considered. In 100m$^2$, four leafy vegetables (palak, mustard green, coriander, methi), seven fruit vegetables (tomato, brinjal, cabbage, cauliflower, broccoli, sem, pea) and three root vegetables (radish, carrot, beet) were included. The 200 m$^2$ models was planned for nutritional as well as livelihood outlook so, nine fruit vegetables (tomato, brinjal, cabbage, cauliflower, broccoli, sem, pea, capsicum and broad bean), six leafy vegetables (palak, mustard green, coriander, methi, bathua and lafa saag), three root vegetables (radish, carrot, beet) were grown. To conserve biodiversity some seasonal traditional leafy vegetables, like Bathua (*Chenopodium* sp.) and Lafa saag (*Malva verticillata* L.) were also included in this model. From 100m$^2$ model 195.02g fruit vegetables, 330.79g leafy vegetables and 172.95g root vegetables were produced during rabi 2019-2020 that is sufficient for a family of four members and from 200m$^2$ model 219.94g fruit vegetables, 131.59g leafy vegetables and 204.81g root vegetables were produced during rabi 2019-2020 that is sufficient for a family of eight members.

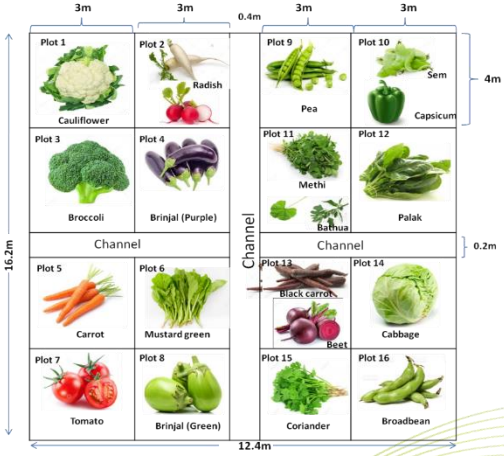


Fig. 11. 200 m$^2$ Model of Vegetable based Nutri-garden model

## Estimation of yield gap in potato through on farm demonstration in East Champaran, Bihar

Low productivity of potato in eastern part of India is a major concern for farmers. Adoption of local and old varieties, like Kufri Lalima is an important reason for lower yield. Therefore, current study was undertaken in East Champaran district of Bihar to assess extent of yield gap in potato by laying out varietal demonstrations at farmers' field. Seeds of high yielding varieties, like Kufri Khyati and Kufri Pukhraj were distributed among 396 farmers of four villages of the district namely Jasaulipatti, Chandrahiya, Khairimal and Chintamanpur (Fig. 12).


Fig. 12. Demonstration plot of Kufri Khyati

The yield level at beneficiary field was found to be significantly higher as compared to non beneficiary farmers. Highest average yield of 28.1 t/ha was observed in case of Kufri Pukhraj followed by Kufri Khyati (26.3 t/ha). Average yield level in control plot of non-beneficiary farmers was only 13.5 t/ha. Therefore, Kufri Pukhraj and Kufri Khyati recorded almost double the production per unit area as compared to local cultivars. Thus, actual yield gap in potato at farmers' field was found to be 94-100% in East Champaran district of Bihar. Therefore, use of improved potato varieties should be encouraged by Government extension agencies in this region.

## Effect of Genetic & Non-Genetic Factors on Prolificacy of Bengal goat

### Genetic factors on prolificacy of Bengal goat

The DNA was extracted from the collected blood samples of Bengal goats with history of high multiple birth for three consecutive parities. All the collected samples were screened for *FecB* gene polymorphism. For exploring the presence of *FecB* mutation in their genetic material, forced restriction fragment length polymorphism PCR technique and then gene sequencing were carried out. Sequencing of *FecB* gene in Bengal goats showed more than 95% uniformity with Bone Morphogenetic Promotor Gene (BMPR) already submitted in the gene bank. When the sequences were cut with NEB cutter, 12% of the samples showed cutting site for Ava II enzyme. This showed there are 12% of animals whose higher fecundity was due to *FecB* mutation. Rest of the goats were found to be homozygous non-carriers indicating absence of *FecB* mutation. *FecB* mutation was found in both the sexes but correlation with phenotype could not be established. More number of animals which does not show any mutation to *FecB* had the phenotypic characteristics of high fecundity.

**Non- genetic factors on prolificacy of Bengal goat**

A study was conducted to analyze the effect of non-genetic factors influencing the reproductive performance of the high prolific Bengal goats. Body weight, age of does at breeding, parity and litter size of 181 pregnant Bengal goats were analysed using one-way Analysis of Variance. The litter sizes proportions for single, twin, triplet and quadruplet were 47.51%, 35.91%, 11.60%, 2.76 and 2.21%, respectively (Fig. 13). The birth of 1869 kids were recorded from 1008 kidding does, average 1.8 kids per doe and the prolificacy rate was 185.4%. Age of does at breeding (27.38 months), BW at breeding (18.49 kg) significantly influenced ($P$<0.01) the triplet, quadruplet or quintuplets litter sizes. Incidences of multiple birth were more ($P$<0.01) at higher parity (3.94) as compared to those of single kidding at lower parity (2.91). The increase in litter sizes with age, body weight and parity indicates improvement of reproductive traits as does reach maturity. Hence, these bodylinear traits could be used to discriminate the goats bearing multiple fetuses or bearing a single fetus and proper management could be taken for does carrying multiple kids.

Fig. 13. Bengal goat with triplets litter size

## Development of Meat and Egg Strains of Duck Suitable for Backyard Farming

The project aims to improve the local duck germplasm by crossing them with White Pekin to generate a strain for meat production and crossing them with Khaki Campbell to produce/develop a strain for egg production. The work on synthesising meat production was initiated by selecting of local duck germplasms and White Pekin with high body weight gain. A total of 25 local female ducks and 6 White Pekin ducks were selected as parents (Fig. 14). By crossing these two germplasms, 43 eggs were collected and hatched (69.7%). Out of 30 chicks hatched out, 22 were alive. Further selection will be applied on these chicks before they are used as parents of next generation.

Fig. 14. Pekin ducks and (inset) Khaki Campbell

## Value addition in popped Makhana through secondary processing and branding

Makhana is a high value cash crop largely grown in North Bihar. The edible popped makhana is obtained by primary processing of Makhana seed. This popped Makhana can be directly consumed in raw or fried form or it can be used in vegetables or sweet dishes like. There are some private companies which add value to the raw popped Makhana by adding different flavours like tomato, pudina, chilli, onion, butter or others. These fried or roasted value added snacks are packed in small attractive packs of 50 g, 100 g or 250g and sold to consumers through retail outlets of large companies like Reliance, Haldiram etc. The products are also sold online through Amazon, Flipkart, Big Basket, Grofers etc to the consumers. Loose popped Makhana without value addition is sold at a price of around Rs 600-800 per kg in national market. However, secondary processing by adding various flavours and attractive packaging increases the market value and therefore it fetches premium price of Rs 1000 per kg and above in major markets of India. If exported, its value increases further based on location of sale. Shakti Sudha Industries at Patna, first started branding of value added products of Makhana. Later on Makhanawala's, Maruti Makhana, Manju Makhana, Sattviko, Divinutty etc joined this business due to higher scope for national as well as International market availability (Table 1). Currently, there are many firms which sell popped Makhana and its product under different brands.

**Table 1. Major firms and its brands of Makhana in India**

| Name of firms | Location | Name of the brands |
|---|---|---|
| Shakti Sudha Agro Ventures Pvt. Ltd | Patna, Bihar | Shakti Sudha |
| Maruti Makhana | Madhubani, Bihar | Makhana Wala's, Amrit, M.P. Gold, Hari Om |
| Manju Makhana Enterprises | Madhubani, Bihar | Neha, Bunty aur babli, Rangeela, Sandesh |
| K.K. Products | Kanpur, Uttar Pradesh | Raja Sahab , Rajdhani , Honey Chhappan Bhog, Radhe Radhe, |
| Sattviko | Ghitorni, New Delhi | Sattviko |
| Rishab Global Industries Pvt Lltd | New Delhi | Mr Makhana |
| Kesharwani Makhanawale | New Delhi | Rajbhog, Badshah, Rajshahi, Shahi Bhog |
| Divinutty Products Private Limited | New Delhi | Divinutty |
| AK Makhana & Co. | Purnea, Bihar | AK Gold, AK Rasgulla |

Some of the firms also export Makhana to foreign countries. With the increasing urbanization and preference for ready to eat food, there is very good scope for value added products of Makhana in Indian as well as in International markets. Being rich in protein and having very low fat content, snacks made of popped Makhana is popularized as healthy food among masses.

## FPO registered in a village of Ranchi district

AFarmer Producer Organization (FPO) named "Greenery Agrotech Producer Company Limited" has been created under the project "Development and validation of need-based technology delivery model through FPO for eastern region of India". This FPO was registered on 19th October, 2020 and office is located at Malti village of Itki block in Ranchi district of Jharkhand. Board of Directors have five members. Mr. Shyamdhani Kumar is acting as Managing Director as well as Chief Executive Officer of the FPO. Two hundred forty farmers from eleven villages in four blocks of Ranchi district of Jharkhand became member of this FPO. The FPO aims at production, procurement, storage, processing, packing, distribution, marketing, selling and trading of all agricultural and allied products. It will also undertake organic production, processing, certification, export and trade business of agricultural and allied products. The experts from FPO will render technical and consultancy services, training for the welfare and promotion of interest of members (Fig. 15). Another important goal of the FPO is to finance the agricultural activities including the insurance for the benefit of member farm families.

**Fig. 15. Meeting of FPO in progress**

## Frontline demonstration and Field day of Rice

Rice FLD in 30.5 acre area was conducted under the NASF funded Project "Development and validation of Need based technology delivery model through FPO in eastern region of India". Two improved Rice varieties *viz.* Swarna Shreya and PUSA Sugandha- 5 were distributed among 68 farmers of East Champaran during the Kharif season. The Swarna Shreya rice variety was very much appreciated by the farmers of East Champaran due to sustainable yield (39-44.6 quintal/ha) in spite of long dry spell during this Kharif season. It indicates a good potential of Swarna Shreya rice variety to withstand weather vagaries, more frequent in recent days.

**Distribution of Paddy seed among the FPO and Non FPO farmers number and yield of Paddy, Karif Season 2019-2020**

| Paddy variety | No of FPO Farmers | Area (acre) | Yield (q/ ha) |
|---|---|---|---|
| Pusa Sugandha 5 | 51 | 26.5 | 35-38.4 |
| Swarna Shreya | 17 | 4.0 | 39-44.6 |

A Rice field day was organized on 17th October 2020 in which large no. of farmers participated widely and shared their experience about these varieties (Fig. 16). They preferred Swarna Shreya for better climate resilience.


Fig. 16. Field day programme at Dephi Village East Champaran, Bihar

## Evaluation of selected wild musk melon (Cucumis melo var. agrestis/callosus) genotypes for yield and nutritional traits

Wild musk melon (*Cucumis melo* var. *agrestis/callosus*) is an important drought hardy under exploited cucurbitaceous vegetable crop. In Eastern Plateau and Hill Region, the wild muskmelon/*kachri* grows as self sown crop during rainy season and immature fruits before ripening are used as cooked vegetable. The salted sundried immature fruit pieces are also fried in oil and eaten with rice. Five wild musk melon genotypes which include HAWMM-1 collected from Garhwa district of Jharkhand, HAWMM-2, HAWMM-3 and HAWMM-4 developed from segregating material of HAWMM-1 and HAWMM-5-2 collected from Jaipur district of Rajasthan were evaluated along with AHK-119, a released variety of CIAH, Bikaner (Rajasthan) for fruit yield and nutritional traits (Fig. 17). Fruit yield ranged from 11.46 to 18.58 t/ha while total phenols content ranged from 27.79 to 92.23 mg GAE/100g of fruits and total mineral content ranged from 516.72 to 883.91 mg/100g of fruits. The total carbohydrate content of fruits ranged from 2.03 to 3.18%, whereas the anti-oxidant activity ranged between 636.55 to 1043.75 mg AEAC/100g of fruits. The genotypes HAWMM-4, HAWMM-2 and HAWMM-1 were found promising for fruit yield, mineral content and antioxidant activity. One hundred gram each of HAWMM-1, 2 and 4 provides 77 to 100% RDA of Iron, 49 to 56% RDA of Zinc and 13 to 15% RDA of Potassium. Hence, these three genotypes of wild muskmelon viz., HAWMM-1, HAWMM-2 and HAWMM-4 can be promoted for nutritional security mainly for combating iron deficiency in Eastern Plateau and Hill Region.

Fig. 17. Promising genotype of wild musk melon HAWMM-4

# EVENTS ORGANIZED

## Inauguration of Custom Hiring Centre at Krishi Vigyan Kendra, Ramgarh

A Custom Hiring Centre was inaugurated at Krishi Vigyan Kendra, Ramgarh (Jharkhand) on 8th January 2020 by Dr. R.K. Samantha, Chairman, QRT, KVKs of Jharkhand and Bihar. Dr Samanta said that farmers in Ramgarh would be benefitted by this agriculture equipment hiring centre and they would not have to look for anywhere else for hiring of these tractors drawn as well as hand operated equipments. He also added that apart from accessibility of farmers to these modern implements, agriculture practices in the district would be modernised and could contribute to greater farm yield.

On this occasion, Dr. Anjani Kumar, Director, ATARI, Patna applauded this move and articulated the importance and use of advanced equipments in agricultural production and said that CHCs were found to have rented out machinery particularly Happy seeder, which is in huge demand during wheat sowing season at exorbitant rents as the sowing period lasts for just 2-3 weeks. The members of the QRT team and scientists from different centres/institutes, Dr. R. B. Sharma, Dr.F.H.Rahman and Dr Amrendra Kumar gave fruitful and valuable suggestions to develop this recently started Krishi Vigyan Kendra.

Dr. D.K. Raghav, Head Krishi Vigyan Kendra, Ramgarh briefed about all available machines in the custom hiring centre and expressed his delight on inauguration of this most awaited hiring centre. Dr. Indrajeet, SMS (Agriculture Extension), also indicated the importance of custom hiring of agriculture equipments to resource poor farmers which could prove boon to these small and marginal farmers.

The QRT chairman and members visited high density mango orchard and medicinal garden at K.V.K premises and disussed about the relevance of high density orchard planting in undulating topography of Ramgarh by Dr.Dharmjit Kherwar. The farm manager of K.V.K, Ramgarh, explained the benefits of power tiller in this plateau region of Ramgarh where cropping areas are small and scattered and farmers face difficulties in tilling the undulating lands with tractors. Mr. Sunny Ashish Balmuchu and Mr.Shashi Kant Choubey informed the QRT members about the progress of advisory services related to weather conditions in agriculture prospect.

## Stakeholders' Meeting organized at ICAR-Agricultural Technology Application Research Institute, Kolkata (Zone-V)

A Stakeholder's meeting was organized on 28th January 2020 at ICAR ATARI, Kolkata under the Chairmanship of Dr. A.N. Mukhopadhyay, Chairman, QRT of the institute (2012-17) and Ex-Vice Chancellor, AAU, Jorhat to understand the issues, problems and priorities of agriculture and its allied sectors in eastern states specifically for West Bengal and Assam and to develop a common platform & linkages for research & extension programme involving SAUs, ICAR Institutes, line departments, public sector, and private sector organisations. Other QRT members Dr. V. Sadamate and Dr. P. K. Mahapatra graced the occasion. Several dignitaries like, Vice-Chancellors of BCKV, UBKV, Directors of ICAR institutes i.e. ATARI of Kolkata & Guwahati, CRIJAF, Barrackpore, NINFET, Kolkata and ICAR- RCER Patna were present. Head of regional stations of ICAR; representatives from various other ICAR institutes & SAUs were present.


## International Women's Day Celebrated

International women's day was celebrated at ICAR RCER Patna on 8th March 2020. Mrs. Suman Singh, Secretary, Sakhi was the Chief Guest of the function. She was felicitated by the In charge Director, Dr. Ujjwal Kumar. Mrs Singh delivered an inspiring lecture on women empowerment and emphasized on role of women power in holistic development of society. Earlier, Dr. Ujjwal Kumar, I/C Director of the Institute elucidated the role of women in various activities. He also discussed about the women centric schemes, like PM Ujjwala Yojana, Beti Bachao Beti Padhao, Sukanya Samridhi Yojana, Mahila E-haat, Working Women Hostels, etc. In this event, 25 women farm workers were felicitated. All the women participants were very delighted and expressed their joy by singing folk songs. This celebration was attended by 55 persons including scientific, technical, administrative staff of the institute.


## National webinar on "Formation and Effective Functioning of Farmers Producer Organization"

Farmers Producer Companies have tremendous potential in enhancing farmers income, farmers empowerment and making India self reliant through Agriculture. On the call of Honourable Prime Minister in 74th Independence Day, ICAR-RCER, Patna organized a webinar on "Formation and effective functioning of FPO" on 18th August, 2020 under ICAR-NASF project "*Development and validation of need based technology delivery model through Farmers Producer Organization for eastern Region of India*".

Dr Ujjwal Kumar, Head, Division of Socio-economics and Extension discussed about Importance of FPOs in achieving *Atma Nirbhar Krishi and* linking market. Mr. Avinash Kumar of Kaushalya Foundation talked about the steps and legal formalities in formation and registration of FPO in India. Dr. Anirban Mukherjee, Principal Investigator of the Project presented strategies for effective functioning of Farmers Producer Company in India. Mr. Parmanand Pandey, BOD member, Lavkush Producer Company Limited, East Champaran, Bihar also provided his experiences in FPO and how farmers are benefitted through the FPO. The webinar was coordinated by the CO-PIs of the project Dr. Dhiraj Kumar Singh, Dr. Kumari Shubha, Dr. V.K. Yadav and Ramnath Kumar Ray.

In this webinar 320 stakeholders i.e. farmers, scientists, SMS, assistant professor, students etc. participated across the India.

## Vigilance Awareness Week 2020

In consonance with the directions of the Central Vigilance Commission, the ICAR Research Complex for Eastern Region, Patna observed the Vigilance Awareness Week "SATARK BHARAT, SAMRIDDH BHARAT (Vigilant India, Prosperous India)" from 27 October-2 November, 2020 with great enthusiasm and active participation.
Keeping in view COVID-19 guidelines, the week began with the administering of the Integrity Pledge to all officers and staff of institute HQ, Patna by Dr. Ujjwal Kumar, Director (Acting).

## World Soil Day Organized

The World Soil Day was organized on 5th of December 2020 at ICAR Research Complex for Eastern Region, Patna. Fifty farmers from Gangapur, Kharphur, Gowrichak, Sampatchak from Fatuah block of Patna district attended the programme. In this programme, Dr Ujjwal Kumar, I/C Director, ICAR RCER emphasized on balanced application of fertilizers based on soil test to maintain the soil health and crop productivity. He also suggested keeping our soils healthy and creating awareness about soil testing among farmers. Dr A.K. Choudhary, Head, Division of Crop research addressed the farmers and stressed the need for the judicious application of fertilizer, inclusion of pulses and leguminous oilseed crops in rotation and importance of maintaining soil fertility. Dr A. Upadhyaya, Head, Division of Land and water management emphasized the ill effects of soil and water pollution due to overuse of nitrogenous fertilizer and importance of soil microorganisms. After completion of the formal Inaugural programme, a farmer-scientist interaction was organized. Dr Sanjeev Kumar (Agronomy), Dr Mohd. Monobrullah (Entomology), Dr Rakesh Kumar (Agronomy), Dr Surajit Mondal (Soil Science, Mr K. K. Rao (Soil Science), Dr Rachana Dubey (Environmental Science), Dr Kirti Saurabh (Soil Science), Dr Abhishek Dubey (Plant Pathology), Dr Kamal Sarma (Fisheries), Dr Pankaj Kumar (Livestock) answered the queries related to soil health, crop production, livestock health, fish culture and insect-pest management. After the interaction programme, a filed visit was organized and farmers visited various experimental plots and got acquainted with the latest production technologies.


## Farmer's Training Programme on Climate Resilient Agriculture

On the occasion of Kisan Diwas, a two days **Farmer's Training cum Field visit** on **"Management of Rabi Crops through Climate Resilient Agricultural Practices"** was organised during **22-23 December**, **2020 at ICAR Research Complex for Eastern Region, Patna**. The programme was organized under the ongoing project on "Climate Resilient Agriculture Programme" funded by Government of Bihar for enhancing knowledge and skills of farmers about climate resilient practices and technologies specially for rabi crops like wheat, lentil, chickpea etc.

Interacting with all the trainees, Director, ICAR-RCER, Patna; Dr Ujjwal Kumar advised farmers to set up custom hiring centre in order to fulfil large machineries required for lanting and harvesting purposes. Dr Abhay Kumar, Principal Investigator of CRA Programme, in his address to farmers, talked about various climate resilient agriculture practices being implemented in selected villages of Gaya district under the project. He also took feedback on present varieties given to them and their field performance. This training covered a range of topics related to cropping system for climate smart agriculture, improved practices for scientific cultivation of wheat, lentil, chickpea, potato etc. and use of machineries used in conservation agriculture. Field visits to ICAR-RCER campus farm was also conducted for trainees so that they can see the implementation of climate resilient practices in farm and learn about it. A Total of 19 farmers participated in this training course. The programme concluded after distribution of certificates to all the trainees for successful completion of programme.


**Foundation Stone Laying Ceremony of Administrative-cum-Lab Building of KVK, Ramgarh, Jharkhand**

Hon'ble MP, Hazaribagh, Shri Jayant Sinha and Dr. Trilochan Mohapatra , Secretary, DARE & Director General, ICAR virtually laid the Foundation Stone of the Administrative-cum-Lab Building of Krishi Vigyan Kendra, Ramgarh on 31 December, 2020.
Shri Jayant Sinha, Hon'ble MP, Hazaribagh said that agriculture and farmers represent the heritage of the country. Speaking as Chief Guest, he told that the new Administrative-cum-Lab Building will give additional strength to KVK, Ramgarh. He also highlighted the role of science in improving the agricultural scenario of the region. Hon'ble MP also highlighted the role of central government for adopting several developmental programmes, schemes, reforms and policies that focus on improving incomes for the farmers..
Regarding the KVK as a livelihood institution of the farmers', Dr. Trilochan Mohapatra accentuated that the eastern region's climatic condition favours animal husbandry, fishery and horticulture. He urged the farmers to diversify the cultivation in these new income generation sectors. In his address, Dr. Mohapatra explained the effectiveness of integrated farming system models in increasing the income of farmers 2-3 times and ensuring the food and nutritional security of farmers at the same time.

Dr. Ashok Kumar Singh, Deputy Director General (Agricultural Extension), ICAR emphasized on entrepreneurship and incubation programmes of the KVKs. He said that the KVK became the brand name among farmers and helped the farmers in their day-to-day farming. This new KVK will be strengthened as the technology-focused institution to solve the agricultural problems of this region.

Dr. S.K. Chaudhary, Deputy Director General (NRM) highlighted the work of KVK, Ramgarh and stressed upon increasing the farmers' income by including secondary agriculture interventions, and capacity building of farmers, and capacity building among farmers.

Earlier, Dr Ujjwal Kumar, Director (A), ICAR-Research Complex for Eastern Region, Patna, welcomed the dignitaries and outlined the efforts being made in making of KVK, Ramgarh so far. He informed that the proposed building of the KVK, Ramgarh will be built at an estimated cost of Rs1.38 crore, and is expected to be completed by end of the year, 2021. Dr Anjani Kumar, Director, ATARI, Patna highlighted the role of the KVKs in agricultural development. A Kishan Goshthi was also organized on this occasion. More than 100 farmers from Ramgarh district participated in the event. The Officials of ICAR and State Agricultural Universities, directors of different ICAR institute, staff members from ICAR sister institutes, KVKs and farmers virtually participated in the event.

# प्रशासनिक–सह–प्रयोगशाला भवन

## कृषि विज्ञान केन्द्र, रामगढ़

वर्चुअल शिलान्यास

**श्री जयंत सिन्हा**
सांसद, हजारीबाग

एवं

**डॉ. त्रिलोचन महापात्र**
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की उपस्थिति में
**दिनांक 31 दिसम्बर, 2020 को सम्पन्न हुआ।**

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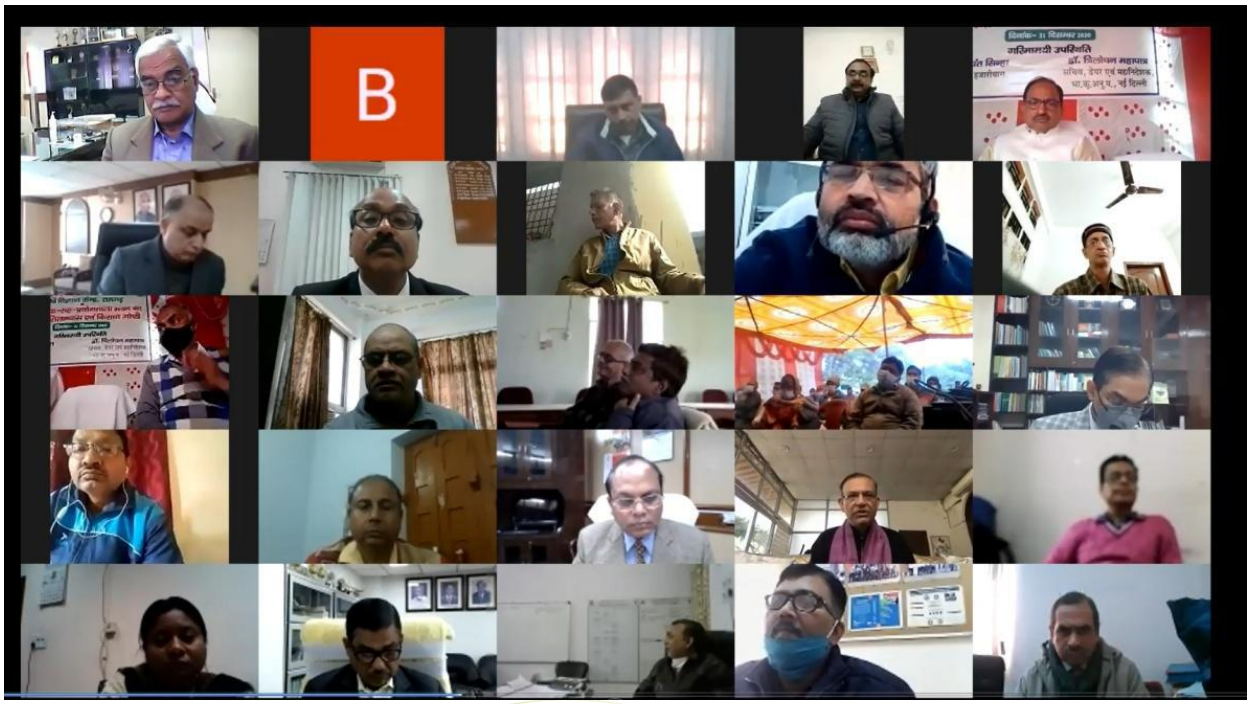

## New Joining

### Scientist

Mr. Govind Makarana, Scientist (Agronomy) w.e.f. 04.040.2020
Mr. Padala Vinod Kumar, Scientist (Agronomy) w.e.f. 04.04.2020
Mr. Saurabh Kumar, Scientist (Microbiology) w.e.f. 06.04.2020
Dr. Ajit Kumar Jha, Sr. Scientist (Plant Pathology) w.e.f. 06.10.2020

## Promotion

### Scientist

Dr M.K. Dhakar, Scientist (Fruit Science) promoted to Scientist (Level-12) w.e.f. 01.01.2018
Dr T.L. Bhutia, Scientist (Vegetable Science) promoted to Scientist (Level-12) w.e.f. 01.07.2018

## Transfers

Dr. J.S. Mishra, Pr. Scientist (Agronomy) & Head joined as Director, ICAR-DWSR, Jabalpur w.e.f. 26.11.2020
Dr. P.R. Kumar, Pr. Scientist (Seed Technology) transferred to ICAR-IARI, Hazaribagh w.e.f. 31.05.2020
Dr. S.K. Dwivedi, Scientist (Plant Physiology) transferred to ICAR-CITH, Lucknow w.e.f. 07.08.2020
Dr. S. Maurya, Scientist (Plant Pathology) transferred to ICAR-IVRI, Varanasi w.e.f. 13.12.2019.
Mr. Vipul Raj, Administrative Officer transferred to ICAR-MGIFRI, Motihari w.e.f. upto 24.08.2020
Dr. B.P. Bhatt, Director transferred to NRM Division, ICAR, New Delhi w.e.f. 02.10.2020

## Retirements

Sh. Tipa Mahli, SSS w.e.f. 31.01.2020
Sh. Y.N. Pathak, ACTO w.e.f. 31.01.2020
Sh. Babulal Mahto, SSS w.e.f. 29.02.2020
Sh. Sarju Mahto, SSS w.e.f. 29.02.2020
Sh. Mangal Lakra, SSS w.e.f. 29.02.2020
Sh. Pradeep Kumar Singh, TO w.e.f. 30.06.2020
Sh. Sukhna Oraon, SSS w.e.f. 30.09.2020
Sh. Somra Munda, SSS w.e.f. 30.09.2020
Sh. Ganga Ram, STO w.e.f. 30.11.2020
Sh. Chandra Kant, STO w.e.f. 31.12.2020

## Editorial Committee

Amitava Dey, Bikash Das , Pankaj Kumar, Prem Kumar Sundaram, Surajit Mondal, Rachana Dubey, Akram Ahmed, Manoj Kumar, Anirban Mukherjee, Jaspreet Singh, Dushyant Kumar Raghav, Mandhata Singh, and Sarfaraj Ahmad

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