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Solutions for a New Generation

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From the Vice-Chancellor's Desk

The agriculture and allied sector continue to be pivotal to the sustainable growth and development of the national economy. It meets the food and nutritional requirements of 1.3 billion people and contributes immensely to production and demand generation through various backward and forward linkages. Although the green revolution has brought food security, it is a paradox that despite being a food surplus and net exporter, 14.2% of the Indian population is under-nourished, having health implications. Agriculture, the backbone of the Indian economy, feeds the nation and provides raw material to the agro-industries and thus has a dominant role in its export performance. India has made significant progress in technological development in agriculture, but the productivity of land and labour remains low in terms of world standards. The technological breakthrough in the green revolution has helped maintain and not improve the per capita availability of landholding capacity due to the ever-growing population. Unless technological advancements are achieved, almost in an unbroken chain, maintaining the present food consumption level in the future would be difficult, and further improvement would be a significant challenge. In the current situation, a new direction can be given to agricultural research only by bringing about a perceptible change in the crop-based farming system for integrated development. Undoubtedly, the 'Make in India' is the most successful initiative ever taken by the government. Big data, Remote sensing and Artificial intelligence are still at a novel stage in India compared to other developed countries. Technological developments such as machines for tillage and harvesting, controlled irrigation, fertilizers, pesticides, crop breeding, genetics research, and biotechnological tools for trait improvement have evolved modern farming. Presently, agriculture can be considered passing through a fourth revolution facilitated mainly by the advances in information and communication technologies. Emerging technologies, such as remote sensing, Internet of Things (IoT), Big data analysis, development of unmanned aerial vehicles (UAV), and artificial intelligence (A.I.) are promising tools being utilized to optimize agricultural operations and aimed to enhance production and reduce inputs as well as yield losses.

Technologies Applied Successfully

In-situ Rainwater Management and Crop Diversification for Climate-resilient Agriculture

An experiment entitled "In-situ rainwater management and crop diversification for climate-resilient agriculture" was initiated in 2020-21 at Rani Lakshmi Bai Central Agricultural University (RLBCAU), Jhansi (Fig. 1) to standardize the Agro-techniques for efficient use of irrigation and rainwater and crop diversification for climate-resilient agriculture in Bundelkhand. The experiment was conducted in a split-plot design with five *In*-situ rainwater harvesting methods: Control (Conventional Practice); Deep tillage; Horizontal mulching; Broad bed and furrow, and Ridge and furrow in the main plot, and three Cropping systems, namely: Groundnut-Wheat; Maize-Mustard and Sorghum-Chickpea in the sub-plot, replicated thrice. The mustard crop was sown in October month after the maize harvest, while Wheat and Chickpea crops were sown in November 2021 under zero tillage conditions with the help of seed-cum-ferti drill machine. Performances of zero-till crops are quite satisfactory, and very few weed problems were observed during the crop growth. **(Yogeshwar Singh, Rajeev Nandan & S. Upadhyay).**

Fig. 1: In-situ rainwater management and crop diversification

Nutrient recommendations on STCR and targeted yield equations basis for promising cropping systems

An experiment has been initiated at the RLBCAU research Farm, Jhansi (Fig. 2), from 2020-to 2021. The field experiment consists of seven treatments, i e. (T_1 - Control), T_2 - 100 %RDF, T_3 - 75% RDF + FYM @ 5t/ha , T_4 - 100% RDF + FYM @ 5t/ha, T_5 – STCR based nutrient recommendations , T_6 - 75% RDF+ Crop residue @ 4t /ha and T_7 - 100% RDF+ Crop residue @ 4t /ha) (Kharif crop residue has been applied in rabi crop only) with two different cropping system i.e. sorghum- chickpea and black gram- mustard. These treatments were replicated three times in RBD design. Chickpea and mustard crops were sown in the month of November 2021, and the performance of the crops is quite good to date. **(Susheel Kumar Singh, Yogeshwar Singh, Bharat Lal and Arpit Suryawanshi).**

Fig. 2: Nutrient recommendations on STCR

Phenotyping of 85 germplasm lines of Chickpea for confirmation of stable resistance against wilt disease for its further utilization in breeding programme

272 chickpea entries received from ICAR-IIPR, Kanpur are phenotyped each for Wilt and Collar rot disease of Chickpea under sick plot and pot conditions, respectively, in two replications (Fig. 3). Under wilt sick plot, around thirteen entries showed a resistant reaction. Similarly, six entries were found to be promising as tolerant/ resistant for collar rot disease of Chickpea. 500 chickpea entries received from ICRISAT and NBPGR under DBT funded Chickpea Project are phenotyped for Collar rot disease of Chickpea both under the sick plot condition and tray. Eight entries viz. ICC 585, ICC 2061, ICC 2484, ICC 2922, ICC 2994, ICC 3448, ICC 5585, and ICC 6821 were found to be tolerant/ resistant to collar rot disease both under field and pot conditions. **(Meenakshi Arya).**

Fig. 3: Phenotyping of 85 germplasm lines of Chickpea

Phenotypic characterization and evaluation for abiotic stress tolerance

1000 accessions received from NIPGR/ICRISAT (Fig. 4) were sown on 19th January, 2022. In addition, 20 promising heat tolerant accessions selected during Rabi 2021 have also been sown. Heat tolerance varieties (J.G. 14 and IPC 2006-77) have been used as checks. These 1000 entries will be observed for pollen fertility, pollen germination and stigma receptivity. EC 542153 was found to be the most tolerant one in Rabi 2021. **(S.K. Chaturvedi and Anshuman Singh).**

Fig. 4: 1000 accessions from NIPGR/ICRISAT

Intercropping of legumes under industrial agroforestry system in Bundelkhand region

The experiment was conducted at H-12, and H-14 blocks of the Bhojla farm area of RLBCAU, Jhansi (Fig. 5). These tree species have been planted at 3 spacing (5m x 3m, 5m x 4m and 5 m x 3m) except Ailanthus excels, which was planted at 2 spacings (5m x 4m and 5 m x 3m) accommodating 144 plants of Melia in an area of 2500 m^2, 168 plants of *Gmelina* and 148 plants of Kadamb in an area of 6000 m^2 and ardu 44 plants in 2000m^2. The area between the rows was inter-cropped with lentil (*Lens culinaris*), grass pea (*Lathyrus sativus*) and chickpea (*Cicer arietenum*) in the *Rabi* season of 2020-21. Among growth attributes of *Melia dubia,* mean plant height and basal diameter were found maximum (199.44 cm, 4.18 cm) in 5 m x 3 m spacing compared to in 5m x 4m and 5m x 5m spacing. Mean plant height and Basal diameter were found to be a maximum of 157.36 and 3.43 (Gmelina), 149.78 and 4.74 (Kadamb) in both species under 5x5m spacing compared to in 5x4m and 5x5m spacing. *Melia dubia, Neolamarckia cadamba, Gmelina arborea* and *Ailanthus excelsa* are promising species of industrial agroforestry system and showed rapid growth during the investigation. **(Prabhat Tiwari, R.P. Yadav, M J Dobriyal, Garima Gupta and A.K. Pandey).**

Fig. 5: Intercropping of legumes under industrial agroforestry

Inter-cropping of legumes under a neem-based agroforestry system

The neem tree was planted in 2019 at 6.0 m x 5.0 m spacing, with a density of 333 per hectare (Fig. 6). The region falls under a semi-arid ecosystem. The soil is very poor in fertility and is red, gravelly sand. The neem trees have been established with an almost 100% survival rate and have a very good growth rate. The area between the rows was inter-cropped with lentil (Lens culinaris cv. IPL-316), grass pea (Lathyrus sativus cv. Ratan), broad bean (Vicia faba cv. Swarna Gaurav), chickpea (Cicer arietinum cv. RBG 202), field pea (Pisum sativus cv. IPFD 12-2 (W) & IPFD 10-2), fenugreek (*Trigonella foenum-graecum*) and jack bean (*Canavalia ensiformis*) in Rabi season of 2021-22. Among growth, attributes mean plant height and basal diameter were found maximum (199.44 cm, 4.18 cm). The neem tree is promising species of industrial agroforestry system and has shown rapid growth during the investigation. **(R.P. Yadav, A. S. Kale, Prabhat Tiwari, Bijilakshmi Devi, M. J. Dobriyal, Garima Gupta, B. S. Pavithra and A.K. Pandey).**

Fig. 6: Inter-cropping of Legumes under a neem-based agroforestry system

Calculating forest diversity with information-theory based indices of Mahavir Swami Wildlife Sanctuary

Tropical forests are an essential source of carbon pool and contain about 40% of the terrestrial carbon storage. Understanding species richness and ecological and structural traits are indelible for conserving forest diversity. Assessment of species' evenness, diversity, and richness has been instructive for future research in various forest ecosystems at spatial scales. The tropical forest serves an important pivotal role in terrestrial biological diversity. The tropical forest provides habitat conditions and natural resources, which act as munificence for the life forms living in the tropics. Analytical scrutiny of the forest stand is provided by the structural diversity of the forest and can be sub-divided into three categories; tree species diversity, tree dimension diversity, and tree position diversity. This study attempts to assess tree species diversity in Mahavir Swami Wildlife Sanctuary (MSWS), Lalitpur, UP, India, using information-theory based indices and Sentinel-2A sensor data. To find out biodiversity extent based on the Sentinel-2A sensor, we covered two separate groups of studies, including biodiversity extent and forest density. The first is forest density mapping from a demographic zone perspective by linking with census data. We selected tree samples from ten transects of 0.1 hec in MSWS through random sampling (Fig. 7).

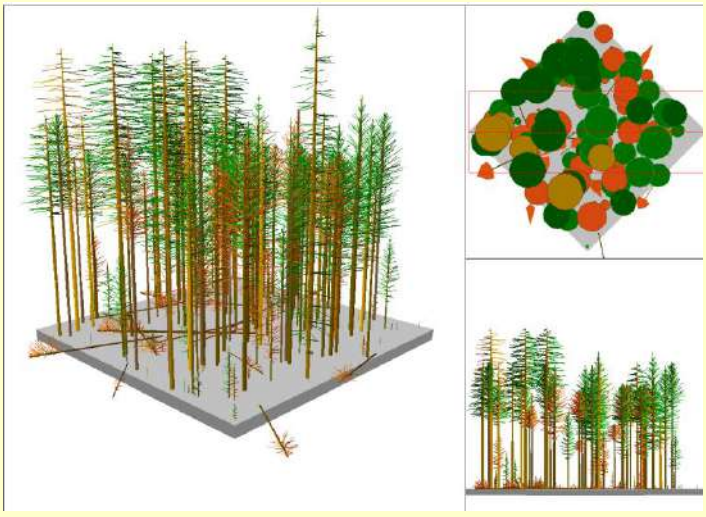

Fig. 7: Layout plot of 0.1 ha

Four ecological indicator indices, namely, Shannon-Wiener index (H/), Simpson's diversity (D), Margalef index (S.R.), index and Pielou's index (J), were utilized for measuring forest diversity. The research outcomes revealed that the Shannon-Weiner diversity index (H/) is best suited for assessing species richness. In contrast, Simpson's diversity (D) index was more suited for determining species diversity. The methodology used in this study can help forest managers, environmentalists, and conservationists formulate policies for managing forest ecosystems at various scales. Thus, the objective of this study is to understand, identify and delineate the species diversification, species richness, composition, and structural forms of the tropical forest. **(Pavan Kumar, Manmohan Dobriyal, Amey Kale, A. K. Pandey).**

Molecular characterisation of fusarium isolates causing stalk rot in maize

The Fusarium spp. causing stalk rot of maize were isolated from different regions of India. A significant morphological variation and a considerable difference in pathogenicity were observed with each isolate. Molecular characterization of the Fusarium spp. exhibiting morphological variations were performed to evaluate the genetic diversity and identify the most virulent strain.PCR amplification was performed using universal ITS 1 and ITS 4 primers and specifically designed Tef1α primers. The amplified product was checked on gel electrophoresis. A band size of 550 bp was attained with ITS primers, while 700-720 bp was observed with Tef1α primers. The amplified product was then sent to Medauxin, Bangalore, for Sanger sequencing. The sequences obtained were subjected to nBLAST to achieve homology with the NCBI fungal DNA database sequences. Among a total of 35 isolates for which, PCR amplification was successfully performed in two different sets. The ITS sequence was obtained for the 14 isolates, and Tef1α sequences were obtained for 13 isolates (Fig. 8). **(P.P. Jambhulkar and Ruchira Bajpai).**

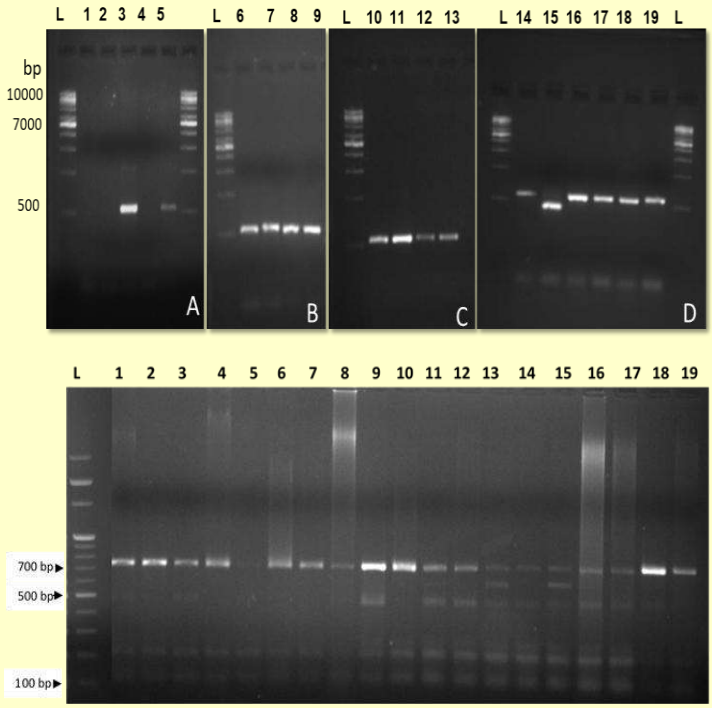

Fig. 8: PCR amplification was obtained from 19 different isolates of Fusarium spp. Using ITS 1 and ITS4 primer (up) and Tef1α primer (down).

Remote sensing and digital image processing of satellite data for ecosystem monitoring workshop

The workshop entitled "Remote Sensing and Digital Image Processing of Satellite Data for Eco-system Monitoring" began on 10th January, 2022. A total of 137 participants from across the country had filled out the forms, and 25 participants were shortlisted (all Post Graduate and PhD students). After the four days of the training program, 7 participants got COVID positive. So, keeping their health situation in mind, we provided online training to them. We also followed all the COVID-19 protocols on our campus to successfully complete the workshop. The entire event focused on remote sensing and digital image processing of satellite data, including application part of forestry, soil, agriculture, climate change etc. After the inaugural session (Fig. 9), the first lecture was delivered on the basic concepts of remote sensing and its importance by Dr. Pavan Kumar. Interns were given theoretical inputs in between the hands-on session. They were taught data collection and analysis and applied the data to image processing software. Pavan Kumar (Workshop Coordinator) coordinated and conducted the workshop under the supervision of Dr. Manmohan Dobriyal (Course Director), Head Forestry, CoHF, RLBCAU, Jhansi.

Fig. 9: Inaugural session of the workshop

National Youth Day on 12th January, 2022

The National Service Scheme (NSS) Unit of RLBCAU Jhansi celebrated the National Youth Day virtually on 12th January 2022 to commemorate the 159th Birthday of Swami Vivekananda. Over 200 participants including Professors, faculty, staff and students of the university were present. Prof. Arvind Kumar (Honourable Vice-Chancellor), Dr. S. K. Chaturvedi (Dean, College of Agriculture), Dr. A. K. Pandey (Dean College of Horticulture and Forestry), Dr. Anil Kumar (Director Education) and speakers from other colleges and universities were present to grace the occasion. As a part of the event, the organisers also arranged essay writing competition on the topic "India of my dream-2047" or "Azadi ka Amrit Mahotsav-Unsung Heros of the freedom struggle" on 15.01.2022 and poster competition on the theme "Burning problems of youth" on 18.01.2022 for the showing the talents of youth.

Celebration of Republic Day on 26th January, 2022

The University celebrated 73rd Republic Day with great zeal. With immense pride, the students glorified and celebrated the spirit of unity. The programme began at 9.00 AM. The chief guest for the day was Dr. Arvind Kumar, Vice-chancellor (Fig. 10), Rani Lakshmi Bai Central Agricultural University, Jhansi. Our chief guest hoisted the National flag, which the students and staff of the University saluted and pledged to uphold its honour and integrity. The chief guest addressed the students and staff and urged them to do their best and feel proud to be Indian. The RLBCAU fraternity also organized cultural programs on the occasion. Through their speech and cultural activity, the students and staff members brought the stage alive with their passion and love for the motherland. The campus reverberated with patriotic favours and enthusiasm by our university students. We held a ceremony to award certificates to the winners of the interuniversity competition. After refreshments, the pupils scattered in their minds and hearts with the sight of the floating tricolour. May we continue celebrating this day forever!.

Fig. 10: Celebration of republic day

World Wetlands Day on 2nd February, 2022

The World Wetlands Day was organised at Rani Lakshmi Bai Central Agricultural University in Jhansi through virtual mode along with a national webinar on "Wetlands for People and Nature". Although to mark the historical Ramsar convention February 2, 1971, in Ramsar city of Iran, it has taken 26 long years for this first programme to materialize effectively on February 2, 1997. Its goal is to save wetlands all around the world from extinction and raise public awareness about their importance. "Wetlands for People and Nature" was the theme of World Wetlands Day 2022. The United Nations has recognized World Wetlands Day as an international day from year 2022. Prof. Arvind Kumar, Vice Chancellor of RLBCAU, who presided over the Wetlands Day programme, said that wetlands must be made useful for human use and economic progress other factors.

National Webinar on New dimensions in crop improvement from allele mining to genome editing

RLBCAU, Jhansi, an institution of national importance is organized a National Webinar on New Dimensions in Crop Improvement from Allele Mining to Genome Editing in virtual version on February 26th, 2022 on the occasion of Vigyan Mahotsav 2022 (Fig. 11).

Fig. 11: Discussion during webinar

This webinar was organized with an aim to cover a wide range of critically important Plant Science and Molecular Biology topics including recent trends, latest breakthroughs and emerging novel research work where the speakers will describe their ideas and works relating to allele engineering, using allele mining techniques and genome editing, in the optic to create new traits. At the beginning, in the welcome address of the program, Dr. Anil Kumar, Director Education, outlined this webinar that focuses on the real concepts and potential of mining approaches for allele discovery and their use for agriculturally important traits in crops. New tools are now available for engineering new ideologies for precise modification of crop genes. The future challenge in this emerging area of genome engineering is to develop efficient methods for allele mining.

Sensitization Workshop on "Agri-Start Ups: A way forward for the generation of employment opportunities for Students

At a time where there is a need for increasing population and better quality and demand for higher quantity of food, production pressure on farms is increasing. Agritech startups are a relevant solution in the agricultural value chain, and they can be as a product, a service or an application. India has already made a strong name for itself in the global startup community. It is high time that Agritech startups are made successful and take India forward as a leader in the agricultural technology sector as well. With these objectives in mind, under the Vigyan Mahotsav Saptah-2022, a sensitization workshop on "Agri-start Ups: A way forward for generation of employment opportunities for students" was organized at Rani Lakshmi Bai Central Agricultural University on March 03th, 2022 in which the heads of various startups shared their experiences and ideas with the students and how the students and students can find new jobs through startups and themselves. It inspired to make the country and the countrymen self-reliant.

8th University Foundation Day on March 05th, 2022

RLBCAU celebrated its 8th Foundation Day on March 5th, 2022 (Fig. 12). This day is celebrated every year on 5th March because it was the day when the university came into the existence under the Act of Parliament, 2014 as an Institution of National Importance. To make this event more memorable, the celebration was honoured by the august presence of Ex-Secretary, DARE and Director General, ICAR Dr. Mangala Rai as chief guest. On this occasion different programmes were organised during 4th to 5th March, 2022. The celebration of foundation day was started on 4th March with the Debate and Extempore competition at 3:00 PM chaired by Dr. Mangala Rai Ex-Secretary, DARE and DG, ICAR and Dr. Arvind Kumar, Vice Chancellor RLBCAU, Jhansi with all Statuary officers, faculty members and students of the university.

Fig. 12: 8th Foundation day

20th Atal Jai Vigyan (AJV)" Lecture: Sharing wisdom and valuable thoughts with new generation

On the occasion of 8th Foundation Day of RLBCAU, Jhansi, the key speaker of Atal Jai Vigyan Lecture Series, Dr. AK Saxena, former Director, National Bureau of Agriculturally Important Microorganisms, Mau delivered the 20th Atal Jai Vigyan Lecture on Microbe based technologies for nutrient management on 5th March, 2022 (Fig. 13). Speaking on the subject, Dr. Saxena said that microbe based technologies are the only low cost and environment friendly way to improve nutrient supply and improve soil health in short and medium term. The combined use of microbial and mineral resources is an emerging research area aimed at designing and developing efficient microbial formulations that are highly compatible with mineral inputs with positive impacts on both crops and the environment.

Fig. 13: Inaugural session of 20th Atal Jai Vigyan

International Women's Day on 8th March, 2022

RLBCAU celebrated the occasion of International Women's Day. The theme of which this year was "Gender Equality Today for a Sustainable Tomorrow". The program was organised under SPARSH- A student-centric platform of the University.

The first female District Judge of Jhansi, Mrs Jyotsna Sharma, and, the first Joint Development Commissioner of Jhansi, Mrs Mithlesh Sachan, was the esteemed Guests of Honour. The welcome address of the program was delivered by Anil Kumar, Director of Education. The Agriculture 2nd Year students recited poems and voiced their opinions about women empowerment. Guest of Honours and dignitaries presented their views on the increasing women disability in different sections of the society that rested upon the importance of education in the progress and emancipation of women. Artika Singh recited a meaningful poem, aptly defining the theme. On this occasion, the chief guests were felicitated by the honourable VC, Dr. Arvind Kumar. In recognition of their outstanding work Certificate of appreciation was presented to both guests of honour and Dr. Meenakshi Arya, Scientist, Plant Pathology. In his presidential address, Hon'ble Vice-Chancellor Prof. Arvind Kumar emphasized the role of women in Agriculture (Fig. 14).

Fig. 14: Experience sharing by the guest of honour on the occasion of international women's day

ELP in Post-Harvest Technology Visit

The experiential learning program (ELP) on "Processing of Fruits and Vegetables for Value Addition" was started in mid of January 2022 with the prime aim of earning while learning. Another motive behind the program is to prepare the students for entrepreneurship. This will help them to become job providers rather than job seekers. The students are learning different strategies for augmenting of shelf-life of horticultural crops and preparing different innovative products at the commercial level in the postharvest technology laboratory.

This will also help in-building essential skills for project making like decision making, problem-solving approach, team coordination, marketing, accounting, and resolving conflicts. The Ex-DG, ICAR Dr. Mangala Rai (Fig. 15), also visited the Postharvest Technology laboratory on 5th March 2022 on the auspicious occasion of the foundation day of the University. He appreciated the work of ELP students and faculty. Further, he emphasised the adopting of a hybrid method of research by the inclusion of millets and pseudo-cereals with local fruits and vegetables.

Fig. 15: Dr Mangala Rai visited the Postharvest Technology laboratory

Forestry and medicinal, aromatic plants filed day on 10th March, 2022.

A large number of people in developing countries have traditionally depended on products derived from plants, especially from forests. The Indian Pulses Research Institute, Kanpur, Uttar Pradesh, sponsored a field day on forestry and medicinal aromatic plants under the direction of Honorable Vice-Chancellor Prof. Arvind Kumar and the guidance and supervision of Dr. S.S. Singh (Director Extension Education) and Dr. M. J. Dobriyal (Head of Department) in Kulua Village, Niwari District, (M.P) on 10th March 2022 (Fig. 16).

Fig. 16: Filed day of forestry, medicinal and aromatic plants

The purpose of this field day was to encourage farmers to adopt an integrated agriculture strategy based on agroforestry and medicinal, aromatic plants to increase their income. On this occasion, Dr. Prabhat Tiwari explained to the farmers the species and importance of trees planted in industrial agroforestry along with the above scheme. Dr. Garima Gupta, Dr. Pankaj Lavania, Dr. Vinod Kumar and Dr. Amey Kale was discussed various agroforestry tree species of Bundelkhand and the economic benefits to the farmers from the cultivation of medicinal and aromatic plants. Mr. Deepchand Kesari and other youth and many senior people of the village participated enthusiastically in the program

World Forestry Day on 21st March, 2022

Forest sustainable management and their use of resources are key to combating climate change, and to contributing to the prosperity and well-being of current and future generations. The College of Horticulture and Forestry, RLBCAU, Jhansi, organized the World Forestry Day Celebration with the blessings of Honorable Vice-Chancellor Prof. Arvind Kumar, the able guidance of Dean, Dr A. K. Pandey and the supervision of the Head of Department, Dr M. J. Dobriyal on 21st March 2022. The International Day of Forests 2022 theme is “Forests and sustainable production and consumption” (Fig. 17). The Collaborative Partnership chooses the theme for each World Forest Day on Forests (CPF). University students, more than 200 took participated in competitions related to quizzes, posters and video clips of nature on the theme “Forests and sustainable production and consumption”. R. P. Yadav declared the results of all competitions. The celebration reached a hiatus with a tree plantation activity at the Tree Born Oilseeds (TBOs) Block, Forestry Farm, RLBCAU, Jhansi.

Fig. 17: World Forestry Day Celebration day

Extension Education Activities

1. Zero tillage Promotion in Bundelkhand under CIMMYT Pilot Project during 17-19 January 2022.
2. Field Day under "Enhancing Rapeseed-Mustard Production among Scheduled Caste Farmers of Uttar Pradesh and Madhya Pradesh For Sustainable Livelihood Security Under the Scheduled Caste Sub-Plan" on 24th January, 2022.
3. Field Day on Mustard under All India Cordinate Research Project on Mustard (ICAR-DRMR-AICRP) at Simra Village (Jhansi) on 5th February 2022.
4. Field Day on Mustard under SCSP Programme (IIPR-Kanpur) at Reda Village (Datia) on 16th February 2022.
5. Field Days were conducted under the FLD-Chickpea programme (AICRP-Chickpea) on 21st February 2022 at Datia District.
6. Field Day on Mustard under All India Cordinate Research Project on Mustard (ICAR-DRMR-AICRP) at Choti Badhoni Village (Datia) on 23rd February, 2022.
7. Field Day on MULLARP-AICRP (Chickpea, field pea, and lentil) on 26th February, 2022, at Hardua village, district Jalaun, Uttar Pradesh.
8. Field Day on Kharif Maize under SCSP (ICAR-IMRI, Ludhiana), 27th February 2022.
9. Exposure visit of farmers to ICAR-Directorate of Rapeseed-Mustard Research, Bharatpur under SCSP Project. First Visit was made from 24 to 25th February 2022, and the second visit was made on 27-28th February 2022.
10. Two Days Farmers Training at RLBCAU Campus, on Millets under SCSP programme on 9th March 2022.
11. Training-cum-Field Day on Agro-forestry and Aromatic Plants on 10th March 2022 at Kulua Village, Niwari District, (M.P) Niwari.
12. Field Day Training programme was organized on forestry and medicinal, aromatic plants on 10th March 2022.
13. One Day Training Programme on Chickpea on 15th March 2022.
14. Technology and Machinery Demonstration Meet-cum-Farmers Fair, 16th March 2022 at Indian Grassland and Forage Research Institute, Jhansi.
15. Field Day on Chickpea (AICRP) on 24th March 2022 at Dhikoli (Jhansi) and Durgapura (Datia).
16. Two days On-Campus training on "Production Technique of Aerobic Rice" at RLBCAU Campus, 24th March 2022
17. Two days Farmer's Skill Training on Beekeeping, 30-31st March 2022.

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5.	रानी मधुमक्खी उत्पादन की प्रमुख विधियाँ	डॉ. सुन्दर पाल, डॉ. ऊषा, डॉ. मैमोम सोनिया देवी, डॉ. विजय कुमार मिश्रा, डॉ. योगेन्द्र कुमार मिश्रा, डॉ. सुशील कुमार चतुर्वेदी, डॉ. सती शंकर सिंह	प्र.शि.नि./त. प्र. सं/फो./ 2022/44
6.	मधुमक्खी पालन के उपकरण और उनके उपयोग	डॉ. योगेन्द्र कुमार मिश्रा, डॉ. ऊषा, डॉ. सुन्दर पाल, डॉ. मैमोम सोनिया देवी, डॉ. विजय कुमार मिश्रा, डॉ. सुशील कुमार चतुर्वेदी, डॉ. सती शंकर सिंह	प्र.शि.नि./त.प्र. सं/फो./ 2022/45
7.	मधु वाटिका प्रबंधन	डॉ. विजय कुमार मिश्रा, डॉ. ऊषा, डॉ. सुन्दर पाल, डॉ. मैमोम सोनिया देवी, डॉ. योगेन्द्र कुमार मिश्रा, डॉ. सुशील कुमार चतुर्वेदी, डॉ. सती शंकर सिंह	प्र.शि.नि./त.प्र. सं/फो./ 2022/46
8.	मौन प्रजातियाँ एवं मौन वंश और उनके कार्य	डॉ. ऊषा, डॉ. मैमोम सोनिया देवी, डॉ. सुन्दर पाल, डॉ. विजय कुमार मिश्रा, डॉ. योगेन्द्र कुमार मिश्रा, डॉ. सुशील कुमार चतुर्वेदी, डॉ. सती शंकर सिंह	प्र.शि.नि./त.प्र. सं/फो./ 2022/47
9.	मधुमक्खी मधुमक्खियों के बीमारियाँ एवं उनका नियंत्रण	डॉ. ऊषा, डॉ. सुन्दर पाल, डॉ. मैमोम सोनिया देवी, डॉ. विजय कुमार मिश्रा, डॉ. योगेन्द्र कुमार मिश्रा, डॉ. सुशील कुमार चतुर्वेदी, डॉ. सती शंकर सिंह	प्र.शि.नि./त.प्र. सं/फो./ 2022/48

Publications/Awards/ Invited Lectures

Publications

1. Jambhulkar, P. P., Raja, M., Singh, B., Katoch, S., Kumar, S., & Sharma, P. (2022). Potential native Trichoderma strains against Fusarium verticillioides causing post-flowering stalk rot in winter maize. Crop Protection, 152.

2. Bairwa, N. K., **Jambhulkar, P. P.**, Sushmitha, V., Arya, M., Manjunatha, N., Bajpai, R., **Shailendra Kumar, Chaturvedi S. K.** & Lakshman, D. (2022). Evaluation of fungicides and bacterial antagonists for managing Corynespora leaf spot on mungbean (Vigna radiata L. Wilczek). Archives of Phytopathology and Plant Protection, 55(4): 433-453.

3. Singh, R. K., **Kumar, P.**, Kumar, M., Tyagi, K., & Jain, H. (2022). Artificial Machine Learning-Based Classification of Land Cover and Crop Types Using Sentinel-2A Imagery. Sustainable Agriculture Systems and Technologies, 326-336.

4. Rani, M., Chaudhary, B. S., **Lal, B., Nandan, R.**, & **Kumar, P.** (2022). Multifaceted Impact of Lockdown During COVID-19 on Food Security and Smallholder Agricultural Systems. Sustainable Agriculture Systems and Technologies, 49-62.

5. Lal, B., **Kumar, P.**, Sengar, S. S., & Singh, R. N. (2022). Hydro-chemical evaluation and fluoride health risk assessment in plain tropical central India school children. Geocarto International, 1-22.

6. Kumar, P., Pandey, A. K., Singh, S. K., Singh, S. S., & Singh, V. K. (Eds.). (2022). Sustainable Agriculture Systems and Technologies. John Wiley & Sons.

7. Aishwarya, R., Meenu, C., Bhagwan Singh, **L., Bharat**, **N., Rajiv**, **K., Pavan**, Twigg, Charlotte, Wenk, Jannis. (2022). Multifaceted Impact of Lockdown during COVID-19 on Food Security and Smallholder Agricultural Systems Review and Meta-Analysis: SARS-CoV-2 and Enveloped Virus Detection in Feces and Wastewater. Sustainable Agriculture Systems and Technologies, 49-62.

8. Lal, B., **Shukla, A. K.**, **Kumar, P.**, & Singh, S. K. (2022). Quality of Irrigation Water for Sustainable Agriculture Development in India. Sustainable Agriculture Systems and Technologies, 224-250.

9. Misra, T., Arora, A., Marwaha, S., Kumar, S., Ray, M., Kumar, S., Das P. (2021). LARGB: Leaf Area Determination from Visual Image. R package version 0.1.0.

10. Misra, T., Arora, A., Marwaha, S., Kumar, S., Ray, M., Kumar, S., Majumder, S. G. (2021). FWRGB: Fresh Weight Determination from Visual Image of the Plant. R package version 0.1.0.

Invited Lectures

1. *Organic amendments and soil suppressiveness in plant disease management* by P. P. Jambhulkar in National Symposium on "Recent trends in Phytopathology to address emerging challenges for achieving food security" during 20-21st January 2022 by ICAR–Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora in association with Mid-Eastern Zone Chapter of Indian Phytopathological Society (IPS), New Delhi

2. Artika Singh, Delivered a lecture on *Organic Farming-Status, Challenges and Prospects* (theme Recent Advances in Agriculture and Frontier Sciences, sub-theme Crop production) organized by RPSSC on 21st January 2022.

3. *Diversity of Trichoderma spp. in cultivated Agricultural fields of southern Rajasthan* by P. P. Jambhulkar Satellite workshop on Trichoderma and Gliocladium, 25th March, 2022 at Sri Karan Narendra Agriculture University, Jobner - Jaipur, Rajasthan, India.

4. Tanuj Misra delivered a lecture and conducted a practical session on the topic of *Deep Learning in Agriculture* in 21 Days Virtual Winter School on "Analytical Techniques for Decision Making in Agriculture" organized by ICAR-National Institute of Agricultural Economics and Policy Research (NIAP) during 5th February to 25th February 2022 in virtual mode on Zoom platform.

5. Tanuj Misra delivered a lecture and conducted a practical session on the topic of *Application of Object Detection and Image Segmentation using Deep Learning in Crop Improvement* in a training programme on "Artificial Intelligence in Agriculture" organized by ICAR-Indian Agricultural Statistics Research Institute (IASRI) during 15th February 7th March 2022 in virtual mode on Zoom platform.

6. S.K. Chaturvedi, Dean, College of Agriculture, RLBCAU, delivered a lecture on *Revisiting Research Priorities for Sustaining Self Sufficiency at* JNKVV, Jabalpur, on 11th March 2022.

7. S.K. Chaturvedi, Dean, College of Agriculture, RLBCAU on *Prospects of agricultural education with respect to job and business opportunities* at College of Agriculture (JNKVV), Tikamgarh (M.P.) on 30th March 2022.

8. Ashutosh Sharma, Assistant Professor, has delivered the University Faculty Seminar on *Agri-Tech Start-Ups in India: Opportunities and Challenges* on 25th February 2022. His lecture addressed unemployment through Agri tech startups and emphasized the potential areas of agripreneurship in the Bundelkhand region.

9. Meenakshi Arya has delivered a lecture on *Chane Ke mukhya rog evam prabandhan* in a training programme organized at RLBCAU, Jhansi entitled 'Bundelkhand Kshetra Mein Chana Utpadan Par Ek Diwasyia Krishak Prashikshan' on 14th March, 2022.

10. Alka Jain was invited for a radio talk on the eve of International Women's Day, by All India Radio on 7th March, 2022.

11. Anil Kumar, Director Education, RLBCAU, Jhansi delivered a lecture on *Importance of Science, Technology, Innovation-STI infrastructure for translational research & Agri-entrepreneurship for self-reliant India* as well as *Development of Micro-Ecosystem for Deriving Bioeconomy Driven Agri-Entrepreneurship* under UGC-HRD refresher training program at Kumaun University, Bhimtal campus, Nainital. (12th March, 2022).

Awards

1. P.P. Jambhulkar, Best Oral Presentation award in 8th International Conference on "Plant Pathology: Retrospect and Prospects" at Sri Karan Narendra Agriculture University, Jobner-Jaipur, Rajasthan, India during March 23-26, 2022.

2. Meenakshi Arya got a Certificate of Appreciation in recognition of Outstanding Work and being a role model for the community on the occasion of International Women's Day, 2022.

Compendium

1. Compendium on Vegetable Crops Diseases by Pratibha Sharma, Pratibha Sharma, K. K. Pandey, Govind Pratap Rao, Sanjeev Sharma, Jayant Tarafdar, Pranab Dutta, Prashant Jambhulkar, Vinay Sagar, Ravinder Kumar, Rahul Tiwari, Aarti Bairwa, Published By: Indian Phytopathological Society, ICAR-Indian Agricultural Research Institute, New Delhi-110012, India.

2. "Relevance of Market-led Extension" by Sanjeev Kumar, Tanuj Mishra and Shailendra Kumar in the Book "Agricultural Marketing in India Reforms for a Liberal and Competitive System" by V. David Chella Baskar & Shailendra, Year-2022, ISBN: 978-93-91668-56-3).

Popular Articles

1. Alka Jain (22/03/2022). To Forests with Love, Krishi Jagaran.

2. अनिल कुमार (25/02/2022). स्वयं सहायता समूह की सफलता की कहानी-बुंदेलखण्ड के ऑवले से बने न्यूट्री आयुर उत्पादः बनेंगे महिलाओं के आजीविका के साधन (स्वदेश, दैनिक जागरण).

3. अनिल कुमार (03/02/2022). बुंदेलखण्ड क्षेत्र को पानीदार बनाने की बड़ी पहल (दैनिक जागरण, अमर उजाला, स्वदेश).

4. अनिल कुमार (07/03/2022). शबरी के बेर बनेंगे बुंदेलखण्ड की पहचान (दैनिक जागरण, दैनिक आज, स्वदेश).

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