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Editors

Dr. Virendra K. Baranwal
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From the President's Desk

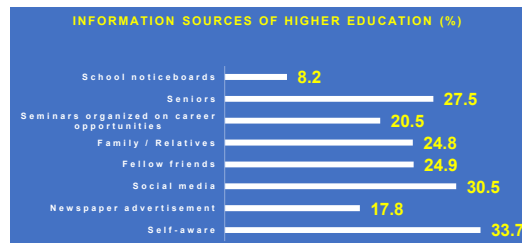
Human Resources Requirements in Agriculture: A Futuristic Assessment



Indian agriculture has made remarkable progress in production enhancement, leading to food security. Competent human resources have been the fulcrum of the progress. Indian Council of Agricultural Research (ICAR) has played a key role in enabling and

capacitating these human resources. In the wake of evolving geopolitical scenarios, dynamic supply–demand forces, and steep technology disruptions globally as well as nationally, identifying and developing quality human resources at various levels in the agriculture and allied sectors have become more relevant.

Students primarily acquire awareness about agricultural higher education through self-realisation, social media platforms, and guidance from seniors, friends, and relatives (see BOX). There is a growing awareness among students about the potential of career in agriculture and agriculture related streams. This perception might be attributed to various factors viz., technological advancements, increasing emphasis on sustainable practices, and the recognition of agriculture's pivotal role in addressing global challenges like food security and environmental sustainability. There is a changing perception of agriculture as a field offering promising career prospects and the acknowledgment of agricultural education as a platform for broader academic preparation, contributing to students' confidence in pursuing careers in this sector.



Skill Acquired by the Students with the Current Course Curricula

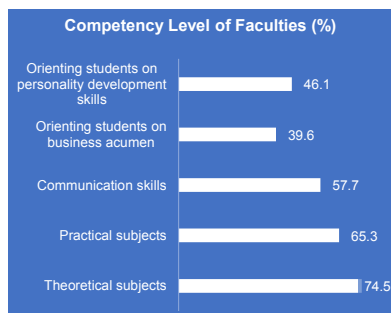
A potential gap has been identified regarding the skills acquired through the agricultural education curriculum. While the importance of



personality development, core subject knowledge, and communication skills have been acknowledged, there is a deficiency in market-oriented skills, especially among undergraduate students. There is a possible disconnect between the educational curriculum and the practical demands of the job market within the agricultural sector.

Market-oriented skills encompass a practical agricultural techniques, understanding market trends, agribusiness management, entrepreneurship, and innovative technologies relevant to modern agriculture. The absence of these skills, particularly among undergraduate students, signifies a potential need for curriculum enhancements or supplementary programs that bridge this gap. Integrating practical, industry-relevant experiences and fostering a more comprehensive understanding of market dynamics within the educational framework could better prepare students for the evolving demands of the agricultural sector job market. Addressing this gap is crucial to ensure that graduates possess the requisite skills and knowledge to thrive in diverse roles within the agriculture industry.

Students increasingly favour jobs rather than higher studies. There's a noticeable rise in demand for skill based private-sector employment signalling a need for educational adaptations to align with the changing job market. There is a need to enhance faculty competency by implementing faculty development programs to better equip them to impart subject knowledge, crucial business acumen, and personality development skills to students, aligning education more closely with evolving job market demands. A greater emphasis on utilising digital teaching aids and establishing stronger industry connections, should be integral part of such training programme (see BOX).



Fields such as agri-business management and food science & technology are anticipated to experience accelerated growth by 2040. These projections reflect the changing landscape of agricultural education, necessitating a strategic reorientation of educational programs and resources to align with the evolving demands of the industry, ensuring students are equipped with relevant skills and knowledge to thrive in the future agricultural landscape.

In a forecasts study, a robust Compound Annual Growth Rate (CAGR) of 3.1%, has been projected showing an escalation in demand from 9.6 lakhs to 17.8 lakhs between 2020 and 2040 (see BOX). Disciplines like agriculture engineering, agri-business management, and food technology are poised to exhibit higher growth rates, underlining the increased demand for specialised



Supply and Demand Gap Estimations (figures in lakhs)

skill sets in these domains. These forecasts underscore the evolving landscape of demand within various disciplines in agricultural education, emphasising the need for educational institutions to align their programs to cater to these changing demands. The focus on undergraduate programs and the prominence of specific disciplines indicate an industry shift towards specialised skill sets and an increased demand for professionals in fields critical for the future of agriculture.

Supply-Demand Gap

Presently, a significant 49% disparity exists between the demand and supply of graduates in overall agriculture and allied fields. There would be a gradual reduction in this gap, estimating it to decrease to 15% by 2040. This projection indicates an anticipated improvement in aligning the supply of graduates with the industry's demands within the agricultural sector over the next two decades. Educational institutions need to produce graduates equipped with relevant competencies as per demand of agriculture and allied graduates, ultimately fostering a better-equipped workforce for the future of agriculture.

Way Forward

Long-term strategies which involves elevating selected Agricultural Universities (AUs) to international standards, focus on refining curricula to emphasize practical, industry-relevant skills in line with the anticipated demands of the evolving job market and aligning students' skill sets with future industry requirements need to be adopted. The combination of immediate actions and forward-thinking strategies shall form a holistic approach to address the pressing challenges and prepare the agricultural workforce for the future. The proactive implementation of these strategies will ensure a skilled and adaptive workforce equipped to meet the evolving needs of the agricultural sector.

Acknowledgements

The inputs from Dr. R.C. Agrawal, DDG (Agricultural Education) and Dr. Hema Tripathi, National Coordinator (NAHEP), Indian Council of Agricultural Research, New Delhi are sincerely acknowledged.

Himanshu Pathak
President



Executive Council Meetings

134th Meeting

The 134th EC Meeting was held in hybrid mode on October 10, 2023 and chaired by Dr. Himanshu Pathak, President of the Academy. After brief welcome, Dr. W.S. Lakra, Secretary of the Academy, informed about the sad demise of Prof. M.S. Swaminathan, Indian Agriculture Titan and Founder President of the Academy, on September 28, 2023, and as a mark of respect one minute silence was observed. Thereafter, the agenda items were deliberated upon by the EC. Some of the important points emerged during the meeting were:

- An update on the status of publications on (i) Indian Agriculture on the Amrit Kaal and (ii) State of Indian Agriculture.
- An update on revenue generation for the Academy from various sources.
- “Digital Agriculture” theme for deliberations during 2024.
- To establish an award of the Academy in the honour of Prof. M.S. Swaminathan.

135th Meeting

The 135th Meeting was held in hybrid mode on December 8, 2023 under the Chairmanship of Dr. Himanshu Pathak, President of the Academy. Dr. Pathak complimented the fellowship on successful organization of the XVI Agriculture Science Congress (ASC) at CMFRI, Kochi and appreciated the local organizing committee for its efforts in making the event successful. He complimented the members of the Programme Committee for ensuring well-structured inclusive technical deliberations and the Organizing Committees which worked tirelessly to provide the logistics support. Thereafter, approved agenda items were taken up for discussion.

Elected New Office Bearers and Members of the Executive Council from January 1, 2024

1. Vice-President Dr Pramod Kumar Joshi
3. Secretary Dr Ashok Kumar Singh
2. Editor Dr. Rakesh Kumar Jain
4. Members (4) Prof. Bishwanath Chakraborty
Dr. (Ms) Pagadala Damodaram
Kamala Jayanthi
Dr. (Ms) Minakshi Prasad
Dr. Om Parkash Yadav

The vacancy of the EC member resulting from the nomination of Dr. Ashok Kumar Singh as Secretary will be addressed as a Casual Vacancy after December 31, 2023.

The EC notified the election of the following Scientists to the Academy Fellowship 2024

Section I: Crop Sciences

Dr. S.L. Krishnamurthy
Dr. Maganti Sheshu Madhav
Dr. Gyan Prakash Mishra
Dr. Tapan Kumar Mondal
Dr. Aditya Pratap
Dr. Mulpuri Sujatha

Section II: Horticultural Sciences

Dr. Rajesh Kumar
Dr. Suresh Kumar Paramasivam
Dr. Rakesh Singh

Section III: Animal Sciences

Dr. Yashpal Singh Malik
Dr. Bimlesh Mann
Dr. Narayana H. Mohan
Prof. Ashok Kumar Mohanty

Section IV: Fisheries Sciences

Dr. Bijay Kumar Behera
Dr. Uttam Kumar Sarkar

Section V: Natural Resource Management Sciences

Dr. Sanjib Kumar Behera
Dr. Puja Khare
Dr. Sunil Kumar
Dr. Rajiv Arvind Marathe
Dr. Sanjay Singh Rathore

Section VI: Plant Protection Sciences

Dr. Dnyaneshwar Madhukar Firake
Dr. Thangavelu Raman
Prof. Birinchi Kumar Sarma
Dr. Amalraj Ramesh Sundar

Section VII: Agricultural Engineering & Technology

Prof. Chandranath Chatterjee
Dr. M.R. Manikantan

Section VIII: Social Sciences

Dr. Mridula Devi
Dr. Girish Kumar Jha
Dr. Prabina Kumar Meher

Foreign Fellows

Dr. Takashi Yamano

Pravasi Fellows

Dr. Harbans Singh Bariana
Prof. P.V. Vara Prasad
Dr. Shiv Om Prasher



NAAS Associates selected for 2024

Dr. Haritha Bollinedi: Crop Sciences
 Dr. Rajkumar Uttamrao Zunjare: Crop Sciences
 Dr. Tanuja Buckseth: Horticultural Sciences
 Dr. A. Arun Prince Milton: Animal Sciences
 Dr. Jess Vergis: Animal Sciences
 Dr. Ferosekhan S: Fisheries Sciences
 Dr. Vijay Pooniya: Natural Resource Management Sciences
 Dr. Ashim Datta: Natural Resource Management Sciences
 Dr. Totan Adak: Plant Protection Sciences
 Dr. Susheel Kumar Sharma: Plant Protection Sciences
 Dr. Suresh Kumar: Social Sciences

NAAS Young Scientists Awards 2024

| Section | Name |
|--------------------------------------|---------------------------|
| Crop Sciences | Dr. Kuldeep Tripathi |
| Horticultural Sciences | Dr. Manjunatha Gowda D C |
| Animal Sciences | Not recommended |
| Fisheries Sciences | Dr. Arisekar U |
| Natural Resource Management Sciences | Dr. Chaitanya Prasad Nath |

| Section | Name |
|---------------------------------------|-------------------------|
| Plant Protection Sciences | Dr. Rahul Kumar Tiwari |
| Agricultural Engineering & Technology | Dr. Adinath Eknath Kate |
| Social Sciences | Dr. Neeraj Budhlakoti |

On behalf of the Academy and his own behalf, Dr. Himanshu Pathak, President, (NAAS) expressed his gratitude and put on record the invaluable contributions made by the outgoing Office bearers and EC Members during their tenure in smooth functioning of the Academy. Some of the important points emerged during the meeting were:

- Short-listing of G.B. Pant University of Agriculture and Technology, Pantnagar as the potential venue for the XVII ASC.
- To rename prestigious Academy's Foundation day lecture as Prof. M. S. Swaminathan Foundation Day lecture from 2024.
- To finalize NAAS Scoring of Journals effective from January 1, 2024.
- To organize a National Conference on "Digital Agriculture" during November 2024.

XVI Agricultural Science Congress

The National Academy of Agricultural Sciences (NAAS) organizes Agricultural Science Congress (ASC) every two years. This year, the Academy organized XVI ASC themed "Transforming Agri-Food Systems for Sustainable Development Goals", in collaboration with Central Marine Fisheries Research Institute (CMFRI) Kochi, India, from October 10-13, 2023. Bringing together more than 1,600 delegates from across India and abroad, the Congress provided a vibrant platform for experts, researchers, farmers, policymakers, and industry leaders to engage in meaningful dialogue and explore innovative solutions to address the pressing challenges facing the agricultural sector.

Shri. Parshottam Rupala, Hon'ble Minister of Fisheries, Animal Husbandry and Dairying, Govt. of India, inaugurated the XVI ASC. He emphasized that there is an urgent need to transform agri-food systems into sustainable enterprises through scientific innovations, in view of the increasing food demand, environmental degradation and the challenges posed by climate change. He further added that the future of India's agriculture depends a lot on how the accumulated scientific knowledge can be translated to commercial success.

Dr. Himanshu Pathak, Secretary to the Department of Agricultural Research and Education (DARE) and the

Director General of the Indian Council of Agricultural Research (ICAR) delivered the Presidential address. Dr. Pathak read out Prime Minister Narendra Modi's message highlighting on living in harmony with nature, ending hunger and achieving productivity growth through chalking out a futuristic blue print to meet the sustainable development goals. He further estimated that India's food grain demand will rise to 340-355 metric tonnes by 2033. Research on genomics and genome editing would be the core focus for technological breakthroughs in agriculture and commodities where traditional breeding cannot yield the desired results.

Some important outcomes of the deliberations during the ASC are listed below:

Promote Dietary Diversity and Nutrition Literacy: Encourage individuals to diversify their diets by including a wider range of foods such as pulses, fruits, vegetables, and animal-based products. Additionally, invest in educational initiatives to increase nutrition literacy, ensuring people understand the importance of consuming a balanced diet for optimal health.

Utilize Traditional Food Processing Methods: Emphasize the importance of traditional food processing techniques in preserving nutrients and phyto-chemicals in plant-based foods. By reducing anti-nutrients through



these methods, the nutritional value of food can be enhanced, contributing to improved nutrition security.

Empower Youth in Agriculture: Provide opportunities and incentives to young people to engage in agriculture, linking their participation to national nutrition missions. By empowering youth to pursue careers in agriculture, interdisciplinary approaches can be utilized to address issues such as hidden hunger and food insecurity.

Invest in Advanced Biotechnologies: Allocate resources towards research and development of advanced biotechnologies like CRISPR-Cas genome editing. These technologies offer potential solutions for improving crop traits, increasing yield, and addressing agricultural challenges in a sustainable manner.

Focus on Livestock and Poultry Nutrition: Establish national missions focused on feed and fodder security to enhance the nutritional quality of livestock and poultry products. By prioritizing nutrition in animal husbandry practices, the availability of high-quality protein sources can be increased, contributing to improved food security.

Prioritize Horticultural Innovation: Place emphasis on horticultural crops in efforts to transform food systems towards sustainability. By promoting innovation in horticulture, including the adoption of modern technologies for production and post-harvest management, the availability of nutritious fruits and vegetables can be increased.

Implement Water and Soil Management Strategies:

Develop and implement strategies for sustainable water and soil management in agriculture. By enhancing water productivity and promoting soil health through conservation practices, agricultural systems can become more resilient to climate change and variability.

Strengthen Digital Platforms for Agriculture:

Enhance digital platforms for data management, decision support, and knowledge dissemination in agriculture. By leveraging technology, farmers can access information and resources to improve productivity, sustainability, and resilience in their farming practices.

Promote Gender Inclusivity and Skill Development:

Implement policies and programs to promote gender inclusivity and empower women in agriculture. Additionally, focus on skill development initiatives for youth, ensuring they have the necessary knowledge and expertise to contribute to the agricultural sector effectively.

Foster International Collaboration:

Encourage partnerships for international collaboration in research, education, and development in agriculture. By sharing knowledge, resources, and best practices on a global scale, countries can work together to address common challenges and achieve shared goals related to food security and nutrition.

Meeting of the Conveners of the Regional Chapters

Meeting of the Conveners of the Regional Chapters was held on December 22, 2023 in virtual mode under the Chairmanship of Dr. Himanshu Pathak, President (NAAS), to review the activities conducted in the year 2023 and outline the plans for the year 2024.

Dr. Pathak in his opening remarks praised the commendable efforts of the Regional Chapters during 2023. He also briefed them on navigating the path forward and implementing plans for the year 2024. Following that, the Conveners of the individual Regional Chapters provided a concise overview of

their respective teams. After detailed deliberations, the President conveyed that the Academy is taking initiative to celebrate “Digital Agriculture” as the NAAS Theme 2024 involving some scientific Societies. Emphasizing this, the President urged all Conveners to arrange activities in their respective regions aligning with the theme of Digital Agriculture. Furthermore, the Chapters were advised to foster collaboration with Professional Societies in their respective regions. Subsequently, the President invited all Conveners to suggest ideas for the successful conduct of this initiative.



NAAS Programs

BRAINSTORMING SESSION (BSS)

'Multiple Uses of Solar Energy in Agriculture and Agro-Processing' (Convener: Dr. N.S.L. Srivastava; Co-convener: Dr. C.R. Mehta)

A BSS on 'Multiple Uses of Solar Energy in Agriculture and Agro-Processing' was organized in hybrid mode on October 5, 2023 under the Chairmanship of Dr. A.K. Singh, Vice President, (NAAS). Around 40 participants from National Institute of Solar Energy (NISE) Gurugram; Ministry of New and Renewable Energy New Delhi; Officers from ICAR institutes and SAUs and representatives from private industries participated.

Based on the presentation by Dr. N.S.L. Srivastava and discussion on the use of solar energy for different purposes and modes in agricultural production, agro-processing and value addition of agro-products, it was observed that there was a need for standardizations of specifications, more research, facilities for evaluation and testing and pilot scale demonstrations of these technologies for their large-scale adoption. The major recommendations from the deliberation are:

Researchable issues

- R&D on agri-voltaic systems in many SAUs, ICAR institutes and other organisations clearly indicates that India has immense potential of the technology in agriculture. However, no definite recommendations are available about the spacing between rows of solar photo voltaic (PV) panels, height of installation of PV panels, arrangements of removing dust from PV panels etc. for different crops in different agro-climatic regions.
- The solar water pumping system is being popularized in agriculture sector on subsidy by the Govt. of India through different schemes. The status of working, water use efficiency and after-sales service of these system may be studied.
- Package of solar energy gadgets for different locations considering the need of agricultural production and location specific insolation may be finalized.
- The mobile PV power unit having foldable PV installation needs to be developed, demonstrated and popularized to operate different stationary agricultural machinery/gadgets for processing of farm produces in rural areas.
- Efforts have been made to develop thermal heat storage methods and material and their applications to drying, cold storage etc. However, more work needs to be done to develop efficient heat materials and methods.

- While working on solar drying, electricity generation and complete end-to-end value chain may be critically seen for economic benefits.
- Geothermal energy is categorized as clean and low cost energy. The application of geo-thermal energy for heating of green houses, aquaculture structures, poultry and animal shelter should be explored.
- The greenhouse agri-voltaic system is another potential area and needs to be investigated.

Testing and Evaluation Issues

- There are number of solar energy based equipment available in the market with varied specifications claiming different performance. The specifications need to be standardized along with performance evaluation parameters based on long duration trials.
- Although testing facility of the solar energy gadgets/system is available at National Solar Energy Institute. However, more testing centres preferable under NARS should be established at centres of AICRP on EAAI (Energy for Agriculture on Agro-based Industries) to evaluate the performance and to provide certification to equipments available in the market.
- The solar cold storage of different technologies of capacity ranging from 5 to 10 tonnes have been developed by many organization and private firms. However, there is a need to standardize the specifications and evaluate performance of solar cold storage.
- The solar drying is the most investigated area. Different types of drying systems are commercially available and sold through different modes including buy-back of dried products. These systems need to be properly tested and performance parameters should be optimized along with standardization of specifications.
- PV net-shed is emerging technology which may be tested and promoted in Indian conditions.

Promotional/Policy Issues

- MNRE (Ministry of New and Renewable Energy) is engaged in the development and implementation of solar energy programmes and policy at national level. The effort should be made to develop a strong linkage to promote application of solar energy between MNRE and ICAR programme in agriculture.
- The solar water pumping system is mostly used as standalone system, so application of these systems should be augmented for other applications such as providing electricity to Agro-Processing



Centres, charging stations and operating stationary agriculture machinery like threshers, sprayers, weeder etc.

- Agri-voltaic system connected with the grid and with proper layout configuration may be popularized and promoted at national level and brought under subsidy program. The sharing of profit to farmers through net metering should be ensured. The mechanism of solar panel insurance against theft need to be worked out.
- The large scale demonstration of solar cold storage system at farmers' fields/mandies may be taken up to promote cold storage systems.
- Solar drying cum space heating systems may be promoted for drying of fruit and vegetables. The KVKs may be equipped with solar thermal systems for mass scale demonstrations, capacity building, awareness and popularization.
- The skill development programmes for solar green house and agri-voltaic technologies should be taken up for rural youth.
- A model solar based green house meeting all energy needs from solar energy should be demonstrated and promoted for high value crops.
- The large-scale demonstration of dryers having heat storage facilities should be taken up under PPP mode.

“Restoration and Improvement of Soil Health” (Convener: Dr B.S. Dwivedi; Co-convener: Dr. Anil K. Singh)

A BSS on “**Restoration and Improvement of Soil Health**” was organized on October 28, 2023 under the Chairmanship of Dr. J.C. Katyal, former Vice President of the Academy. About 50 participants representing ICAR, SAUs, CG Institutes, Ministry of Agriculture & Farmers Welfare, and other Government organizations participated.

The group underlined that the health of soil is closely linked with the health of other living beings, and thus the same is indivisible from the well-being of the Society. In fact, a decline in the health of soil and other natural resources is now considered one of the most important second-generation problems of post-Green Revolution era, threatening sustenance of agricultural production. Restoration and enhancement of soil health assumes tremendous significance across the world, more so, in the developing countries due to ever-increasing population pressure on finite land resources. With nearly one-third of the geographical area suffering from various forms of land degradation in India and least scope of any expansion in the cultivated area, the experts were of the opinion that appropriate attention to soil health becomes critical to ensure sustained high productivity

and farm income. Key recommendations emerged out of the deliberation are:

- Primarily, soil organic carbon (SOC) governs healthy state of a soil. There are two other indicators of good soil health – sustainable productivity growth and periodicity and quality of soil cover, that are mostly ignored. In most cases, soil health is expressed in terms of soil test values, thus the attention is largely on soil fertility. Inclusion of biological measurements is essentially required. A Centre for Soil Carbon Research is required at national level to guide the soil carbon research in the entire country.
- Improved understanding of the soil biological properties and behaviour of soil microbes under various soil-crop management practices is important for harnessing the potential of soil microbiome towards soil health management. Attempt should be made to establish the threshold levels of biological properties of soils in relation to the state of soil health. Feasibility of using microorganisms as sensitive indicator of the state of soil health should be assessed.
- Considering that K fertilizers are imported, and the possible depletion of Non-exchangeable K under the present farming, judicious site-specific K management strategy has indeed the potential to address the concerns regarding its excessive mining. Necessary policy initiatives are needed for tapping K from glauconite (green mica) deposits. Besides, due emphasis is to be laid on the use of alternate K sources viz, waste mica, K-enriched compost, crop residues, etc.
- The extent of soil and water pollution due to metal and metalloids, micro-plastics and organic pollutants in the country needs to be assessed. Risk assessment of pollutants being transferred to plants, animals and humans, and strategies for their effective management have to be worked out.
- The current soil health monitoring network has to be strengthened by inclusion of improved methodologies and modern tools such as hand-held devices and sensors. The mechanism for providing carbon credits and green credits to the farmers is to be developed.
- Long-term, multi-location experiments involving nutrient-water-tillage interactions have to be established for development/refinement of soil and cropping system-specific conservation agriculture technologies, and also to evaluate their impact on soil health and crop productivity.
- Knowledge on spatio-temporal variation in soil health at the micro-level is essential for effective soil management and agricultural crop planning. Therefore, generation of precise scientific



information on soil resources and soil health using geospatial technologies assumes great importance. A robust Unified Soil Information System is needed under the thematic area of soils within the framework of National Geospatial Policy 2022.

- Soil health management should ensure ecological sustainability (ES), thereby espousing more output with less synthetic inputs but without harm to environmental health and containment of climate change. Three pillars of ES are: best management practices to enhance input use efficiency; integration of natural complements and supplements to synthetic inputs; and alternative methods of farming viz., conservation agriculture and regenerative agriculture.
- The Land Use Policy (2013) of India is not yet approved and adopted by the Government. A decade has elapsed since publication of the draft document. Subsequently, the Academy also developed a Soil and Land Use Policy and submitted to the Dept. of Agriculture & Farmers Welfare. These need to be appropriately integrated and formally adopted with due emphasis on delineating and protecting prime lands from the perspective of future food security and sustainability.
- In order to meet the challenges of regaining soil health, it is absolutely necessary to invest in building scientific capacity to undertake advanced research and teaching in sub-disciplines such as pedology, soil physics and soil biochemistry. Adequate number of students and researchers

need to be trained in the global universities and institutions having desired expertise in these areas.

VIRTUAL WORKSHOP

“Millets for Food and Nutrition Security: Celebrating International Year of Millets” (Convener: Prof. Rajeev K. Varshney; Co-convener: Prof. K.C. Bansal)

The Academy organized a virtual workshop in collaboration with World Food Prize Foundation, on October 17, 2023 under the Chairmanship of Dr. Himanshu Pathak, President, (NAAS).

The workshop included presentations from: **Dr. Tara Satyavathi**, Director, ICAR-Indian Institute of Millets Research, Hyderabad; **Dr. Arvind Kumar**, Deputy Director General, ICRISAT, Hyderabad; **Dr. Luigi Guarino**, Senior Science Coordinator, The Crop Diversity Trust; **Dr. Ndjido Kane**, former Director, Senegalese Institute of Agricultural Research (Institut Sénégalais de Recherches Agricoles) (ISRA)-CERAAS, Senegal, and **Dr. P.V. Vara Prasad**, Distinguished Professor and Director, Centre for Sorghum Improvement, Department of Agronomy, Kansas State University, USA. **Ms. Joanna Kane-Potaka** Deputy Director General for Strategy, Engagement, and Impact, IRRI, Manila highlighted the importance of millets research for increasing productivity and production; also stressing the need for large scale adoption of millets to address climate resilience, nutritional security and sustainable development of agriculture.

Other Activities

A National Dialogue on International Year of Millets-2023

The Academy organized a National dialogue on “**Developing Roadmap for Promoting Millets for Sustainable Agriculture**”, chaired by Dr. Himanshu Pathak, President (NAAS), aimed at formulating strategies and an action plan for sustainable development. The program included address by Dr. Himanshu Pathak followed by two panel discussions. The first Panel Discussion, led by Dr. A.K. Singh, (Director, IARI), focused on incentivizing millet-growing farmers and enhancing productivity. Dr. Singh emphasized the role of technology, market initiatives, and profitability in promoting millets. He also discussed mainstreaming millets into food systems, including mid-day meals and ready-to-eat/cook items. Dr. Singh shared a vision for India in 2047, highlighting the right to nutritious food and the eradication of hidden hunger.

The key panelists were: Smt. Shubha Thakur, Joint Secretary (DAFW, MoA&FW, Delhi), emphasized on the importance of maintaining momentum in millet efforts; Dr. D.K. Yadava, ADG (ICAR), stressed the need for sustainability linked to profitability for farmers, emphasizing fair sharing of yield and profits; Prof. Rajeev K. Varshney, International Chair in Agriculture & Food Security, (Murdoch University, Australia), commended the effective promotion of millets in India and overseas, noting India’s status as the largest millet producer.

The second Panel Discussion, led by Dr. Tara Satyavathi, (Director, ICAR-IIMR, Hyderabad), focused on diversifying the agri-food production system, addressing nutrition concerns, and exploring new markets for millets. She expressed her concern over one-third reduction in millet consumption over the past 20 years. She proposed countering this trend through a holistic approach involving culture, policies, markets, and technologies to enhance millet production and productivity. Emphasizing millets as a promising crop



due to their gluten-free nature, she discussed strategies for enhancing productivity in stressed ecologies through optimal input supply and crop substitution. The key panellists included were:

Dr. M.L. Jat, (Global Research Program Director, ICRIAT, Hyderabad) discussed strategies for making millets economically competitive, emphasizing the importance of enhancing productivity and identifying suitable domains for expansion. Prof. Balraj Singh, (Vice Chancellor, Sri Karan Narendra Agriculture University, Jobner) highlighted the need for interventions

to develop millet varieties compatible with drought conditions and heat tolerance. He also advocated for the promotion of natural farming. Dr. B. Dayakar Rao, (CEO (Millets), ICAR-IIMR, Hyderabad) addressed the misconception that millets are only suitable for consumption in certain seasons, stressing the need to promote year-round consumption. Dr. Israel Oliver King E.D, (Director – Biodiversity, MSSRF, Chennai) emphasized the inclusion of Krishi Vigyan Kendras (KVKs) for farmer-centric work and advocated for the development of alternative seed systems.

Activities of the Regional Chapters

Bengaluru Chapter

The NAAS Bengaluru Chapter organized a lecture by Dr K Giridhar, (Principal Scientist, ICAR-NIAP) on December 5, 2023 for the students of Sri Ramakrishna Ashram, Shivanahalli at Bengaluru on 'Career opportunities in Agriculture and allied Sciences'. Offering insights into career opportunities in agriculture and allied sciences can be incredibly beneficial for students, especially in rural areas where such knowledge might not be readily accessible. This could potentially inspire and guide students toward promising career paths in these fields. Such efforts contribute significantly to educational enrichment and career awareness among young learners. Students were also briefed about the role of nutrition in maintaining health, vigour and immunity. In general, it's a great way to promote both awareness about healthy eating and the significance of millets in a balanced diet!

Bhopal Chapter

Interaction with school Students

Bhopal Chapter in collaboration with ICAR-Indian Institute of Soil Science, Bhopal celebrated Agriculture Education Day (AED) on December 4, 2023. The major purpose of AED program was to sensitize the school students about the career prospects in Agriculture Science and to make them aware about the importance of natural resources for human survival and the need for conservation of these vital resources. A special lecture on "Need for Soil and Water Management" was delivered by Dr. S.P. Datta, (Director, ICAR-IISS

Bhopal. About 50 students from various schools of Bhopal with their teachers were benefitted. A Quiz Competition on "Soil Health" amongst the school children was also arranged.

World Soil Day

A massive March Past was organized by the staff and students of ICAR- IISS, Bhopal, on World Soil Day December 5, 2023 to spread awareness among the public on the importance of soil and water in human life. Dr. Anil K. Singh, (Vice President, NAAS) delivered the lecture emphasizing the importance of scientific use of water for higher productivity of soil. He also stressed upon the ecosystem services provided by soil and the need to quantify them for optimum soil management. The programme also extended mass awareness on "Soil Health" amongst the farmers.

Coimbatore Chapter

Coimbatore Chapter organized a workshop on "Trends in the Application of Artificial Intelligence for Sustainable Agriculture" in association with ICAR-Sugarcane Breeding Institute (SBI), Coimbatore and National Academy of Biological Sciences (NABS), Chennai, in hybrid mode on November 29, 2023. The eminent participants included Dr. Karun Kumar Choudhary, Scientist-SF & Head, Crop Assessment Division, Agricultural Sciences and Applications Group, RSA, NRSC, Hyderabad; Dr. P. V. Vara Prasad, Director





and University Distinguished Professor, Kansas State University; Dr. R. Viswanathan, Director, ICAR - Indian Institute of Sugarcane Research, Lucknow; Dr. Jagadish Rane, Director, ICAR-Central Institute for Arid Horticulture, Bikaner, and Mr. Mandar Gadage, Senior Manager, Mahindra and Mahindra, Precision Farming Kandivali East, Mumbai.

Cuttack Chapter

Cuttack Chapter organized a BSS on the “Utilization of industrial wastes for reclamation of acid soils: Waste to wealth for promoting circular economy” at ICAR-NRRI, Cuttack on October 10, 2023. The eminent participants included from various organizations representing ICAR, Industry, Krishi Vigyan Kendras, Startups, Farmers Producers Organization and State department officials from Govt. of Odisha.

Besides “World Soil Day” was organized on December 5, 2023. More than 80 participants including farmers, farm women, scientists and students joined the programme. Farmer participants from Cuttack and Jajpur districts received awareness training on soil sampling, and various soil related problems.

Hyderabad Chapter

Women Skill Development Training on Millets Value Addition

NAAS Hyderabad chapter in association with ICAR-NAARM organized six days skill development training programme on “Value added Products with Millets” on the eve of celebrating International Year of Millets 2023 for women members at SAIRD KVK, Gaddipally, Telangana from October 7-12, 2023. 25 women from

various villages of Suryapet district participated in the training programme. Various health benefits, nutrition aspects of millets, value addition, processing, marketing the products were explained. Participants were also exposed to millet processing unit.

Crop Management Technologies and Value Addition of Millets Training at Amadalavalasa, Andhra Pradesh

Hyderabad chapter conducted a skill development training programme on “Improved Crop Management Technologies and Value Addition of Millets” for the farmers of Srikakulam District from November 1-3, 2023 in collaboration with Krishi Vigyan Kendra (KVK), Amadalavalasa, Srikakulam District, Andhra Pradesh. 75 farmers including 28 women were benefitted through the training programme. They were trained on various aspects related to improved package of practices of millets, nutritional significance and health benefits of millets, importance of bio fertilizers in present agriculture, role of millets in fish and animal nutrition, preparation of diversified value added products with millets, packaging, branding, and FSSAI registration procedures. Exposure visit to millet processing unit to ARS, Vizianagaram was conducted.

Hyderabad chapter in association with Krishi Vigyan Kendra, Amadalavalasa, ANGRAU, and ICAR-NAARM also developed a technical bulletin on “**Millets- Our health**” (చేరుధనయలా -మన ఆరోగ్యం) in Telugu for awareness creation on millets towards health benefits.





Kolkata Chapter

A 'SAVE SOIL' awareness campaign was organized on October 17, 2023 with the Jiaganj Raja Bijoy Singh Vidyamandir, Jiaganj. Nearly 300 students (class IX-XII) along with their teachers were benefitted by the programme.

Lucknow Chapter

Lucknow Chapter in collaboration with ICAR-Indian Institute of Sugarcane Research, Lucknow organized, the 'World Soil Day' on December 5, 2023. Dr. K.N. Tiwari (consultant IFFCO, Chief Guest) talked about key issues such as progressive increase in fertilizer application over decades, decreasing soil organic carbon, increasing nutrient imbalances, increasing the area of salt-affected soil (saline and saline), soil degradation, decreasing nutrient use efficiency, and factor productivity due to adopting a faulty package of practices in the present scenario. About 100 scientists and students were benefitted through this programme which emphasized on traditional cost-effective and chemical-free cultivation for conserving soil health and reducing groundwater pollution, the role of soil and water

in the survival, existence, and livelihood of human beings on the earth's surface, the role of the Panchabhootha i.e., earth, water, fire, air, and atmosphere, for the survival and existence of human beings.

Lucknow Chapter also arranged an online lecture of Dr. P.V. Vara Prasad, Distinguished Professor, & Director-Sustainable Intensification Innovation Laboratory, Kansas State University, USA on *Artificial Intelligence for Sustainable Agriculture* on December 8, 2023. More than 65 scientists from various ICAR institutes participated.

Varanasi Chapter

Varanasi Chapter organized awareness programme on climate change impact and agricultural education at Nivedita Shiksha Sadan Balika Inter College, Tulsipur, Mahmooorganj, Varanasi on December 29, 2023. An essay competition on "Impact of climate change on daily life" along with planting of guava was also held. Dr. Tusar Kanti Behera, (Convener) encouraged students to include diverse vegetables in their diet for nutritional benefits. About 1100 girl students were benefitted from the programme. Winners of the essay competition were felicitated.



Forthcoming Programmes

Brainstorming Sessions

- Strategies and policy design for enhancing the global footprint of Indian spices (Convener: Dr. Prasath Duraisamy)
- Cellular Fish Meat production: Prospects and Challenges (Conveners: Dr. C.N. Ravishankar and Dr. A. Gopalakrishnan Co-convener: Dr. Mukund Goswami)
- Underutilized Wild Fruit & vegetables for Nutritional and Health Security: Policy Perspectives (Convener: Dr. T.K. Behera and Co-convener: Dr. Oliver King, MSSRF)
- Smart Animal Farming: Perspective Planning Towards 5 Trillion Economy (Convener: Dr. Y.S. Malik)
- Climate Adaptive Conservation of Aquatic Genetic Resources (Convener: Dr. U.K. Sarkar)
- Agrivoltaics in Agriculture (Convener: Dr. A.K. Sikka Co-Convener: Dr. P. Santra)

Strategy Workshops

- Crop Protection Solutions: Group MRL & Minor Uses of pesticides (Convener: Dr. P.K. Chakrabarty)
- Maize to Ethanol in India: Prospects and Strategies (Convener: Dr. H.S. Jat)
- Carbon Farming (Conveners: Drs. Biswapati Mandal and Vinay Sehgal)



- Water Security: Is Quantum or Management the Issue? (Conveners: Dr. Anil K. Singh and Dr. K. Palanisami)
- Nano Fertilizers (Conveners: Dr. V.K. Singh and Dr. Sanjay Singh Rathore)

Obituaries



Dr. Prem Narain
(1934 - 2023)

The Fellowship of the National Academy of Agricultural Sciences deeply condole the sad demise of Dr. Prem Narain, Former Director, ICAR-IASRI, New Delhi.

Dr. Prem Narain will be remembered for developing the methodology of statistical genetics, and many outstanding contributions in quantitative genetics. He introduced the method of conditioned diffusion equations in relation to population genetics. In collaboration with Prof. P. V. Sukhatme, he provided a new genetic interpretation on the study of intra-individual variations in food and human nutrition. As the Director of IASRI, Prof. Narain was instrumental in developing efficient statistical and computer techniques for agricultural research and development that had a world-wide impact. Dr. Prem Narain was instrumental in developing a blue-print of KRISHINET. Prof. Narain published over 300 research articles, and several books including a treatise on statistical genetics, and mentored a large number of students. Besides being a founder Fellow of NAAS, he was a Fellow of INSA, IASc, and NASI, and received many prestigious awards, including Rafi Ahmad Kidwai Award (1077), Dr. MS Randhawa Memorial Award (1997-98) and Dr. BP Pal Memorial Lecture Award (2007) of NAAS.

The Scientific community has lost a visionary scientist, administrator, teacher, and wonderful human being. The Fellowship of the Academy prays to the Almighty to give peace to the departed soul.



Dr. S.R. Verma
(1939 - 2023)

The Fellowship of the National Academy of Agricultural Sciences deeply condole the sad demise of one of its distinguished fellows Dr. Sewa Ram Verma, an extra-ordinary

teacher and a scientist *par excellence*, who left for his heavenly abode on 12 December, 2023. Dr. Verma served in various important positions in India and abroad, and left an indelible impression among his colleagues as well as the agricultural fraternity globally. He will be remembered for his contributions in Farm machinery & power engineering, ergonomics, safety. The contributions of Dr. Verma were widely recognized by his organisations as well as many professional bodies nationally and internationally, including PAU Best Research Worker's Plaque 1970; Rafi Ahmed Kidwai Award 1976-77; Jawaharlal Nehru Award 1977; NRDC Invention Award, 1977 & 1982; ISAE Gold Medal 1990-91; Commendation Certificate for Outstanding Contribution, PAU Foundation Day, 1997; Institution of Engineers (India) Commendation Plaque for Rathindranath Tagore Memorial Lecture, 2007; Punjab Government "Award of Honor" for Outstanding Contribution in Agriculture Development, 2014, ISAE Mason Vaugh Agricultural Engineering Pioneer Award 2019, and many more. Honouring the contributions of Dr. Verma, PAU dedicated the Research Hall of College of Agriculture Engineering and Technology as "Dr. S.R. Verma Research Hall". He was a Fellow/Member of several acclaimed Academies, besides the National Academy of Agricultural Sciences, India.

In passing away of Dr. S.R. Verma, the scientific community has lost a brilliant scientist, teacher and a wonderful human being. The Fellowship of the Academy prays to the Almighty to give peace to the departed soul, and strength to the members of the family to bear this loss.

Editors: Drs. Virendra K. Baranwal and Rakesh Kumar Jain

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