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From the President's Desk

Improving Nutritional Security

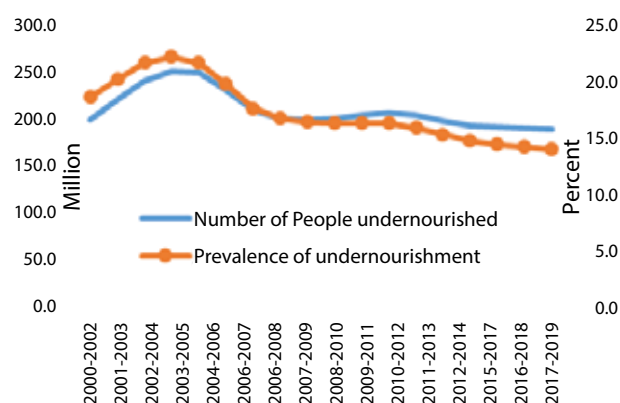


Good nutrition is essential for human resource development, which is a key determinant of a nation's socio-cultural and economic progress. Poor nutrition means poor cognitive development in the children, and subsequently their feeble mental and physical capabilities.

India faces a paradoxical situation of the '*persistence of high burden of under nutrition amidst plenty of food*'. Despite being one of the fastest-growing economies, it continues to be the hotspot of nutritionally insecure populations. Every third undernourished person on the globe is an inhabitant of India. The FAO estimates show a decline in India's undernourished population, from 251 million in 2003-05 to 189 million in 2017-19. The incidence of undernutrition declined by 8.2 percentage points, reaching 14% in 2017-19. This progress is by no means impressive, given the robust economic growth and substantial increases in agricultural productivity and food supplies.

Prevalence of undernourishment in India

The incidence of stunting, underweight, and anaemia among the children has declined, but the incidence of wasting has remained almost unchanged. As per the fourth National Family Health Survey



(NFHS4) close to 38% of the children below 5-years of age are stunted, 21% are wasted, and 36% are underweight. The problem also prevails among adults — the body mass index (BMI) of 23% of the women and 20% of the men is less than 18.5. Compounding this, there is also a problem of malnutrition — 19% of the males and 21% of the females suffer from obesity. Anaemia is a chronic problem among children and women —59% of the children, 53% of the women, and 24% of the men are anaemic. Undernutrition is also manifested in micronutrient deficiency, which is estimated to cost US \$15–46 billion, equalling 0.8–2.5% of the country's gross domestic product.

National-level estimates mask regional variation in the prevalence of undernutrition and progress therein. Compared to its all-India average, the incidence of stunting is higher in Bihar, Uttar Pradesh, Meghalaya, Madhya Pradesh, Jharkhand, and Gujarat. The incidence of wasting is higher in Jharkhand, Gujarat, Madhya Pradesh, Karnataka, Maharashtra, Rajasthan, Chhattisgarh, Haryana, Goa, Uttarakhand, Tamil Nadu, Bihar, and Odisha. Likewise, the incidence of underweight is higher in Jharkhand, Bihar, Madhya Pradesh, Gujarat, Chhattisgarh, Uttar Pradesh, Maharashtra, Karnataka, Rajasthan, and Odisha. The progress in nutritional indicators has been uneven across states. Between 2005-06 and 2015-16, the incidence of stunting declined by 10 percentage points at the all-India level, ranging from 34 percentage points in Delhi to 8 percentage points in Madhya Pradesh. The incidence of wasting declined in Bihar, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tamil Nadu, and Tripura, but increased in other states. It is surprising to note an increase of 66% in its incidence in Punjab and a decline of 51% in Meghalaya.

The prevalence rate of anaemia among children as well as adults is alarming in several of the states. Among

adult women, it ranges from 33% in Kerala to as high as 72% in Haryana. Between 2005–06 and 2015–16, the proportion of anaemic women at the all-India level declined by 11 percentage points, ranging from 0.3 percentage points in Jharkhand to 33 percentage points in Assam. Its prevalence rate increased in women of Delhi and Goa.

Malnutrition is not confined to undernutrition, it also includes over nutrition and associated non-communicable diseases. India faces a *'triple burden of malnutrition, i.e.,* the coexistence of undernutrition, micronutrient deficiency, and over nutrition. The diseases associated with over nutrition are also becoming a major public health concern.

Trends in malnutrition indicators across states

	NFHS 4					NFHS 3				
	2015-16					2005-06				
	S	W	U	A	O	S	W	U	A	O
Andhra Pradesh	30.5	17.5	30.8	59.8	1.1	37.4	12.0	29.0	70.7	4.7
Arunachal Pradesh	29.5	18.8	20.5	54.4	8.7	41.5	16.6	34.9	56.9	6.9
Assam	35.8	16.7	29.4	35.6	3.5	45.1	14.8	35.7	69.1	3.9
Bihar	47.7	21.9	44.7	63.4	2.3	52.9	27.3	54.2	77.9	0.7
Chhattisgarh	38.2	24.5	39.8	41.4	2.9	50.8	19.9	45.8	71.1	1.8
Delhi	28.6	19.1	28.3	59.8	2.1	43.5	16.2	30.3	57.1	7.5
Goa	21.2	23.0	25.2	48.1	5.3	25.8	15.6	25.6	37.8	5.8
Gujarat	39.2	28.9	42.6	62.6	3.0	50.8	19.5	44.8	69.9	2.6
Haryana	33.1	23.0	31.7	71.7	4.4	45.5	19.3	39.7	72.5	2.0
Himachal Pradesh	25.2	14.5	21.3	53.8	4.3	36.5	19.3	34.6	54.6	2.6
Jammu & Kashmir	28.3	12.6	17.9	54.4	6.7	33.9	15.4	26.5	58.1	3.7
Jharkhand	43.2	30.6	49.0	70.0	3.1	46.8	32.4	55.2	70.2	2.1
Karnataka	37.4	26.7	37.9	61.0	4.9	42.3	19.4	39.4	70.6	4.0
Kerala	18.6	17.3	17.9	35.6	5.3	25.3	16.3	24.3	45.2	2.8
Madhya Pradesh	41.6	26.9	44.0	68.8	2.9	45.2	36.0	56.4	73.5	2.1
Maharashtra	35.6	26.6	38.9	53.7	3.1	43.8	17.0	37.2	63.4	7.1
Manipur	29.8	7.1	14.3	23.9	4.8	34.6	9.7	21.6	40.9	3.1
Meghalaya	42.7	17.7	30.7	48.0	5.9	49.3	36.2	56.2	64.4	8.5
Mizoram	29.9	8.8	14.2	19.3	5.8	40.5	9.5	20.8	44.1	8.4
Nagaland	28.9	12.2	18.3	26.4	5.5	37.2	14.6	25.4	NA	10.9
Odisha	34.4	21.8	36.2	44.3	4.0	43.5	19.3	40.2	65.4	3.6
Punjab	24.9	16.1	22.7	56.4	3.2	37.4	9.7	25.4	66.4	2.5
Rajasthan	38.0	24.7	37.9	60.3	2.9	41.4	22.4	41.1	69.4	3.6
Sikkim	30.1	16.4	14.4	55.0	12.3	38.7	12.4	20.6	59.2	19.2
Tamil Nadu	26.8	22.0	26.6	50.7	6.2	29.6	23.2	29.7	64.5	5.7
Tripura	25.6	18.7	26.7	48.2	3.2	35.4	24.7	40.3	62.8	3.9
Uttar Pradesh	45.3	18.1	39.3	63.2	2.4	54.1	15.1	41.6	73.9	3.9
Uttarakhand	32.0	22.1	28.4	59.7	5.2	43.5	19.7	38.8	61.6	5.0
West Bengal	33.5	21.0	33.4	54.1	3.0	40.4	17.5	37.0	60.9	3.7
India	38.4	21.0	35.7	58.5	3.3	48.0	19.8	42.5	69.5	3.8

S stands for stunting, W for wasting, U for underweight, A for anaemia, and O for obesity

Agriculture can make a significant contribution towards improving the nutritional security in several ways — by contributing to the enhanced food intake of the home-produced foods, speeding up the agricultural diversification towards nutrient-dense crops and

animal-source foods, and reducing the food prices. Sustained efforts of the National Agricultural Research System, supported by enabling policies, have brought a sea-change in India's food economy, turning it from 'deficit to surplus' in several of the food items. Since 1950-51, the food grain production increased almost 6-fold, reaching 303 million tonnes in 2020-21. The progress in the nutrient-dense foods has even been more impressive — the production of fruits increased from 14 million tonnes in 1961-62 to 99 million tonnes in 2018-19, vegetables from 18 million tonnes in 1961-62 to 186 million tonnes in 2018-19; milk from 17 million tonnes in 1950-51 to 198 million tonnes in 2019-20, fish from 0.75 million tonnes in 1950-51 to about 14 million tonnes in 2019-20, and the number of eggs from 18 billion in 1950-51 to 103.3 billion in 2018-19.

Despite such revolutionary progress in food production, the high incidence of nutritional insecurity is a matter of serious policy concern. It is not the production that may lead to an increase in the consumption of nutritious foods, the access to and affordability of such foods also merits policy attention. The need is to create earning opportunities for the poor to enable them to buy nutrient-rich high-priced foods. Besides, there is an urgent need to improve nutrition literacy among school children, women and farmers through special awareness campaigns. The concepts of Nutri-garden and Nutri-thali need to be mainstreamed in such campaigns.

India's agri-food policy has focused on enhancing the production of staple food cereals, mainly rice and wheat, and their subsidized provision through the public distribution system. This has led to the displacement of traditional nutrient-dense foods like millets and pulses. India has managed a tremendous increase in the milk production of cows and buffaloes. There are species like goat, sheep, camel, and donkey whose milk contains several nutritional and therapeutic properties, but their potential remains grossly under-exploited. There is a need to promote these species as dairy animals, focusing on their breeding for higher milk, and establishing market linkages with the nutraceutical and pharmaceutical industries.

The prevalence of a high rate of undernutrition demands a change in the policy stance in favour of the crops and animal species that produce nutrition-rich foods but have not received much attention from the nutritionists, policymakers and pharmaceutical industries. The Indian Council of Agricultural Research has demonstrated the nutritional and health benefits of several of such neglected crops and animal species. Their utility becomes more visible in fighting against the

emerging diseases that have no medical treatment but can be prevented through a healthy and nutritious diet. Let the nutraceutical and pharmaceutical industries come forward and strengthen their backward linkages with the research institutions and farmers, and forward linkages with distributors and consumers to promote low-cost healthy diets.

Fortification or biofortification of staple foods can be a viable option to improve the nutrition security of the masses. The Indian Council of Agricultural Research has been actively engaged in developing biofortified varieties of several crops, including rice, wheat, maize, pearl millet, finger millet, lentil, mustard, cauliflower, sweet potato, and pomegranate. On the occasion of the 75th Anniversary of the United Nation's Food and Agriculture Organization (FAO) on October 16, 2020, Prime Minister Shri Narendra Modi dedicated 17 biofortified varieties of eight crops to the nation. The biofortified crop varieties contain 1.5 to 3 times more nutrients as compared to their traditional counterparts. For example, the rice variety CR DHAN 315 has more zinc; the wheat varieties HD 3298, DBW 303, and DDW 48 are rich in protein and iron; the maize hybrids 1, 2, and 3 contain more lysine and tryptophan; the finger millet varieties CFMV 1 and 2 are rich in calcium, iron, and zinc, and CCLMV 1 variety of small millet contains more of iron and zinc. The Pusa Mustard 32 is enriched with low erucic acid, and the Girnar 4 and 5 peanut varieties are rich in oleic acid.

A critical evaluation of the technological options and the development of a roadmap for biofortification of food crops and their large-scale promotion is the need of the hour. India adopted a National Nutrition Policy in 1993, and subsequently has taken several initiatives, including the launch of the Integrated Child Development Scheme (ICDS), and the Mid-day Meal Scheme, to improve the nutritional and health status of the children, and pregnant and lactating women, besides providing the subsidized food grains to the poor through the public distribution system. However, undernutrition is not due to the lack of access to nutritious food alone, it is also influenced by several factors such as quality drinking water, cleanliness of the surroundings, and availability of health services. The Government of India has launched several programs, including the National Rural Drinking Mission, Swachh Bharat Mission, and National Health Mission that complement the nutrition-focused programs implemented by different ministries. Further, to bring convergence among these, the Government of India had launched a National Nutrition Mission in 2017 (renamed *Poshan Abhiyan* in 2018),



which sets the quantifiable targets for each nutrition indicator to be achieved within a specified time frame through the governance, convergence, and innovative delivery systems. Improving nutritional security is also one of the key priorities of the government in the recently launched Aspirational Districts Program.

The Academy foresees an active partnership among the governmental, non-governmental and philanthropic

organizations, private sector, and agricultural research institutions to make India nutritionally secure.

A handwritten signature in blue ink, appearing to read 'T. Mohapatra', is positioned above the printed name.

(T. Mohapatra)
President

New Year Get-together

The National Academy of Agricultural Sciences organized a New Year Get-together on January 1, 2021 under the chairmanship of Dr Trilochan Mohapatra, President of the Academy. The other dignitaries included office-bearers of the Academy namely Dr P.K. Joshi, Secretary, and newly-elected Vice-President, Dr A.K. Singh, and Secretary Dr K.C. Bansal. Dr P.K. Joshi extended warm welcome to the President, Vice-President, and newly elected members of the Executive Council, Fellows and Associates.

Dr T. Mohapatra wished all a happy, safe and healthy New Year, and in his address expressed concerns regarding COVID-19 pandemic. He appreciated the efforts of the Government of India to contain the pandemic. He hoped that New Year would be safe for everyone, and urged all to take necessary preventive measures against the disease.

Dr Mohapatra applauded Academy's achievements in 2020 and thanked all members of the EC, and Secretariat staff for their untiring efforts. He highlighted the significant role played by the Academy in providing inputs to the Government of India on the Pesticide Bill, the Seed Bill and the Biodiversity Act. He pointed out some key areas for immediate action—recognition and representation of women in agricultural science; visibility of the Academy at the global level, especially in the SAARC countries, and need for managing transboundary diseases. He emphasized that Academy should identify gaps in implementation of agricultural and rural development policies and also suggest ways to bridge gaps and align policies with the changing socio-economic environment. The Academy needs to highlight relevant scientific issues conveying importance of agricultural sciences to the society at large, and school children in particular through print and social media. He also desired that the Academy shall build a strong knowledge-base relevant to the society. He stressed the Fellowship to use its vast experience to disseminate

knowledge through Regional Chapters. He congratulated the newly elected members of the EC; and reposed faith in them to take the Academy to greater heights. Later, newly elected Fellows and Associates were welcomed and introduced.

Dr A.K. Singh discussed priority areas for 2021. He invited suggestions from the esteemed Fellowship for improving further the functioning of the Academy. The distinguished Fellows who were present in the meeting and who were virtually present shared their views on making Academy more visible at the national and the international level.

Dr P.K. Joshi thanked the outgoing office-bearers and members of the EC for their administrative and academic support. He emphasized that only science and innovation-led agriculture has the potential to enhance farmers' income and make India '*Aatma nirbhar*' and a global leader in agriculture. He also gave a brief account of the following innovative programs envisaged by the Academy for 2021: (i) a greater number of intellectual debates on topical issues; (ii) interaction with international organizations; (iii) mainstreaming of NAAS activities with government programs; (iv) visibility of NAAS in print and electronic media; and (v) XV Agriculture Science Congress.

Prof K.C. Bansal proposed a vote of thanks to the august audience. He highlighted the need for a *virtual science academy* to improve partnership and interaction of fellows. He strongly felt that the benchmark be raised to achieve excellence, and working groups be formulated for brainstorming specific contemporary issues, and develop opinion papers, which can then be published in reputed national and international journals addressing Academy's visibility in scientific and policy issues.

116th Executive Council Meeting

The 116th meeting of the NAAS Executive Council was held at 10.00 AM on 19 February 2021 in a hybrid mode-in-person as well as online-under the Chairmanship of Dr T. Mohapatra, President of the Academy.

The Chairman welcomed all the EC Members, specially the newly elected Office Bearers and Members of the Executive Council, who joined on January 1, 2021: 1 Dr Anil K Singh, Vice President; Dr K.C. Bansal, Secretary; Dr (Ms) Malavika Dadlani, Editor; and Dr M.S. Chauhan, Dr S.K. Datta, Prof A.R. Podile and Dr (Ms) Taru Sharma, Members. The EC observed one-minute silence to pay homage and respect to Dr Sanjaya Rajaram, who expired on February 17, 2021.

The President in his opening remarks while appreciating activities taken up by the Academy, stressed that it should also take up focused discussions on the current topical issues. The deliberations should provide evidence-based solution to the policy makers and Central/State Governments.

Prof Ramesh Chand, Director, Institute of Agricultural Sciences, BHU, special invitee, briefed on preparation of XV Agricultural Science Congress (ASC). He gave detailed account of the logistic arrangements and about various committees constituted for organizing the Congress. The EC approved registration fee structure for foreign and national delegates. Dr Anil K Singh, Member-Secretary of the Technical Program Committee, XV ASC and Vice President,

NAAS, briefed about the Technical Program. It was decided that the program should be finalized by February end after incorporating suggestions by the Members. The President requested members to suggest some contemporary topics as well as global researchers and experts who may be invited.

The EC was informed that as per the revised guidelines approved in 115th EC meeting, the Nomination Forms and Guidelines for election of Fellows, selection of Associates and Young Scientist Awards have been modified and uploaded on the website. EC was also informed about the documents submitted to various ministries and departments such as the Recommendations to Science, Technology and Innovation Policy 2020 (STIP 2020) to the Principal Scientific

Advisor, Government of India. The other notable decisions taken by the EC included the following: The report submitted by Dr J.C. Katyal, Chairman of the Committee for Screening of actionable points from NAAS Policy/Strategy Papers and preparation of a roadmap for further action. The Committee was requested to relook for the implementing agencies for the action proposed.

The EC approved (i) extension for submission of applications for election of Fellows, selection of Associates and Young Scientist Awards to April 15, 2021; and (ii) selection of Dr Sanjeev Saxena, ADG (IPR), for the post of Executive Director of the Academy.

117th Executive Council Meeting

An emergency meeting of the Executive Council was held on March 11, 2021 in a hybrid mode, under the Chairmanship of Dr T. Mohapatra. The Agenda of the meeting was to discuss involvement of NAAS in the Supreme Court case on 'GM Food Crops'. The matter was listed for hearing in the Supreme Court on April 13, 2021.

The members appreciated the pro-active role of the Academy

in supporting evidence-based information submitted earlier to the Hon'ble Supreme Court. It was decided that scientific evidence should be collated to present a strong case in the Supreme Court for conducting field trials of GM food crops; and other Departments such as DST and DBT also need to be invited for discussion. A Committee under the Chairmanship of Prof Swapan K Datta was constituted to chalk out response after collecting the needed information.

NAAS Programmes

International Women's Day: Role of Women in Agricultural Sciences

The Academy celebrated the International Women's Day on March 8, 2021 by organizing a virtual panel discussion on the 'Role of Women in Agricultural Sciences' under the Chairmanship of Dr Trilochan Mohapatra, with Dr J.C. Katyal, as co-chair. The meeting started with a welcome note by Dr Malavika Dadlani, Editor, NAAS, followed by a presentation on the scope of the meeting by the Convenor of the programme Dr K.C. Bansal, Secretary, NAAS.



Dr T. Mohapatra in his opening remarks, mentioned that the Academy is celebrating Women's Day for the first time. Conveying his personal regard to women scientist leaders, he emphasized on honouring and acknowledging their contributions. Dr Mohapatra appreciated women involvement in every field. He pointed towards the ICAR vision to have a separate institute for women in agriculture—one of its kind in the world. However, he was concerned about low number of women scientists in the ICAR system. He said that among different Science Academies in the country, the proportion of women Fellows in the NAAS is only 6.5%, as compared to 9% in INSA, 8.9% in IASc, and 12% in NASI. At the end, he reiterated the role of the Academy in mentoring girl students' right from entry-level so they are groomed for leadership positions. He mentioned that however a large number of women have made laudable contributions to science and have proved themselves to be strong leaders.

Dr Jacqueline d' Arros Hughes, Director General, ICRISAT, Hyderabad, delivered the keynote address. She appreciated the Government of Telangana for declaring a holiday for women on this day. She said, 'I have never been a pro-women or pro-gender; I am for the best, and the only thing we need to give an extra boost to the women'. She emphasized productivity, equity, and prosperity with a special reference to India, and echoed and appreciated viewpoints of

Dr Mohapatra, and pointed out the role of women in enhancing productivity and production.

Dr Rupamanjari Ghosh, Vice-Chancellor, Shiv Nadar University, Noida, stated that each individual is different from another and possesses uniqueness and hence we should respect that uniqueness in everyone be it a man or a woman. In higher education system, we need to deal with this diversity fully in a rational manner. Confident that each woman is a wonder woman inside, she emphasized that there should be zero tolerance for gender bias in any institution.

The panel discussion on “Enhancing the Role of Women in Agricultural Sciences” was co-chaired by Dr J.C. Katyal and Dr A.K. Singh. Ms Subhra Priyadarshini, the Chief Editor of Nature India, chalked out the journey of this journal. She emphasized the importance of science communication and encouraged women to play an active role. Dr S. Uma, Director, ICAR-NRC for Banana, Trichy, gave examples of women being at the higher position in the NARS. She said that women in agricultural research need to put more efforts to climb professional ladder and require firm family support too. Dr Sunita Grover, former Head, Dairy Microbiology, NDRI, Karnal, mentioned the role of women in agriculture. She said that women are now exceling in every field, which is evident from the fact that about 60 women have already received the coveted Nobel Prize till now. She also narrated the example of Dr Gagandeep Kang, a well-known virologist, the first Indian woman to receive a Fellowship of the Royal Society.

Dr P K Joshi, Secretary, suggested for a Taskforce of Women Scientists at the NAAS on promoting the role of women scientists in agricultural development. The Taskforce may prepare a position paper.

The following points emerged in the panel discussion.

- An innovative and transparent system is required to identify uniqueness of women.
- Despite the increased proportion of girl students pursuing agriculture education in the ARS system, only 24% of scientists are women and of them, hardly 1% reached leadership positions. The low proportion of women professionals could be due to government measures to enforce women reservation in the education system, but not in services. However, gradually the situation is improving as some states are bringing in reservation in services.
- Similar to the International Women Day celebration, NAAS may also start celebrating National Women’s Day.
- Indian society has always given respect to women, but better professional recognition is also desired.

In his concluding remarks, Dr J.C. Katyal said that ICAR has constituted a Women Young Scientist Award. It is also true that women show less interest in agriculture science compared to medical, ICT, or other sciences, so we need to motivate them. For this, he recommended a brainstorming

session on the strategies to bring women in the ARS system. The meeting ended with a vote of thanks by Co-convenor Dr G. Taru Sharma.

Contract Farming for Transforming Agriculture in India: Challenges and Way Forward (Convenor: Dr Anjani Kumar)



The enactment of Farmers’ Empowerment and Protection Agreement on Price Assurance and Farm Services Act, 2020, along with other two interrelated farm bills, is expected to accelerate adoption of contract farming. Against this backdrop, the National Academy of Agricultural Sciences (NAAS) organized a one-day brainstorming session on “**Contract Farming for Transforming Indian Agriculture**” March 10, 2021 under the chairmanship of Dr T Mohapatra. It was attended by policy researchers, policy-makers, agri-preneurs, and representatives from the private sector, government, civil society, farmers groups. The contract farming bill aims for a favourable arrangement for farmers through provision of guaranteed price, protection against liability in the event of crop losses and full payment at time of delivery. However, the Act itself may not be able to create a surge in contracts. For facilitating contract farming, a few structural issues need to be addressed. The participants suggested a number of strategies for increasing farmers’ linkage with markets for better price realization and improvement in farmers’ economic condition.

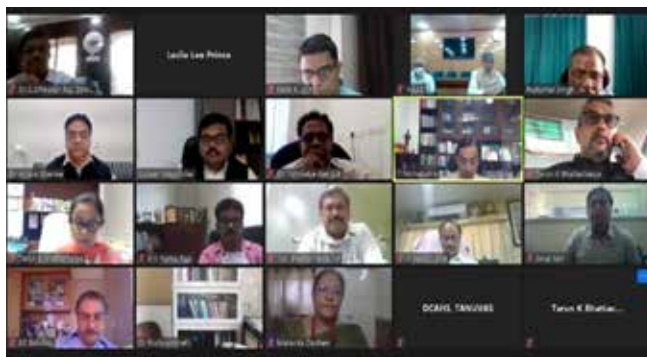
- **Ensuring coexistence of regulated and private markets:** To ensure competition and better price discovery, a vibrant and strong APMC system along with private traders would be most advantageous. Hence, efforts at infrastructural upgradation and governance reforms in APMCs need to be continued.
- **Strengthening FPOs/FPCs and farmers’ collectives:** Farm Act offer tremendous opportunities for FPOs to engage in trading and enter into contract with corporate buyers and firms. FPOs can play an important role in minimizing information asymmetry in agricultural marketing. The FPOs could also enter in mutually beneficial contract farming arrangements with its members. However, two measures need to be taken to enable them to play bigger role in agricultural marketing: (i) capacity building of FPOs on entrepreneurship and

agribusiness development, and (ii) addressing capital and infrastructural requirement of the FPOs.

- **Decentralized storage and processing infrastructure:** Creating decentralised storage, quality control infrastructure and low capital processing facilities at the village or at the cluster level can improve holding capacity of the farmers, and thus can improve their bargaining capacity and also better price realisation.
- **Robust market intelligence systems:** Developing market intelligence system and tools to set right certain issues of asymmetry in the market information.
- **Facilitating financial inclusion:** Improvement in financial inclusion is critical to enable smallholder farmers to choose from multiple marketing channels and avenues.

Strategy Workshop on Potential of Transgenic Poultry for Biopharming (Convener: Dr T.K. Bhattacharya)

A strategy workshop on **Potential of Transgenic Poultry for Biopharming** was organized on March 15, 2021 under the Chairmanship of Dr T. Mohapatra. Dr R.K. Singh, former Director and Vice-Chancellor, IVRI (Deemed University), Izatnagar, Uttar Pradesh was Co-chairman. Dr P.K. Joshi, Secretary, NAAS welcomed participants and briefed regarding objectives of the session. A total of 31 participants attended the workshop. Dr T. Mohapatra strongly recommended biopharming for pharmaceutical industry. The production cost of pharmaceuticals need to be reduced. He also pointed out that transgenic animals and poultry may produce therapeutics in bulk; while the traditional cell line-based system has limited production capacity. Dr T.K. Bhattacharya chalked out advantages of transgenic poultry in production of biopharmaceuticals. He elaborated on the present status of transgenic animals for therapeutic products.



Presentations were made by Dr Subeer S Majumdar, Director, NIAB (DBT), Hyderabad, on transgenic animals; Dr Nitin K. Jain, Head, Animal Biotechnology, DBT, on biosafety and regulatory aspects of genetic engineering; Prof G. Dhinakar Raj, Director, DBT on translational research; and Dr S.V. Rama Rao, Principal Scientist, DPR, Hyderabad, on the present status of Indian poultry. Dr. R.K. Singh, the former Director, ICAR-IVRI chaired the panel discussion. Dr A.K.

Rawat, former Adviser, DBT empathetically mentioned the role of transgenic animals for bio-therapeutics production and applauded the research efforts at DPR, Hyderabad. Dr Arjava Sharma, former Director, NBAGR and CIRC opined in favor of transgenic research in the country and also pointed the lead role of the DPR in developing transgenic poultry. He stated that there is a need to prepare a white paper on transgenic animal production in India.. Dr K.C. Bansal, Secretary NAAS emphasized the role of transgenic plants and animals in production of therapeutics. Dr V.K. Saxena, ADG, ICAR, emphasized the role of primordial germ cells (PGCs) in developing transgenic chicken. Dr R.N. Chatterjee, Director, DPR mentioned that the DPR has developed transgenic chicken, gene knock-down chicken for improving growth and production of low cholesterol eggs, and genome-edited chicken. Dr A.K. Tiwari, Director, CARI, stressed the importance of production of therapeutics in transgenic poultry, and informed regarding research activities of CARI in molecular biology, metagenomics, and semen cryopreservation. Dr G. Taru Sharma, Head, Animal Physiology & Director, CAS, IVRI, presented on the critical roles of transgenic animals in lowering production cost of therapeutics, and on the issues of efficiency of stem cell-mediated transgenesis in livestock, biosafety regulations, and commercialization of technologies. Dr R.K. Singh in his concluding remarks emphasized on the need for collaboration among institutes to develop high-end biotech products, including transgenic animals for biopharmaceuticals. Dr A.K. Singh, Vice-President, concluded the session by reiterating the critical role of transgenic animal platform for production of therapeutics vis-a-vis other traditional systems and mentioned the use of advanced biotech techniques for biopharming to have purified products at low cost. The following recommendations emerged.

- Transgenic poultry platform may be given preference for the production of biopharmaceuticals, including biosimilars, immunoglobulins, and cytokines. The already developed therapeutics through transgenic chicken will guide the developmental and commercialization efforts. As patenting of the animals is restricted in India, the transgenic chicken so developed may be patented in other countries.
- Keeping the tremendous use of transgenic animals for biopharmaceutical production in mind, awareness may be created among scientists, policy-makers and other stakeholders to adopt technologies for the production of therapeutics at affordable price.
- Biosafety guidelines prepared by DBT (RCGM) and Ministry of Environment & Forest (GEAC) for development of transgenic animals need to be simplified so that scientific research can be pursued to develop transgenic animals. There is a need to create sufficient infrastructure for transgenic animal research, and collaborations for developing transgenic animal platforms for production of low-cost therapeutics.

Activities of Regional Chapters

Barapani Chapter

A Brainstorming Session on *Integrated Agriculture for Rural Bio-entrepreneurship* was organized at Nongstoin College, West Khasi Hills District, Meghalaya, on February 8, 2021. The session was chaired by Dr (Mrs) I. Mawthoh, Principal, Nongstoin College. Mrs A.V.D. Shira, Additional District Commissioner, Nongstoin, West Khasi Hills District, Meghalaya, was the Chief Guest, and Mr E. P. Syiem (King of Nongstoin) was the Guest of Honour. One-hundred-fifty participants attended the session. Coordination of the activities was done by Dr Lala IP Ray, Associate Professor, CPGSAS, Umiam, Meghalaya.

Dr Mawthoh welcomed all the participants. She laid emphasis that the students shall be agri-entrepreneurs and thus should become job providers. Mrs A.V.D. Shira expressed her concern over the slow adoption of improved technologies, and added that farming communities in the region are not taking full advantage of the scientific inputs and capacity-building. She also pointed out fast-degrading ecologies due to the development activities.

Dr U. K. Behera presented his views on *“Integrated Agriculture and Rural Bio-entrepreneurship: A Roadmap for NEH region”*. He emphasized need for Farm Development Card, which can be a game-changer.



He elaborated on the challenges of climate change, and the need for sustainable plans for smallholders integrating region-specific components. He also narrated on various aspects of rural bio-entrepreneurships the NEH region Students showed interest in rural bio-entrepreneurship aspects.

A brainstorming workshop was organized on *“Aatma Nirbhar Bharat through Integrated Agriculture”* on March 9, 2021 at CAU, Imphal. More than 60 delegates including scientists, NGOs, farmers, and research managers participated in the event. Prof Anupam Mishra, Vice-Chancellor, CAU, Imphal, was the Chief Guest. The Chapter felicitated two newly-inducted NAAS Fellows, Dr V.K. Mishra, Director, ICAR

Research Complex Barapani, Meghalaya, and Dr Pulok Mukherjee, Director, IBSD, Imphal. Dr U. K. Behera, Convener of the Chapter gave his presentation on *“Aatmanirbhar Bharat through Integrated Agriculture: A Roadmap for NEH Region”*.

Bengaluru Chapter

Dr Srinivasa Kaveri, Director, CNRS Office in India, New Delhi, presented views on *“Environment and our immune system: What has the pandemic taught us?”* on February 26, 2021. More than 90 participants were present, including NAAS Fellows and Associates, scientists



of the ICAR Institutes and students. Dr Raghavendra Bhatta, Convenor of the NAAS Regional Chapter, Bengaluru, and Director, NIANP coordinated the program. Dr Kaveri informed regarding influences of external and internal environments on the human-associated microbiome signature and its influence on immunity development. He stated that compared to many developed nations, susceptibility of the Indian population to COVID-19 seems to be lesser. He said that the close association of the Indian population with animals and environment since childhood exposes them to disturbed hygiene, which eventually boosts up its immunity against many diseases. And the lifestyle and unique food habit of the Indian population (inclusion of spices in everyday meals), could be another important factor contributing towards better immunity; besides greater genetic diversity; this needs detailed scientific investigations.

Dr Kalidas Shetty, Associate Vice-President for International Partnerships & Collaborations and Founding Director of the Global Institute of Food Security and International Agriculture, North Dakota State University, USA presented his views on ‘Post-COVID-19 lessons and strategies for advancing global food systems for climate-resilient food security and health’ on March 27, 2021. While emphasizing about the importance of food quality in maintaining health and immunity during the pandemic, environmental issues, food security, and conservation of water are to be equally taken care of. COVID-19 susceptibility is found to be linked to co-morbidity, which in turn is associated with failure of food system and consumption of a calorie-rich diet, coupled with the inadequate intake of phytochemicals and exposure to environmental pollutants. Considering the benefits of traditional food habits, he recommended bringing back traditional crops with known health benefits into the current production system. He concluded that the fermentation ecology of food systems with knowledge of biochemistry and metabolic biology applied to

the challenges of contemporary nutrition and food science can help combat diet-linked chronic diseases.

Bhopal Chapter

On the National Science Day, 28th February 28, 2021, a webinar on *Future of Science & Technology on Natural Resources Management in Agriculture*, was organized. Dr R.T. Patil, former Director, ICAR-CIPHET, Ludhiana, and Dr D.K. Pal, former Visiting Scientist, ICRISAT, were the lead speakers. Dr Ashok K. Patra, Convener of the NAAS Bhopal Chapter and Director of ICAR-IISS, Bhopal, welcomed the participants and briefly outlined crucial role of natural resources in sustaining



food production. Dr R.T. Patil highlighted role of futuristic technologies in addressing problems in utilization of natural resources, and suggested prospects of new technologies such as artificial intelligence and cooling technologies to address post-harvest losses. Dr D.K. Pal was empathetic on the role of soils in food and nutrition security, and suggested new research areas such as ecosystem services provided by soils and the role of soil inventory in natural resource management.

Other eminent speakers were Dr A. Subba Rao, former Director, ICAR-Indian Institute of Soil Science; Dr D.L.N. Rao, former Emeritus Scientist, Dr B.N. Johri, Chairman, NASI Regional Chapter; Dr A.K. Biswas, Head, ICAR-IISS and Dr M.L. Khan, Professor, Dr H.S. Gaur, Central University, Sagar.

Karnal Chapter

A meeting of the NAAS Fellows and Associates was organized on January 28, 2021 under the chairmanship of Dr M. L. Madan. The meeting was to chalk out programs to be taken up during 2021-22. Dr Madan informed that the Fellows from Rajasthan and Chandigarh are also a part of this Chapter. Taking advantage of several ICAR and other academic Institutions being located at Karnal, the faculties and subject matter specialists should also join to organize collaborative activities. Dr M.L. Madan welcomed the newly-elected member Dr Dheer Singh. An account of programs organized and activities carried out by the Chapter during the past quarter was presented., and the activities to be taken up in 2021 were discussed.

As per the directive from the Academy, policy papers and policy briefs are to be translated into regional languages. The following policy papers and briefs have been shortlisted to be translated in Hindi.

- Bio-drainage: An eco-friendly tool to combat waterlogging (Policy Paper 74)
- Linking farmers with markets for inclusive growth in Indian agriculture (Policy Paper 75)
- Practical and affordable approaches for precision in farm equipment and machinery (Policy Paper 84)
- Vertical farming (Policy paper 89)
- Precision farming (Policy paper 84)
- Renewable energy: A new paradigm for growth in agriculture (Strategy Paper 10)
- Development and adoption of novel fertilizer materials (Strategy Paper 13)
- Better management of pesticides in India: Policy perspective (Policy Brief 6)
- Direct benefit transfer of fertilizer subsidy: Policy perspective (Policy Brief 9)

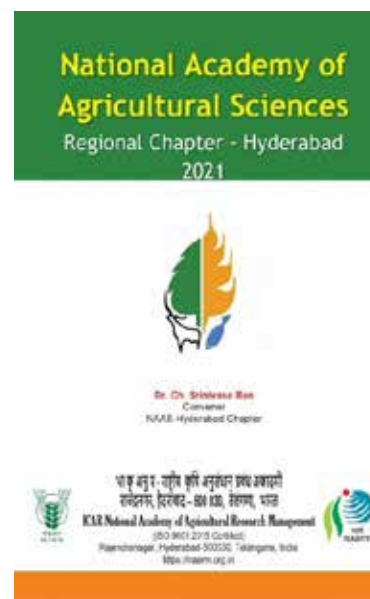
Further proposal is for initiation of lecture series by NAAS Fellows in their areas of expertise, targeting school and college students, and social organizations as Lions Club and Rotary Club.

A directory of the Chapter will be prepared giving salient biographical sketches of the NAAS Fellows, prominent academicians of the region and progressive and innovative farmers.

Webinar on “Online teaching during COVID-19: Challenges and Lessons Learnt” should be organized by involving students and faculty of leading institutions in the region.

Hyderabad Chapter

A meeting of the Fellows and Associates of NAAS on January 16, 2021 was organized at ICAR-NAARM to review activities of the preceding year, discuss emerging issues related to agricultural research, technology, and policy needs, to finalize activities for 2021, and felicitate the newly-elected EC Members, Fellows, and Associates. In total 30 Fellows and Associates from Telangana and Andhra Pradesh



attended the meeting. Dr T. Mohapatra, President, and Dr A.K. Singh, Vice-President, NAAS graced the occasion.

Dr Ch. Srinivasa Rao, Convener, Hyderabad Chapter, and Director, ICAR-NAARM welcomed the participants. Dr A.K. Singh, NAAS, mentioned that the Hyderabad Chapter is a flagship Chapter of NAAS and suggested that efforts be taken to create awareness about its activities. A publication on the Inventory of NAAS Hyderabad Chapter was released by Dr Trilochan Mohapatra, President, NAAS.



Four newly-elected Fellows of NAAS : Dr N. Sarla, National Professor (Retd, ICAR-IIRR, Dr P. Krishnan, Principal Scientist, ICAR-NAARM, Dr B. M. Naveena, Principal Scientist, ICAR-National Research Centre on Meat, and Dr G.M. Subba Rao, Scientist E & Head-NICHE Division, ICMR, NIN, were felicitated by Dr T. Mohapatra. The Chapter also felicitated Dr Podile Appa Rao, Vice-Chancellor, University of Hyderabad, for being inducted as a member of the EC.

Dr Mohapatra suggested two brainstorming sessions should be organized in a year, and desired that the Regional Chapters organize discussions on the issues related to climate change, food and security, and malnutrition problem, and create awareness among producers and consumers regarding nutritional requirements, Nutri-foods, and biofortified crop varieties through visits to schools. In AICRPs on various crops, action needs to be initiated to accelerate breeding of nutritious high-yielding varieties and hybrids. In five years, minimum standards regarding nutritional attributes must be made mandatory for identification and release. He mentioned that plans are afoot to prepare and finalize crop plans for the whole country by 2022. ICAR has already prepared crop plans for 12 crops. Considering the diversity in ecologies, crop clusters and crop planning are the need of the hour. The topics for deliberation can be responsible aquaculture, bioethanol from maize (especially for farmers of Punjab and Haryana), natural farming, market-driven agricultural research, and the role of NAAS in inspiring and igniting young minds towards biological and agricultural research.

The following activities are proposed for 2021.

- **Developing communication strategy to reach diverse clientele in the region:** The galaxy of experts may be effectively used to devise an appropriate communication strategy.
- **Enhancing Policy Influence in Telangana and Andhra Pradesh** The Chapter shall interact with the State Department of Agriculture, and Academic and Research

Institutes to explore opportunities for undertaking various studies under consultancy mode, utilizing expertise and skill-sets of the NAAS fellows and Associates based in Hyderabad region. The potential areas for such studies/policies are (i) Advisory on science-based cropping pattern, (ii) Assessment of cyclone damage using frontier technology, (iii) Impact of Covid19 on agriculture, (iv) Responsible fisheries and aquaculture, (v) Crop clusters and crop planning, and (vi) Regional policy for self-sustainability of oilseeds

- **Brainstorming for scientific excellence:** Brainstorming sessions may be planned on focussed themes, inviting experts from the Academy. Indicative areas for such brainstorming are as follows: climate change, agrobiodiversity conservation, food security, nutritional security; causes, effects, and remedies for differential population growth in the country; minimum standards concerning nutritional attributes for varietal identification and release; strategies for enhancing maize cultivation and their use in bioethanol production; status and scope of natural farming; and institutionalizing market-driven research.

Meeting ended with a vote of thanks by Dr Meenakshi Sundaram, Treasurer of the NAAS-Hyderabad Chapter.

An Academia-Government consultative workshop on Scientific Interventions and Policies for Strengthening of Buffalo Meat Sector: Catalyst for Boosting India's Agro-Economy was organized by the ICAR-National Academy of Agricultural Research & Management (NAARM), Hyderabad on January 19, 2021. Thirty experts, including government officials, researchers, and faculty members of ICAR Research Institutes, State Agriculture Universities, officials of the Agricultural and Processed Food Products Export Development Authority (APEDA), Fellows of NAAS, and Agri-Business Incubation (ABI) centres of ICAR expressed their views. Dr Inderjeet Singh, Vice-Chancellor, GADVASU, Ludhiana, was the Chief Guest, and Dr Laxma Reddy, Director, Animal Husbandry & Fisheries, Government of Telangana was the Guest of Honour. Dr S.B. Barbuddhe, Director NRC on Meat, convened the workshop.

The experts had highlighted the potential of Indian buffalo meat. It is estimated that salvaging and rearing of male buffalo calves in India can contribute approximately Rs 1.0 lakh crore and will act as a significant source of income to poor farmers. However, there are restrictions on slaughtering of both male and female buffaloes of less than 13-14 years. Dr Laxma Reddy highlighted the need to consider amendment of the Acts coined several decades earlier.

Presentations were made on the potential of the buffalo meat sector in India.

Key recommendations emerged are as follows.

Realization of buffalo production potential: Studies on preventing early age mortality in male buffalo calves and

development and promotion of low-cost milk replacers and calf starters.

- **Studies to improve per day body weight gain and carcass yield:** Studies to understand muscle growth and possible improvements in production systems to ensure more body weight gain.
- Monitoring chemical residue, value addition, and development of high-value by-products.
- Development of DNA/Protein-based methods to determine age of buffaloes.
- **Crop diversification:** Farming system models for buffalo production need to be evolved for different situations. In real time, on-farm economics of male buffalo calf production need to be demonstrated.
- **Training and awareness:** Universities and ICAR Institutes to start certificate and diploma courses on clean meat production and value addition for producers, processors, retailers, butchers and conduct consumer awareness programs about food safety, health, and diet risks.
- **Animal preservation acts need to be amended:** In buffalo slaughter regulations states having ban/restrictions need to consider deleting reference to buffaloes in the respective animal preservation act.
- **Male buffalo calf salvaging and rearing for meat production to be promoted:** The DAHD (GOI) scheme on salvaging and rearing male buffalo calves needs to be revised to include small farmers having 1-2 calves to participate and benefit from the scheme.
- **Livestock markets to be developed for different species:** To facilitate farmers income through safe and hygienic milk and meat production.
- **FMD free zones need to be established in the buffalo population rich states:** Uttar Pradesh, Maharashtra, Telangana, Andhra Pradesh, Gujarat, Rajasthan, Punjab, Haryana, Delhi and Madhya Pradesh with a large buffalo population must establish FMD free zones to ensure food safety and to enhance greater export of meat and milk products even to developed nations.
- **Removal of duty on export of raw hides:** While the leather sector has received financial benefits over several decades; the same has not been made available to meat export sector. Meat, milk, and leather sectors need to be considered at par for promotional programs as meat export returns reflect farmers' returns directly.



A five-day student mentoring training program on *Entrepreneurial and Communication Skill Development* was concluded on March 12, 2021. The program was organized by ICAR-National Academy of Agricultural Research Management jointly with PV Narsimha Rao Telangana State Veterinary University (PVNRTSVU) and NAAS-Hyderabad Chapter at College of Veterinary Science, Hyderabad. The program was designed to promote and nurture entrepreneurship skills of students, and to impart communication skills to them. Critical aspects of research in the livestock sector in agriculture and allied sectors were part of interactive discussions. Creating awareness on “Job Providers” vs “Job Seekers” was part of the discussions.

The ICAR-NAARM conducted two days training program on *Competency Enhancement and Student Mentorship in Agricultural and Allied Sectors* in collaboration with Acharya N G Ranga Agricultural University and NAAS Hyderabad Chapter for the students of the Agricultural College, Mahanandi. The training program at Agricultural College, Mahanandi was held on March 5-6, 2021. The training program sensitized students regarding career opportunities. The students were trained on improvement of communication skills and soft skills. Dr Sivaramane briefed the students about the Agri-Business Management courses. Dr Ramesh Naik and Dr H. Umesh together were for interaction sessions on agricultural research and job opportunities in India.

A similar training program was conducted in collaboration with Acharya N G Ranga Agricultural University and Hyderabad Chapter of the NAAS for the students of the Agricultural College Rajamahendravaram on March 9-10, 2021. Dr D. Damodar Reddy, Director, CTRI, delivered a motivational address. Dr Ch. Srinivasa Rao, Director NAARM highlighted the role of students in nation-building and sensitized them for higher education.



Pune Chapter

A panel discussion on *Abiotic Stress Management in Maharashtra Agriculture* was organized on February 20, 2021 at NIASM, Baramati. The discussion was chaired by Dr Y.S. Nerkar, former Vice-Chancellor, MPKV, Rahuri, and the Fellow of the Academy.



Dr Himanshu Pathak, Director, ICAR-NIASM, and Convener of the Pune Chapter pointed out that agricultural productivity and sustainability are under threat of various abiotic stresses. Maharashtra shares about one-fourth of the country's total drought-prone area, and there is need for development of new technologies, tools, and techniques to manage the adverse impacts of abiotic stresses on agriculture..

The impacts, technological interventions, and policy recommendations that emerged from the discussion are as follows.

- Impacts of abiotic stresses on quality and value addition in floriculture should be assessed and technology developed for their improvement.
- Drought and water logging tolerance in onions should be enhanced utilizing recent advances in research.
- Sensor-based irrigation and fertigation technologies for export quality pomegranate production should be standardized.
- Image-assisted technologies should be developed for mitigation of abiotic stresses in grapes.
- Livestock contingency plans should be developed for mitigation of abiotic stresses in livestock.
- Abiotic stress responses of different crops in a protected

cultivation environment should be assessed and mitigation strategies be developed.

- Microbial interventions should be standardized for abiotic stress-prone areas to enhance soil organic carbon and stress relieving compounds in different crop systems.
- Research should assess the interface between abiotic and biotic stresses in crops, livestock and fisheries.
- Traits and genes specific to abiotic stresses and the use of machine learning and artificial intelligence tools that can be used for management and analysis of phenotypic and genotypic data should be identified.
- Complementation of conventional breeding approach with advanced technologies such as gene-editing and marker-assisted technologies for abiotic stress tolerance should be promoted. Environmental biotechnology, nutritional biotechnology, and nanotechnology approaches should be used to alleviate priority abiotic stresses.

Coimbatore Chapter

The Coimbatore Chapter organized a Brainstorming Session on Impact of Climate Changes on Abiotic and Biotic Stresses in Crop Plants at ICAR-SBI on March 11, 2021. About 25 participants including NAAS Fellows physically attended the program, and 114 participated online.



The session was chaired by Prof S. R. Sree Rangaswamy, FNAAS. He stressed the need to combat all abiotic and biotic factors together in varietal development programs. Dr Arun Kumar Sankar, Principal Scientist (Plant Physiology), ICAR-CRIDA, Hyderabad in his opening address highlighted anthropological interventions that cause

changes in climate, and explained the role of photosynthesis in C3 and C4 plants vis a vis climate change. In his address, Dr R. Chandra Babu, Vice-Chancellor, KAU, Thrissur, Kerala, emphasized the need for a cropping system approach to face climate change, mapping of genes from germplasm, P utilization efficiency, improving root efficiency for moisture stress and phenotyping germplasm for multiple stress factors. Dr Bakshi Ram, Director, ICAR-SBI, Dr G. Hemaprabha, Head, Crop Improvement, ICAR-SBI, Dr R. Viswanathan, Head Crop Protection, ICAR-SBI, Dr C. Palaniswami, Head, Crop Production, ICAR-SBI, Professor Prakash, Annalamai University, Dr Vanaja, Principal Scientist, ICAR-CRIDA, Dr R. Gomathi, Principal Scientist, ICAR-SBI and other delegates spoke during the follow-up discussion. The key highlights are as follows.

- Different crops face climate issues differently, and changes in one stress parameter influence other factors, hence climate change needs to be studied in totality in different cropping systems.
- There is a need to identify specific adaptations in different crops to mitigate moisture, temperature, or salinity stress. The mechanism of stress tolerance needs to be investigated by a team of breeders, biotechnologists, and physiologists.
- Interrelations and interactions between various abiotic and biotic constraints. Increase in sucking pests during heat stress and high humidity, need to be addressed holistically.
- The severity of epidemics is dictated by different abiotic stresses. How far changes in climatic factors like CO₂, temperature, humidity, influence evolution of new races of pathogens, biotypes in insects, fecundity and life cycle of pests, adaptive changes in the pests' phenotype, invasion of new pests and diseases, etc need detailed investigation across the crops.
- Understanding the molecular ecology of a host-pathogen interaction needs a new thrust towards identifying specific influence of the abiotic stresses on the severity of different diseases. How the changes in the climate dictate the expression of specific genes to alter host-pathogen interaction from incompatible to compatible requires detailed investigation.

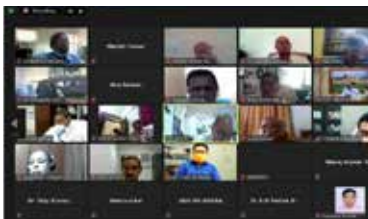
pond (1:1 ratio), was suggested under canal command for improving soil and water productivity. It was explained that a land modification-based integrated farming system has great potential to reclaim waterlogged sodic soils.

Varanasi Chapter

A field and laboratory visit of the B. Sc. (Ag) students of Microtek College of Management and Technology, Varanasi, at ICAR-Indian Institute of Vegetable Research, Varanasi was organized on January 30, 2021. About 25 students of B. Sc. (Ag) participated and visited the technology block, waste management unit and laboratory of ICAR-IIVR, Varanasi. Dr. Sudhakar Pandey, Convener NAAS-Varanasi Chapter briefed about the National Academy of Agricultural Sciences activities to the students. Dr. Pandey also briefed about the advanced research being carried out by the ICAR-IIVR, Varanasi and career opportunities for the students in vegetable research.



Lucknow Chapter



A webinar on *Management of Waterlogged Sodic Soils for Livelihood Security of Resource Poor Farmers* was organized on October 13, 2020. Dr S.K. Pandey, Convener, of the Lucknow Chapter welcomed the Fellows and participants, and Dr Yash Pal Singh moderated the session. Drs V. K. Mishra, Head, ICAR-CSSRI Regional Station, Lucknow, and C. L. Verma Senior Scientist, ICAR-CSSRI highlighted twin problems of waterlogging and sodicity in nearly 0.15 million hectares in Uttar

Pradesh, and the solutions developed by the Institute. A new approach for management of waterlogged sodic soils through land modification model (LMM), comprising raised bed and



Forthcoming Programmes of NAAS

- Strategy Workshop on 'Waste-to-Wealth: Use of Food Industry Waste as Animal Feed' (Convener: Dr N.K.S. Gowda)
- Brainstorming Session on 'Gender and Nutrition Based Extension in Agriculture' (Convener: Dr Ashok K. Singh)
- Brainstorming Session on 'WTO and Indian Agriculture' (Convener: Dr P.S. Birthal)
- Strategy Workshop on 'Sericulture for Enhancing Farmers' Income' (Convener: Dr M. Mahadevappa)
- Strategy Workshop on 'Agriculture and Entrepreneurship Models for Quality Fodder Production' (Convener: Dr Ajoy Kumar Roy)
- Strategy Workshop on 'Drudgery Free Agriculture' (Convener: Dr N.S. Bains)
- Strategy Workshop on 'Quality Planting Material for Promoting Agricultural Diversification' (Convener: Dr V.K. Baranwal)
- Policy Brief on 'Road Map to Rehabilitate 26 million ha Degraded Lands by 2030' (Conveners: Drs Ch Srinivasa Rao and J.C. Katyal)
- Strategy Workshop on 'Impact of COVID-19 on Animal Health and Dairy Industry' (Convener: Dr R.K. Singh, former Director, IVRI).

Change of Addresses

- Dr. B. Mohan Kumar, Vice-Chancellor, Arunachal University of Studies Knowledge City, Namsai 792103, Arunachal Pradesh; Cell: 9995815730; 8590930195; Email: bmohankumarkau@gmail.com; bm.kumar@kau.in
- Dr. V.K. Mishra, Director, ICAR Research Complex for NEH Region, Umroi Road, Umiam 793103, Meghalaya; Cell: 9451990546; Email: vkmishra_63@yahoo.com; director.icar-neh@icar.gov.in
- Dr. D.D. Patra, Dean, School of Agricultural Sciences, JIS University, Kolkata 700109, W.B.; Cell: 9830071278, 9450096944; Email: ddpatra@rediffmail.com
- Dr. G. Venkatesan, Senior Scientist, FMD Research Lab, FMD Research Centre, ICAR-IVRI, Bengaluru Campus, Bengaluru 560024, Karnataka; Cell: 9410765027, 9410657548; Email: gnanamvirol@gmail.com (Associate)
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Announcement

XV AGRICULTURAL SCIENCE CONGRESS 13-16 NOVEMBER, 2021 ON
Energy and Agriculture: Challenges in 21st Century
Organized by NAAS & BHU, Varanasi

EVENTS

- Plenary, Special and invited lectures by eminent scientists to discuss most recent trends, innovations and concerns as well as challenges and solutions
- Technical sessions on thematic areas
- All India Student's debate
- Poster presentations
- Exhibition and farmers experiences
- NAAS Business meeting

POSTER PRESENTATION

The extended summaries for poster presentation will be reviewed before acceptance. Each poster session will have a convener who will present summary on the symposium of concerned session. This will aid in formation of substantial recommendations.

REGISTRATION

Delegates	Registration Fees Offline mode	Fee in Online mode
International	US\$ 250	US\$ 100
International-Students & Research Schotars	US\$ 150	US\$ 60
International accompanying person	US\$ 150	---
National	₹ 8,000	₹ 3,000
National-accompanying person	₹ 4,000	---
National-Students & Research Scholars	₹ 3,000	₹ 1,200
Corporate Registration	₹ 20,000	₹ 8,000
On Spot Registration	₹ 10,000	₹ 10,000

The Academy pays its deepest respect to the following distinguished Fellows who left us during this period.

Dr Sanjaya Rajaram



Dr Sanjay Rajaram, the renowned wheat breeder was born on February 10, 1943 in a village near Varanasi in Uttar Pradesh. He earned his B.Sc. (Agriculture) degree in 1962 from College of Jaunpur at the University of Gorakhpur. He studied genetics and plant breeding under Prof M.S.

Swaminathan at the Indian Agricultural Research Institute (IARI), New Delhi, and received his Master's degree in 1964. He earned his Ph.D. degree in 1968 from the University of Sydney, Australia, and began his research career at the International Maize and Wheat Improvement Center (CIMMYT), Mexico, in 1969 with Dr Norman E. Borlaug. Dr Rajaram served CIMMYT for 33 years and succeeded Dr Borlaug in leading the wheat programme. Dr Rajaram developed an astounding number of 480 wheat varieties, which were released in 51 countries and were widely adopted by farmers in six continents In 2014. He was honoured as the World Food Prize Laureate, equivalent to Nobel Prize in agriculture, for his innovative research that led to a prodigious increase in world wheat production by more than 200 million tonnes. He developed wheat cultivars with durable resistance to rusts using his concept of 'slow rusting'. His high-yielding wheat varieties are disease- and stress-resistant and adaptable to diverse geographical regions and climatic conditions and have contributed significantly towards improving food security and poverty alleviation in developing countries. After 33 years with CIMMYT, Dr Rajaram also served ICARDA as the Director of its Integrated Gene Management Program.

A man of great wisdom and humility, Dr Sanjaya Rajaram left for his heavenly abode on February 18, 2021. He will be missed by the Academy and the fraternity of agricultural scientists worldwide.

Dr Madappa Mahadevappa



Padma Bhushan Dr M. Mahadevappa was born in Madapura, Karnataka, India on August 4, 1937. He did his B.Sc. (Ag), from the Agricultural College, Bangalore in 1960 and obtained his M.Sc. (Ag) and Ph.D. degrees from the Agricultural College, Coimbatore, in 1962 and 1965, respectively.

Dr Mahadevappa's salient contributions were in developing improved rice varieties, and giving practical solutions to farmers' problems and seed production technology. He was a fellow of a number of scientific academies and academic societies, including the Indian Society of Genetics and Plant Breeding, and the Indian Society of Seed Technology. He served as Vice-Chancellor, University of Agricultural Sciences (UAS), Dharwad, during 1994-2000, and Chairman, Agricultural Scientists Recruitment Board, New Delhi, during 2001-02. Dr Mahadevappa was recipient of several prestigious awards, including Hooker Award, (1981) Padma Shri (2005) and Padma Bhushan (2014).

A humble and spiritually evolved person committed to serving the humanity, Dr Mahadevappa breathed his last on March 6, 2021. He will be much missed by the agricultural fraternity, in general, and the Academy, in particular.

Editors: Dr P.S.Birthal and Dr Malavika Dadlani

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