NAAS NEWS
RESEARCH EDUCATION AND TECHNOLOGY POLICY FORUM

Vol. 19 No. 1 January-March 2019

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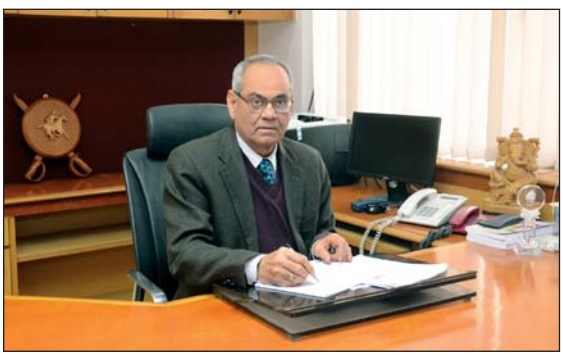
Editors
Dr V.K. Bhatia
Dr Kusumkar Sharma

From the President's Desk

A Long Term Solution to Agrarian Distress



There are many success stories of Indian agriculture but in spite of these successes, low productivity, economic unviability, fiscal and ecological burden of subsidies have regressed Indian agriculture to its back foot. The rural economy and farm distress need serious attention to counter the current challenges of price volatility, climate change and indebtness. Across the country, majority of marginal and small farmers are under stress, especially in rainfed areas. Post-harvest price crash, frequent droughts and absence of even basic amenities like drinking water, drainage, children education, health etc. have further aggravated the symptoms of distress. The public investment in agriculture and related areas has fallen as a share of public spending, and the promised increases in crucial areas are nowhere in evidence. The expected benefits of the much touted crop insurance scheme have also not materialized. Farmers reeling under dry spells or sudden hailstorms that destroy standing crops are not compensated for their losses. Addressing agrarian distress requires fresh thinking around the process of growth in India and the role of agriculture. Knee-jerk policy responses like raising minimum support prices, providing farm-loan waivers, or making other populist announcements, do not build adaptive capacity in the rural economy. Such measures fail to facilitate the inevitable process of structural transformation and are unable to provide a long-term solution to agrarian distress.

One of the primary objectives of India's agricultural policy since independence has been to improve farmers' access to institutional credit and reduce their dependence on informal credit. However, as informal sources of credit are mostly unreliable, the government has taken steps to improve the flow of institutional farm credit from 10% in 1999-2000 to nearly 41% in 2015-16 through measures like nationalisation of commercial banks, establishment of Regional Rural Banks, the National Bank for Agriculture and Rural Development(NABARD), schemes like Kisan Credit Card, Agricultural Debt Waiver and Debt Relief, the Interest Subvention and the Pradhan Mantri Jan Dhan Yojana. While the flow of institutional farm credit has gone up, the rolling out of the farm waiver scheme in recent months may slow down and pose a challenge to increasing agricultural growth. Recently many State Governments have waived farm loans. This resulted in a serious debate on whether providing loans to farmers at a subsidised rate of interest or their waiver would accelerate farmers' welfare at all. At the global level, studies indicate that access to formal credit contributes to an increase in agricultural productivity and household income.

However, such links have not been well documented in India, where emotional perceptions quite often dominate the political decision. A recent study by the International Food Policy Research Institute (IFPRI) reveals that at the national level, 48% of agricultural households do not avail of a loan from any source. Among the borrowing households, 36% take credit from informal sources, especially from money lenders who charge exorbitant rates of interest in the 25%-70% range per annum. More importantly, the study using the 2012-13 National Sample Survey-Situation Assessment Survey (schedule 33) finds that institutional borrowers earn a much higher return from farming (17%) as compared to non-institutional borrowers. Clearly a major proportion of farmers' remains outside the ambit of a policy of a subsidised rate of interest, and depends on loan waiver schemes announced by State Governments. In reality the farm loan waivers have benefitted only 10-15% of farmers as the rest do not have access to institutional loans. Further, it is also against economic principles and adversely impacts the credit culture, the behaviour of borrowers and emerges as a disincentive for honest borrowers. This anomaly can be rectified only if the credit market is expanded to include agricultural labourers, marginal and small holders. It is therefore, important to revisit the credit policy with a focus on the outreach of banks and financial inclusion.

For handling farm distress and weak wage growth across occupations, the idea of direct benefit transfer for small farmers seems to be gaining momentum. One can think of various versions of income support schemes suggested like income support scheme for farmers, broader income support scheme for all and income support scheme targeted towards the poor especially for small and marginal farmers. One such scheme, an income support scheme called Pradhan Mantri Kisan Samman Nidhi Yojana has been recently launched, which involves direct cash transfers to poor farmers, which may change the face of agriculture if implemented diligently. The success of PM-Kisan Samman Nidhi Yojana will depend on accurate land records of farmers as it covers farmers with clear land titles. It does not cover share croppers who are more than 50% of the farming population. They are the real farmers working as landless labourers.

The policy mix for agriculture ranges from strengthening National Rural Employment Guarantee Scheme for the landless to improving the crop insurance scheme. Besides, economists have suggested that the government must ensure that farmers receive more of what has been paid by the consumers by improving access to international markets and doing away with the on and off policy for exports.

Indian farmer who works hardest, gets subsidy on all key inputs, still makes losses. He gets subsidised interest rates, free water, power, subsidised diesel, fertilizer, and minimum support price for his produce and still cannot generate enough income to make his both ends meet, leave aside, being a good borrower. If the crop fails, he obviously has no money. If the crop is good, prices tumble and he is bankrupt again. Half of the working population do farming that barely produces enough for themselves and other half.

Another issue of farm distress is overproduction of some of the crops which results in price crash. In our country today, there is a need for a policy which may advise farmers to grow certain crops depending on the region, demand and price. There are instances, that in spite of farmers knowing there are no takers for rice, wheat and sugarcane, they still grow these crops e.g. sugarcane, farmers grow this crop because it can withstand hailstorms and does not get destroyed by wild boars. In addition to problem of oversupply, there is a problem of middle man traders who make lot of money on farm products and farmers do not even recover their cost of cultivation.

Finally, it has been observed that there is a deeper malaise in the farm sector on account of multiple factors that calls for a structural overhaul to repair the damaged farm-infrastructure via reform based approach. However, the governments are merely relying on temporary solutions in the form of hiking MSPs, offering loan waivers and giving growers hope of unrealistically good days ahead. For instance, Shanta Kumar committee reported that MSP benefits only 6% of farmers that to in wheat and paddy. It will be prudent to restrict MSP procurement to marginal and small farmers only.

Realising that the various schemes launched so far to increase farmers income and reduce their distress have failed, what could be the ideal package? Indian Agriculture needs long-term structural fix like increase in investment in agricultural research and development (Ag. R&D), more drought and pest-resistant crops along with better irrigation technology, interventions in the seed sector to raise production and diversify to alternate crops to induce higher growth, strengthening of the National Agricultural Insurance Scheme, technological interventions that update farmers about sowing and harvesting time and extension services to help prevent misfortunes. Such practices need massive investment in technology and farm-to-fork infrastructure. Government and most Indian farmers are not in position to make such investments. Here the role of private sector may be explored. Land can be taken on lease from the farmers without a need to transfer land rights. This can be done by actively promoting contract farming ventures for large scale exports on the lines of SEZs for agriculture. A public-private partnership model may be developed for agri-markets, agro-processing, trade, warehouses and cold storages. Existing agri-export zones need to be revisited and strengthened. At farm level, incentives may be given to consolidate farmers through farmer-producer organisations to take advantage of scale of production. The Government should assure doable action plans that quickly rescue famers from price or crop failure. Finally Indian agriculture needs structural transformation that improves agricultural productivity and income per farmer.

(Panjab Singh)
President

107th Executive Council Meeting

The 107th meeting of the Executive Council of the Academy was held under the Chairmanship of Prof Panjab Singh, President, NAAS on February 19, 2019. Dr J.K. Jena, Secretary, NAAS welcomed the participants, especially the newly elected office bearers and Executive Council members. He recorded the useful contributions of the outgoing EC members that enabled the Academy to successfully implement its mandated activities. The President of NAAS, Prof Panjab Singh extended a warm welcome to all EC members including new members Dr Brahma Singh and the ICAR Nominee, Dr Ch. Srinivasa Rao. He appreciated the approval of ICAR to use the new conferencing facility by the Academy to organise the XIV ASC. The EC expressed its satisfaction over the development and thanked the ICAR authorities for the gesture. Further, EC members also expressed their satisfaction on the scale of preparedness for this Congress and appreciated the concerted efforts being made by the core group. The notable decisions taken by the Executive Council included the Constitution of Sectional Committees for Election of Fellows / Selection of Associates for the year 2020, Constitution of New NASS Journal Score Committee for evaluation of Journals, approval of the proposed programme for AGM and approval for disposal of non-impact factor scientific journals received for NAAS scoring.

XIV Agricultural Science Congress on "Innovations for Agricultural Transformation"

A day before the Congress, the event MEET THE PRESS was organised in which media was appraised about the details and importance of XIV Agricultural Science Congress on "Innovations for Agricultural Transformation".

The Congress underpinned that Innovation is the process by which inventions are produced–it may involve new ideas, new technologies, or novel applications of existing technologies, new processes or institutions, or more generally, new ways of doing things in a place or by people where they have not been used before. Innovation, thus, has to be viewed in a broader context–multidisciplinary and multi-stakeholder system geared to enhance productivity, income of the farmers, inclusiveness, livelihood security, input-use efficiency, climate resilience and ecological/environmental sustainability. Thus, agricultural innovation is a *sine qua non* for meeting the Sustainable Development Goals (SDGs), Agenda 2030.

This Congress provided an intellectually rich multi stakeholder platform for discussing and critically analyzed veritable disruptive innovations for transforming agriculture and food systems to reshape India. It showcased agriculture not only as the main source of employment and livelihood security for nearly 50 per cent of India's population, bulging to be the largest in the world by 2025, but also as a business opportunity, service provider, industry, and ecosystem protector. Reflecting on the journey from the green revolution to the gene revolution, the Congress emphasized the need for innovations to drive congruent acceleration of productivity, profitability, sustainability, equity and inclusivity. Besides leaps in genetic enhancement, innovations in precision agriculture, natural resource management, climate smart agriculture, mechanization, micro-irrigation (per drop more crop), ICT, digital technology, farmer-market linkage, value chain and post-harvest management, renewable energy, price realization, and, of course, farmers' net income were deliberated in detail in its 5 Plenary Lectures, theme areas sessions, and Panel Discussions. A special Farmers' Session, one Student' Elocution Contest and several enthusiastic and huge Poster Sessions enriched the contextuaity of the Congress.

Along with innovative technologies, the Congress examined the uncommon synergistic transformative policies, strategies, institutions, partnerships, processes, products, investments, business models, trade, group dynamics (FPOs, cooperatives),

and human resources development. Further, in this fast changing globalized world, and keeping in mind the increasing appreciation of Local-Global interdependence, increasing volatilities of climate change, achieving the SDGs by 2030, the Zero Hunger Challenge and the Paris Declaration, the Congress examined the scope of international partnership toward enriching the evergreen revolution for evergreen economy.

At the Inaugural Session the Hon'ble Minister of Agriculture Shri Radha Mohan Singh highlighted the excellent progress made in agricultural production, the various new initiatives of the Government and its special attention to the farming communities and agricultural development. He congratulated the scientific community and other stakeholders for their roles in transforming Indian agriculture. The Hon'ble Minister of State, Agriculture and Farmers Welfare, Shri Gajendra Singh Sekhawat, advised that innovations should be demand-driven and should be at the centre of the agricultural transformation. Shri Radha Mohan Singh, Hon'ble Minister of Agriculture presented the Academy awards to the Scientists Selected by NAAS, and released publications brought out by NAAS and organisers for this Congress.

In his Presidential Address, Prof Panjab Singh highlighted that knowledge, information and technologies are growing at a very rapid speed that may be both, knowledge and cost intensive thus could remain out of reach of several developing countries. We need to develop mechanism whereby the exchange of knowledge, information, technologies and materials could be facilitated at the international level. A regulatory framework

harmonized to create a win-win environment for all the cooperating countries needs to be put in place. He hoped that the scientists from different countries will deliberate on the issues of cooperation in S&T to achieve a sustainable agriculture and achieve the dream to see a world free of hunger (as actually happened). He stressed, it is extremely important to invest in agricultural research and education to promote and nurture excellence, multi-disciplinary, system based knowledge intensive and problem-solving approach. This is most needed to provide food, nutrition and environmental security to entire population (sufficient, safe and nutritious food with low ecological foot print), feed and fodder security to our huge livestock population and on top of all livelihood security to small and marginal farmers and entire farming community.

Prof Trilochan Mohapatra, Secretary DARE and DG, ICAR in his Plenary Lecture on “Indian Agriculture: Needs and Pathways for Food Security and Prosperity” revealed that the Government of India and ICAR are proposing several innovative technologies and policy pushups to ensure that India remains self sustained as far as food production is concerned. Convergence of agriculture, digital and engineering technologies with modern biotechnological tools would revolutionize the Indian agriculture in coming years. However, we need to enhance investment in agriculture for sustainable increase in production and productivity with enhance inputs and resource use efficiency.

He concluded that India’s population would touch 1.7 billion by 2050 and ensuring food and nutritional security for such a large population would be a great challenge. Use of technology and innovation in Indian agriculture would only be the way out. All out efforts have to be a made on generation, transfer and adoption of technologies during coming two decades. ICAR’s vision for the future is to encourage “SMART FARMS” with greater technological support to reduce post-harvest losses, strengthen value chain and provide markets to increase farmer’s income. Agriculture in India, being the source of livelihood of almost two thirds of the working population and vast contribution in India’s economic growth in recent years, which is no less significant than that of industry and services (16% of total GDP and 10% of total exports). He exalted that we need to regularly innovate, invest and support to strengthen agricultural research and development in the country.

Dr Lee Hickey in his Plenary Lecture “Speed Breeding: A Powerful Tool to Accelerate Crop Research and Breeding” highlighted that Speed Breeding protocols that shorten plant generation times can hasten breeding and research to help fulfill the ever-increasing demands. Global agri-food systems rely on a relatively small number of plant species; however, there are calls to widen the scope of globally important crops to include orphan crops, which are currently grown and used by the world’s poorest people or marketed as niche products for affluent consumers. Orphan crops can supply global diets with key nutrients, support economic development in the world’s poorest region, and bolster the resilience of the global agri-food sector to biotic and abiotic stresses. Little research efforts has been invested in orphan crops, with farmers growing landraces that are sourced and traded through poorly structured market systems. Efforts are underway to develop breeding resources and techniques to improve orphan crops. Here, he highlighted the current efforts and opportunities to speed breed orphan crops and discuss alternative approaches to deploy speed breeding in less-resourced regions of the world. Speed Breeding is a tool that, when used together with other multidisciplinary R&D approaches, can contribute to the rapid creation of new crop varieties, agricultural practices and products, supporting the production and utilization of orphan crops at a commercial scale.

Prof R.B. Singh, Former President, NAAS, in his Plenary Lecture " Nutrition-Sensitive Agriculture and Food Systems to Build New India", highlighted the India's enigma of carrying the triple load of Malnutrition perpetuating the double burden of human diseases as India is home to 21% of world's poor, 15% of world's undernourished children and over 50% of world's wasted children. Referring to the Hon'ble Prime Minister's pledge to build a New India by 2022, we scientists and other stakeholders must congrue to render India Zero Hunger as the highest national priority. He alluded to the elusive Pot of Gold at the end of the 'Rainbow', meaning thereby that we have to keep striving to achieve eternal justice, comprehensive, nutritional security, prosperity and peace.

He concluded that as Agriculture employs more than 50% of the people (nearly 700 m), accounts for 14% of GDP, and is almost three times more effective in alleviating hunger, poverty, and under nutrition, the sector (agriculture) matters the most in India. Thus, besides enhanced production, Agriculture and Food System (AFS) should emphasize ecological efficiency, More from Less for More (MLM), Save and Grow, environmental health, nutritional adequacy, inclusiveness, sustainability, and remunerative income (Doubling farmers income by 2022). Inter-disciplinary and integrative approaches, adequate investment, vibrant STI, trained human resources, responsive and effective implementation are a must to reach the unreached to help build a Zero Hunger New India.

Prof Raghunath Mashelkar in his Dr A.B. Joshi Memorial Lecture "Leveraging Agritech Startups in Indian Agriculture Innovation Ecosystem" highlighted that in India, we have daunting challenges in our agriculture system. They range from the need for substantial enhancement of our productivity to dealing with over dependency on monsoons, to managing dry land farming as also the small and fragmented land holdings to rapid elimination of poverty and malnourishment. Climate change poses some daunting challenges too. To deal with all these, India needs to take recourse to not only innovation but 'disruptive game changing innovation'.

He suggested that in building the new National Agricultural Innovation System, one of important measures is to fully develop and use 'collective intelligence' that involves several stakeholders. Amongst this should be innovative youth, but not at the periphery but at the core. Recalling the various initiatives of the Government, namely, Make-in-India, Skill India, Start-up-India, e-NAM, etc., he reiterated that for achieving assured success in innovation would come from an ASSURED Innovation matrix: with **A (Affordable); S (Scalable); S (Sustainable); U (Universal); R (Rapid); E (Excellent) and D (Distinctive)**

He concluded that Young Indian Agritech Startups are emerging, but somewhat slowly. If the current Agriculture Innovation Ecosystem can leverage the Agritech Startups by bringing them from periphery to the core then not only we provide an opportunity for the youth to contribute to the greatest public good, namely agriculture, but we can also accelerate the disruptive innovation led agriculture based inclusive growth, which can be achieved within a decade.

Prof Ramesh Chand, Member, NITI Aayog in his Plenary Lecture on "Policy Options, Actions, and Implementation to Achieve Accelerated Inclusive Growth" observed that most policies are not always win-win options for everyone. The trade-offs among the various options should be critically analyzed before implementing given policies. Likewise, inclusiveness should not only mean reduction in disparity but also equitable sharing of the benefit arising from the intended growth. Spatial, temporal, inter-generational and gender considerations should be kept in mind while pursing inclusiveness with equity. While policies should support to wipe-off the disparities as much as possible through providing effective social protection floors, investments in development and capital formation should always remain a high priority to ensure planned growth.

Prof John Dixon, Ex-Principal Advisor Research, Australian Centre for International Agricultural Research (ACIAR) in his Plenary Lecture "Climate Smart Agriculture and Averting Risks to the Food Chain" alluded to the various asymmetries in top 10 development successes viz. successes in farm intensification, but at great cost to natural resources; national food (calorie) security achieved, but with growing malnutrition; value chains/market access strengthened, but poor farm gate prices; public/ private agricultural services enhanced, but social capital weakened; focus on averages and aggregates, rather than spatial and temporal variability; limited coordination across climate, agriculture and economic growth; limited consideration of risk and management at all levels; limited targeting and tailoring to specific farming systems requirements; limited trans-disciplinary systems approaches, including integrated GxMxE/P, production/value chains, and weak capacity for systems R&D methods.

While strongly advocating removal of the asymmetries, he underpinned that policy makers and science leaders need to be aware of the tight nexus between climate, agriculture and economic growth. The challenge of maintaining food security while reducing green house gas emissions was a central challenge. But the most important challenge for farmers in low income countries has been adapting to the increased variability and frequency of extreme events which are occurring. Considerable investment in Climate Smart Agriculture (CSA) has created frameworks at the international and regional (e.g., South Asia) levels. Fortunately, there are a sub-set of CSA practices which foster mitigation while building resilience and adaptive capacity of farmers, i.e., a win-win way forward. Effective CSA implementation requires appropriate technologies, social capital, institutions and enabling policies. Because of the diversity of farming systems and seasons, big data and modelling will contribute to progress with CSA technologies. Policy makers need good targeting approaches such as the FAO/World Bank farming systems framework to optimise investments.

Theme Presentations

During four day Congress, 32 technical sessions were organised covering 10 broad theme areas viz. Plant Sciences (Field Crops); Plant Sciences (Horticultural Crops); Natural Resource Management; Plant Protection; Food Science and Value Addition; Animal Sciences Livestock, Dairy and Poultry; Fisheries; Engineering & IT; Social Sciences and Agricultural Education. In these technical sessions involving different theme areas, a large number of eminent invited speakers presented their research. In the Congress four panel discussions on the topics Agriculture 2030: Meeting

SDGs; Pathways and Investment Priorities; Regulation of GMOs and Genome-edited Products and Inclusive Growth in Agriculture were held in which very senior level experts involving scientists, policy makers, development departments and farmer groups actively participated and presented their views. Different Poster Sessions were also organised, in which Young Scientists presented their work through posters. These were evaluated by expert judges for selecting Best Poster Papers. On the occasion of Congress, a exhibition "Agri-Expo" was also organised. In a Farmers-Scientists Interaction Session, large number of farmers raised many issues concerning impact of climate change on their crop and animal production, and the scientists present satisfactorily explained them the coping strategies that farmers need to adopt to minimise production loss. In addition to these technical sessions, a very important event was "Students' Elocution Contest" in which, students from different regions of the country presented their talks on the topic of "Transforming Agrarian Economy: Innovative Solutions through Science and Technology". A cultural programme was also organised during the Congress.

Some of the theme presentations gave insight to remove certain myths and misgivings. For instance, on the basis of the data of the period 1950 to 2017 on area, production and productivity in 127 million hectares grown to rice, wheat, maize, pearl millet and sorghum making up for about 85% of the area and 90% of the food grain production, it was evident that the Green Revolution of 1967-1984 in wheat and rice under irrigated ecosystem has actually continued in its next phase, in other major cereals including rice and wheat over both irrigated and rainfed ecosystems across all regions of the country, contrary to the general notion that the Green Revolution of first phase has fatigued and did not reach other crops or regions in the country. In fact, we are having an Evergreen Revolution, which must be sustained.

It is therefore recommended that in order to tackle the negative impact of climate change and other stresses in view of nutritional and food security needs of the expected population of the country targeting SDGs there has to be a substantial increase in the investment in agriculture as it is also proved that every Rupee invested in agriculture returns the maximum benefits among all the sectors in the country.

At the end of the Congress, the Valedictory Function was held on 23rd February, 2019 in which Prof R. B. Singh, Chairman, Scientific Programme Committee presented the main recommendations of the Congress. This Valedictory Function was presided over by Prof K. VijayRaghav, Principal Scientific Adviser to Government of India, who stressed the importance of science and scientists in solving societal problems and hoped that the deliberations of the Congress would enable and empower the nation in dealing with impacts of climate change and scientific research in agriculture. The recommendations that emerged from the different technical sessions are outlined below.

Recommendations

The major recommendations emerging out of the Congress include:

- Adoption and promotion of inter-disciplinary, interactive research based on agro-ecologically and socio-economically differentiated, disaggregated approaches to enable sustainable, equitable, nutrition sensitive and climate smart agriculture.
- Strive to enhance farmer's income through effective farmer-market linkage along the value chain, thereby ensuring quality and minimizing wastage, and realization of remunerative price.
- To enable science to serve the society, appropriate regulatory policies should be in place so as, (a) to ensure development and transfer of need based technologies and to promote public-private co-operation and (b) to bring congruence between science social responsibility and corporate social responsibility.
- To transform agricultural education system for developing necessary human capital with entrepreneurship, employability and leadership qualities in meeting the SDGs-2030 and to contextualize and provide academic legitimacy to various national initiatives to build a zero hunger and prosperous India as well as world.
- To create and implement effective implementation pathways to measure and manage the expected outcomes and impact with due accountability and responsibility of the stakeholders.

Meeting of the Conveners of Regional Chapters

A meeting of the Conveners of NAAS Regional Chapters and Office Bearers was held on the sidelines of XIV Agricultural Science Congress in Bharat Ratna C. Subramaniam Auditorium, a new ICAR conferencing facility, NASC Complex, New Delhi on February 22, 2019. The meeting was Chaired by Prof Panjab Singh, President, NAAS. The salient features of activities carried out during the year 2018-19 by various chapters were shared by the Conveners, besides the appraisal of programme to be undertaken during the financial year 2019-20. It was suggested that regional chapters should focus and develop strategies to create general awareness about the technical strength of NAAS at regional and national level. It was also reiterated to organize an annual meeting of the all Conveners preferably a day before the AGM of NAAS. The Conveners were requested to compile a directory of NAAS Fellows located in the states coming under the jurisdiction of their respective chapters. It was also felt that some of the NAAS Policy/Strategy Papers may be translated in the local language by regional chapters for large scale benefit of the stakeholders. A need to develop website of the respective chapter with hyperlink on the main NAAS website was also felt. The Conveners were requested to contribute an account of their activities that could be included in the NAAS-News on regular basis.

The meeting ended with a vote of thanks to the Chair.

Programmes Held

New Year Get-together

The Academy organised a get-together of Delhi based Fellowship at NAAS Complex on January 1, 2019 under the Chairmanship of Prof Panjab Singh, President of the Academy. Others present on the dais included Prof A. K. Srivastava, Vice-President, Dr T. Mohapatra, Secretary DARE and DG, ICAR and incoming Vice-President, NAAS, and the two secretaries of the Academy Dr J.K Jena and Dr Anil K. Singh.

Dr Jena, Secretary, NAAS extended a very warm floral welcome to all the dignitaries and introduced the newly elected members of EC, Fellowship and Associates present in the house. He also briefly described the activities and achievements of the Academy during the year 2018.

Prof Panjab Singh, President of the Academy also welcomed the Fellowship and extended his warm greetings and best wishes for the New Year. He highlighted the implementation of some important recommendations made by the Academy to address contentious issues like use of GE technology for food and nutrition security, solutions to crop residue burning, sustaining soil health etc. He also lauded the impact of NAAS policy/strategy/status papers in formulating policies for growth

of national economy. He further informed that a compendium of impact of NAAS publications would be brought out very shortly. Further, he drew attention of the Fellowship towards national issues like waiver of farm loans, heavy subsidies on fertilizers, water and electricity, governance and need for enhancing interest in research and teaching by scientific community. He appealed and requested the Fellowship to focus on achieving something innovative for the growth of agriculture in general and for farmers in particular and submit proposals to be addressed by the Academy in near future. He appreciated the positive development observed in increasing number of nominations of young scientists for NAAS Fellowship.

Dr T. Mohapatra, Secretary DARE and DG, ICAR and Vice-President, NAAS conveyed his warm greetings and best wishes for the New Year to all dignitaries and NAAS Fellowship gathered on this occasion. He highlighted the role of policy interventions so that the researches carried out may reach the stakeholders in a more efficient manner. He emphasised that there is a strong need to identify areas of research where it has reached maturity for immediate policy intervention. He expressed his concern over the imbalanced/skewed distribution of Fellowship across gender, institutions and disciplines. He hoped that Regional Chapters shall play very important role in dissemination of policies and knowledge in most effective manner, besides creating awareness about various activities of the Academy. He further laid emphasis on science communication and also suggested that the recommendations of the Policy/Status/Strategy papers must be precise so that Policy Decisions can be made and implemented.

Dr A.K. Srivastava, Vice-President, NAAS introduced the topic "Search for Research" for discussion among the Fellowship. While giving the genesis of the topic, he emphasised that the real need is to take/translate research to stakeholders. He explained this concept with the help of several live examples like bad and good cholesterol, iron fortified milk, iodine fortified salt, probiotic/fermented milk etc. He pointed out that **"SEARCH"** generally involve looking for something, while **"RESEARCH"** denotes looking into something. However, when the concept of research is used in an academic activity, it involves both. He was of the view that Researchers have to not only find the missing links in their thoughts and so called hypothesis, but they also need to look into the matter to discover the justifications for their outputs. He stressed to identify most important thrust areas for research with direct relevance to society at large.

On this occasion, Academy's Strategy Paper No 10 "Renewable Energy: A New Paradigm for Growth in Agriculture", NAAS Yearbook 2019 and NAAS_NEWS October-December 2018 were also released. The programme ended with a vote of thanks by Dr Anil K. Singh, Secretary, NAAS.

Experts Meet on Uniform Policy for Fish Disease Diagnosis and Quarantine

NAAS Experts Meet on "Uniform Policy for Fish Disease Diagnosis and Quarantine" was held on 29 January, 2019 in order to develop a uniform policy on fish disease diagnosis and quarantine for the country to strengthen disease management in aquaculture. The Experts Meet was Chaired by Prof Panjab Singh, President, NAAS, and convened by Dr P.K. Sahoo, Principal Scientist, ICAR-CIFA, Bhubaneswar. The meet included experts from ICAR Institutes under Fisheries and Animal Sciences Divisions, besides eminent scientists from SAUs, State Universities, State Governments, Officials of DAHD&F and Executive Committee members of NAAS.

In his opening remarks, Prof Panjab Singh outlined the need of this meet to debate upon all the important issues, knowledge gap, legal and operational aspects that concern fish disease diagnosis and quarantine in the country, and stressed upon in bringing out a National Policy document based on the deliberations. Dr J. K. Jena in his welcome address highlighted the scale of production obtained from fisheries and aquaculture sector, the current trends in export and import of aquaculture products, the on-going National Surveillance Programme *vis-à-vis* the extent of loss due to fish diseases and some drawbacks in the quarantine system being practiced in the country. He also accentuated the importance of developing a policy on fish disease diagnosis and quarantine as, such a policy does not exist in the country despite emergence of newer pathogens and emerging trade of ornamental and other fish trade among countries.

Dr P.K. Sahoo, Convener presented the overall scenario of fish disease diagnosis in freshwater aquaculture and flagged off issues related to poor commercialization of diagnostics already developed in the research institutes, lack of field level diagnostics, poor preparedness to handle emerging or re-emerging pathogens, involvement of private sectors in diagnostics development, lack of sufficient laboratories to cater the needs of the states, poor HRD with respect to diagnostic pathologists at state level, difficulties in identifying primary and secondary pathogens, confusing level I diagnosis and sero-diagnosis, zoonotic pathogens, regulatory mechanisms in setting up and functioning of diagnostic laboratories, uniformity in case coding, besides legal, regulatory and institutional issues with regards to quarantine. Dr K.V. Rajendran, Head, ICAR-CIFE, Mumbai made a detailed presentation on the status of shrimp disease diagnosis in the country and the gaps, constraints and way-forward. He highlighted the disconnection in disease reporting system, quality control of diagnostics, harmonization and accreditation of laboratories, delinking R&D organization from diagnosis, empowerment of State Government in diagnosis, importance of production limiting diseases in brackish water, involvement of multiple pathogens with obscure etiology, demand-based diagnosis development, contextual categorization of diagnostics with multiple level validation and developing genomic resources for pathogens. It was followed by a presentation on quarantine system practiced in India and the issues there on by Dr Neeraj Sood, ICAR-NBFGR, Lucknow. He stressed upon Epizootic Ulcerative Syndrome (EUS) affecting ornamental species, entry of White Spot Syndrome Virus (WSSV) through frozen products, poor risk analysis during import, inclusion of amphibians and aquatic plants in screening process during import, construction of more quarantine facilities, non-availability of proper disposal system at on-farm quarantine, loop-holes in inspection mechanism and record keeping, difficulties in screening of pathogens while importing early life stages and cost towards inspection and co-habitation studies during quarantine. Dr R.K. Singh, Director, ICAR-IVRI, Izatnagar underlined the importance of diagnosis in disease eradication programme, parallel screening with more than one diagnosis methods for unequivocal diagnosis, looking for World Organisation for Animal Health OIE twinning laboratories in fisheries, creation of Centro de Diagnosticos Laboratoriais (CDDL) like facilities and portable diagnostic laboratories. Mr I. A. Siddiqui, Asst. Commissioner, Fisheries, Department of Animal Husbandry, Dairy and Fisheries (DAHD&F) stressed upon the initiatives taken by the Government and use of National Animal Disease Referral Expert System (NADRES) in disease reporting.

The major recommendations emerged from the presentations followed by group discussions and plenary session included:

- Accreditation of laboratories involved in disease diagnosis in public and private sectors.
- Formation of a statutory body for accreditation under the Department of Fisheries.
- Registration of existing diagnosis laboratories in all shrimp hatcheries and entered into ring testing mechanism.
- Establishment of One Central Diagnosis Laboratory in CDDL pattern with 6 Regional Laboratories (8-10 manpower) under central funding, linking of such to each state level key laboratory (either at SAUs or at SFDs) and district laboratories.
- Institutionalization of National Surveillance Programme with technical backstopping from ICAR institutes.
- Sero-diagnosis with emphasis on antibody titre in fish in healthy and challenge conditions in research institutes and revisiting the sensitivity of diagnosis methods used for quarantine.
- Strengthening of aquatic animal disease diagnosis and reporting to meet the national and international requirement of aquatic animal farming, trade, effective quarantine and trans boundary movement of aquatic animals.
- Development of regulatory framework to ensure the quality standards and sustained functioning of laboratories (state level, central level).
- Participation of industry/stakeholders in commercialization of diagnostics developed through R&D.
- Promotion of quarantine systems under PPP mode based on region, commodity or ecosystem.
- Feed additives following internationally recognised protocols for sampling and testing for trade.
- Mechanism for regulating movement of live aquatic animals within the country.

It was further recommended that the policy guidelines may be finalized as early as possible to develop a National Policy with guidelines.

Activities of Regional Chapters

Varanasi Chapter

The National Academy of Agricultural Sciences - Varanasi Chapter organized a Special Lecture on “Feeding 1.37 billion with Nutritional Security: Bigger Challenge” at ICAR-Indian Institute of Vegetable Research, Varanasi on 29th January, 2019. The lecture was delivered by Dr A.K. Srivastava, Member, Agricultural Scientists Recruitment Board, New Delhi and Vice President, NAAS. In his deliberation, Dr Srivastava emphasized on farmer’s nutritional, food and economic security. He also advised the scientists for developing the climate resilient technologies which can help in sustaining the

production for feeding the increasing populations. He gave emphasis to develop the hybrids in vegetables by public sector and making them available to the farmers at affordable prices.

During his visit to the Technology Park, Experimental Fields and Laboratories of the Institute, Dr Srivastava applauded the ICAR-IIVR team for the excellent works done at the institute.

Dr Gautam Kalloo, Ex-VC, JNKVV, Jabalpur and Ex-DDG (Hort.) gave his remarks. Dr Bijendra Singh, Convener, NAAS-Varanasi Chapter and Director, ICAR-IIVR, underlined the ongoing activities of the Chapter and also the achievements of the Institute along with their impacts on the farmers. The Fellows of NAAS-Varanasi Chapter, Scientists, Technical, Research Associates and SRFs, etc. were also present during the occasion.

Proposed activity of the Varanasi Chapter for the year 2019-20 was also outlined and One day Brainstorming session on "Cucurbit Breeding for Virus Resistance: Challenges Ahead" has been proposed for the year 2019.

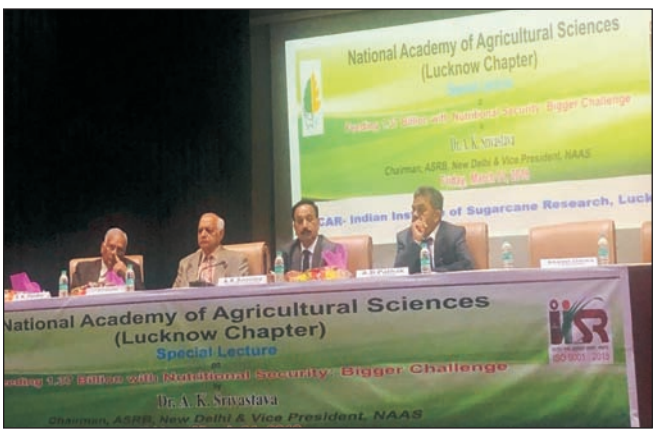
The share of cucurbit vegetables is about 10% in total vegetable production. The major problem in cucurbit production is diseases and pest. Among the diseases, viruses are most important and having 10-100% loss due to this disease. During the brain storming session lectures on different aspect of resistance breeding, molecular breeding, diagnostics etc. for cucurbitaceous crops will be discussed. This will be helpful to develop a roadmap for future research strategies for virus resistance.

Bengaluru Chapter

One day interaction program was organised on 26th October, 2018 for the benefit of farmers of two districts of Karnataka on the topic "Crops and Millets for Intermittent Rains and Drought". One day workshop was organised on 16th February, 2019 on "Awareness and Popularization of Popular Varieties of Paustic Rice Varieties as a Natural Source for Protein and Micro-nutrients" for the benefit to men and women farmers. The importance of cultivation and cooking aspects were also deliberated upon.

Lucknow Chapter

NAAS Lucknow Chapter organized a one day interactive cum special lecture program at ICAR-Indian Institute of Sugarcane Research, Lucknow on March 01, 2019. More than 70 scientists from ICAR-IISR, ICAR-NBFGR, ICAR-CISH and ICAR- CSSRI, RRS, Lucknow attended the program. Young researchers were also invited to participate in the program. Dr A. K. Srivastava, Member, ASRB and Vice-President NAAS, New Delhi delivered the lecture on "Science Led Food Production to Feed Future India with Nutrition". Dr P. L. Gautam, Dr R.K. Singh, Dr P.S. Pathak, Dr Mathura Rai, Dr D. K. Sharma, Dr S. Rajan, Dr V. K. Mishra and Dr A. K. Verma were also present and attended the program.



At the outset Dr S.K. Pandey, Convener, NAAS Lucknow Chapter welcomed the distinguished NAAS Fellowship, participants and introduced the speaker, Dr A. K. Srivastava, Member, ASRB and Vice President, NAAS, New Delhi. Dr A. D. Pathak Director ICAR-IISR Lucknow also welcomed the participants/dignitaries and highlighted the activities of the institute and appreciated the NAAS choosing the venue for a very informative and interactive talk. Dr Amaresh Chandra, Organizing Secretary of the program briefed about the past activities taken under Lucknow Chapter at IISR Lucknow and highlights of the recently concluded 14th Agricultural Science Congress.

Dr P. L. Gautam as a special invitee presented the agenda and objectives of the 12 regional chapters located at different parts of the country. He also briefed about NAAS, its various awards, Fellowships and Associate-ships given to encourage quality science and education in the country. He made an earnest appeal to scientists and researchers to apply for these coveted awards/fellowships. He also appreciated the efforts so far made by Lucknow Chapter having arranged various programs in past under the convener-ship of Dr P.S. Pathak and Dr R.K Singh.

Dr A. K. Srivastava spoke about the agricultural scenario in the country and highlighted the quantum jump in production and productivity of various commodities with exhaustive and lively presentations of the facts and figures. He emphasized

the role of science in achieving astounding progress in food production to feed future India with nutritional security. He flagged the hidden hunger and malnutrition as serious problems that still exist in India and invited the attention on some of the following issues:

- 1/4th of world's hungry and poor have their home in India
- More than 70% Indians consume less than 50% of the RDA of micronutrient
- 6000 children die annually due to malnutrition or lack of micronutrients
- 80% women of reproductive age are suffering with Fe deficiency anaemia
- 57% women and children are suffering with vitamin A deficiency
- One-third of girls aged 15-19 years are stunted
- Iodine deficiency continues to be public health problem

He expressed a need for new researches and cutting edge sciences to play a pivotal role in addressing these issues. He exploded many myths especially associated with A1/A2 milk and use of oxytocin in dairy by emphatically explaining scientific facts. He summarized his presentation with following positive notes:

- Science led growth and development in food and agriculture will continue to feed future India
- A "Mission Mode" action is required to address the Mal-nutrition
- Livestock, Fishery and Horticulture will play major role
- The new vision for agriculture food sector for 2050 would be to work together and to enhance productivity by 40%; reduce hunger and rural poverty by 30% and reduce emission by 20%

At the end, Dr Amaresh Chandra thanked the honourable speaker Dr A.K. Srivastava, special invitee Dr P. L. Gautam, distinguished Fellowship, Directors of the Institutes, past and present Conveners and participants.

Mumbai Chapter

A lecture on "Food Security, Intensive Food Production Systems and Ecological Footprints" was delivered by Dr Mohan Joseph Modayil, Former Chairman/Member, ASRB on 29th March, 2019 at ICAR-Central Institute of Fisheries Education (CIFE), Mumbai. Dr Gopal Krishna, Director and Vice-Chancellor, ICAR-CIFE welcomed the speaker and the guests. The Convener, Dr S.D. Tripathi (Former Director, ICAR-CIFE, Mumbai) introduced the key speaker Dr M.J. Modayil. Besides a total of 100 faculty and students, Dr T.J. Varghese (Former Prof of Aquaculture, College of Fisheries, Mangaluru), Dr H.G. Hingorani (Former Faculty of ICAR-CIFE) and Dr A.K. Reddy (Emeritus Scientist, ICAR-CIFE) attended the lecture.

Dr Modayil highlighted the major concern about the food for future and aspects related to food security, intensive production systems and how it impacts the ecological footprints. Citing a lot of statistical data available on global platforms he indicated that the UN has envisaged the Sustainable Development Goal of Zero Hunger to be achieved by the year 2030. There is also a growing recognition that a more humane understanding of food security is needed. According to the World Food Programme, nearly 50% of World's hungry people are in India and 35% of the total population is food insecure, hence ensuring food security is of prime importance for India.

Most farming systems are concentrated around the World near the tropical and sub-tropical belt. These are also areas which are prone to severe impacts of nature's vagaries and climate change. He highlighted role of water as food and input for agriculture. Since the total water available on planet earth remains the same, climate change and extreme water events are posing threats. New adaptive water management strategies are needed in all areas of agriculture, industry and human consumption. He also emphasized that water foot print is a multi-dimensional indicator showing water consumption volumes by source and polluted water by type of pollutants. Increasing input efficiency will have environmental benefits for both crops and livestock systems. Plant-based foods have lowest environmental impacts. Studies have quantified the spatial expanse of global marine fisheries based on PPR (Primary Production Required) as an index of ecological

footprint. Understanding the linkages between diets, production practices and environmental degradation is important for reducing the adverse impacts. Challenges and uncertainties resulting from stagnation of productivity and negative impacts of climate change, in addition to competition for land and water are challenges to meet the target envisaged by FAO for increasing the global food production by 60% by the year 2050. Alternate non-conventional species like sea cucumbers, insects, euphasids etc. are all future foods for humans. He said that our current knowledge of food and various dimensions of nutritional security and environmental impacts have advanced. Agriculture and animal production have a multitude of environmental impacts beyond the usual indicators currently analysed. More work is needed to understand the complex issues on environmental impacts. He summed up by saying that produce food responsibly, reduce post-harvest losses and wastage, conserve every drop of water and finally emphasize and think from a hungry man's perspective.

Dr Gopal Krishna, Director and Vice-Chancellor, ICAR-CIFE, Mumbai highlighted the importance of this special lecture for the benefit of faculty and students. The programme ended with a formal vote of thanks proposed by Dr N.K Chadha, Principal Scientist and Head, Division of Aquaculture, ICAR-CIFE, Mumbai.

Awards and Honours

Honour of OBE

Prof D.S. Virk has received the honour of OBE (Officer of the Order of the British Empire) in the Queen's New Year List of Honours. The citation in the gazette reads:

"Professor Dr Daljit Singh Virk, Senior Research Fellow, Bangor University, Wales, for services to tackling Poverty Abroad and to Education in Derby."

Padma Shri

Dr Baldev Singh Dhillon, Fellow of National Academy of Agricultural Sciences, New Delhi and Vice Chancellor, Punjab Agricultural University, Ludhiana was conferred with Government of India National Honour of Padma Shri on Republic Day, 2019 for his outstanding contributions in Agricultural Sciences.

Forthcoming Programmes

1. Brainstorming Session on "Enhancing Science Culture in Agricultural Institutions" *(Convener: Dr N.H. Rao)*
2. Brainstorming Session on "Payment of Ecosystem Services" *(Convener: Dr P.S. Birthal)*
3. Brainstorming Session on "Vertical Farming" *(Convener: Dr Bramha Singh)*
4. Brainstorming Session on "Big Data Analytics" *(Convener: Dr Rajender Parsad)*
5. Brainstorming Session on "Potential of Non-bovine Milk" *(Convener: Dr M.S. Chauhan and Dr Ashish Kumar Singh)*

Fellows Views

Post-Harvest Management Status and Future Needs

India is booming for record food productions. The recent fourth advance estimates indicates that total food production, excluding animal and fishery products, is all time high to about 285 million tonnes. ICAR led National Agricultural Research System which includes ICAR Institutes, State and Central Agricultural Universities have contributed immensely to keep the pace of production levels despite bad weather conditions and natural calamities in preceding years. Despite bumper production, farmers' economic conditions are not pleasing and we hear their suicide at regular intervals from different parts of the country. This is because they do not get the desired returns from the inputs they invest in crop production system. When production is more, prices crash and losses occur. Agricultural commodities are perishable in nature, their qualities get lost continuously and finally farmers are in distress. All agricultural commodities, in fact demand care like an infant child after birth to reduce their mortality rates.

As per a nation-wide study conducted by ICAR-All India Coordinated Research Project (AICRP) on Post-Harvest Engineering and Technology (PHET) during 2012-14 on 45 major commodities (including meat, fish, milk, poultry, plantation crops) the post-harvest losses from harvesting to retailing in 120 districts ranges between 4.65 % to 15.88 %, which was about of 65 million tonnes based on production

year 2012-13 with a monetary value of about Rs.92651 crores based on average wholesale prices of 2014. Many media reports suggest that several countries including Australia even do not produce that much food which we lose during harvesting to retailing every year. If we include losses of food in dining tables, hotel restaurants, parties etc., it will be at least 3-4 fold more of these estimated losses. Maximum losses occur in most field crops during the harvest followed by transport, storage and retailing. Accordingly, Government of India has planned to develop infrastructure through different schemes and have allowed 100 % FDI in food processing. Development of cold chain (from harvesting to consumption), and good road and horticultural train need foremost attention. Presently, country has only 250 pack houses whereas more than seventy thousand are required. As per one estimate, the number of refrigerated trucks is less than ten thousand against the requirement of at least 62000. However, the gap between the availability and requirement of cold stores has reduced substantially (its built in capacity is about 32 million tonnes as on 31 December, 2016 while requirement is about 35 million tonnes). Improved road infrastructure and technology interventions have also reduced the post-harvest losses on an average by 2 % relative to data reported in the first study of post-harvest loss of 2007-08 production year. Two percent saving comes to about 18 million tonnes, which is a huge contribution of post-harvest engineers and technologists.

There is a need of further reduction in post-harvest losses at accelerated pace. We cannot put pressure on our natural resources continuously to produce *more from less for more*. We, therefore, have to save whatever we produce and mechanize pre- and post-production operations. Unfortunately, there is no post-harvest policy in the country. Once we develop a policy that one grain saved is one grain produced at farmers' level, all those involved in agriculture will be a happier lot. For this Government need to; i) establish agro-processing centres with warehouse/storage facilities for raw and processed products with marketing logistics in each panchayat. About 170 such processing centres have been established in the country with technical input and guidance of ICAR-AICRP on PHET. These processing centres not only provide jobs to local youth in their villages, but also help the farmers to get many more remunerative prices of their produce; ii) decentralize storage of grains, fruits and vegetables with public and government partnership at block level adjacent to these agro-processing centres instead of centralized storage system being followed by the government agencies; iii) enhance funding for post-harvest research and development, which presently is a meagre amount; iv) open entrepreneurship development training and incubation centres in each district for rural youth, and v) launch a dedicated campaign for educating all stakeholders involved from *farm to fork* to save the huge amount being lost in different channels.

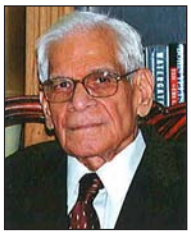
S.N.Jha
Snjha_ciphet@gmail.com

Ethnobotanically selected medicinal and aromatic plant based vaccine adjuvants for potential application in livestock and fish farming

Indian agriculture is constantly faced with the threats and economic consequences of various diseases of livestock and fish. Vaccination of livestock and fish is one of the most effective and safe approaches to disease prevention and control by stimulating immune responses in the defence, ensuring health. Unlike traditional vaccines, novel vaccine strategies include inactivated or highly purified vaccines, so called subunit vaccines, which generally require the addition of an adjuvant that increase and modulate the immunogenicity of the vaccine against challenging pathogens. Adjuvant is an ingredient, which play an important role in vaccine formulations with increased immunogenicity by inducing stronger adaptive immune responses associated with vaccine antigens. It can reduce the dosage and production cost of vaccine. Aluminium salt has been in use for last 90 years as an adjuvant for vaccines. However, its use as a vaccine adjuvant offers limitation in supporting cell mediated response. A safe and effective vaccine adjuvant is important in search of new and modern vaccines against challenging pathogens. It is expected that many biomolecules of indigenous plants may prove medically significant for the global market. In todays scenario, there is certainly urgent need of assessment of the indigenous knowledge of rural tribal communities associated with the ethnobotanical species and indigenous scientific evaluation of our original medicinal and aromatic plants. Ethnobotany is not new to India because of its rich ethnic diversity, endowed with a rich flora of medicinal use. Plant based bioactive compounds isolated from medicinal plants may be considered as a better vaccine adjuvant candidate and have the advantage that they are potent inducers of both cellular and humoral immunity, making them suitable for a wide spectrum of prophylactic and therapeutic vaccines. In summary, the discovery of new generation vaccine adjuvants derived from ethnobotanically selected medicinal and aromatic plants with immune modulating bioactives may be of significant interests to vaccinologists and immunologists. In this context, ethnobotanical studies and scientific evaluation of medicinal and aromatic plants with the major emphasis on the identification and characterisation of their bioactive compounds that augment new or existing vaccines should be the priority.

Kishore Kumar Krishnani
kishor.krishnani@icar.gov.in

Obituaries



(1928 - 2019)

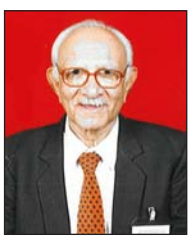
Dr Sishta Venkata Seetharama Shastry was born in Guntur, India on 4th November, 1928 and obtained B.Sc. from Agricultural College, Bapatla and thereafter M.S. and Ph.D. from University of Wisconsin, USA.

He joined IARI and started teaching and research work during 1958 to 1965. He was also the Founder Project Coordinator of the All India Coordinated Rice Improvement Project (AICRIP), Hyderabad and also the Indian Institute of Rice Research (IIRR) of Indian Council of Agricultural Research (ICAR) New Delhi. Dr Shastry had also served as the Executive Secretary, International Rice Commission of the Food and Agriculture Organisation (FAO), Rome and as the Director of Research at the International Institute of Tropical Agriculture in Nigeria, during 1977 to 1983.

Dr Shastry along with other researchers had developed high-yielding rice varieties Padma and Jaya that broke the yield barrier in the 1960s. Under his leadership, the AICRIP expanded and almost 1,100 rice varieties were released over the past 5 decades under ICAR system.

He won numerous awards including Padma Shri in 1971, the Norman Borlaug Award and Janna Reddy Venkatareddy Prize in 1974.

Dr SVS Shastry, a pioneer in rice research in India, who made immense contributions towards the agriculture sector for more than fifty years died at the age of 91 years in Hyderabad on 08 February, 2019. He left behind a son and two daughters. The Academy and the country have lost a very valuable and high calibre scientist. The entire Fellowship mourns the sad demise of a great scientist and Fellow of the Academy and pays homage to the departed soul.



(1922 - 2019)

Dr Jaswant Singh Kanwar was born in Kherakalmot, Hoshiarpur, Punjab on 10th December, 1922. He obtained B.Sc. (Agric.) from Punjab Agricultural College, Lyallpur in 1944, M.Sc. (Agric.) in 1950 from Punjab University, Ph.D. from Adelaide, Australia, Post Doctorate from State University of California and of Ohio, USA.

Dr Kanwar started his career from Lecturer-cum-Research Assistant, Punjab Agricultural College, Lyallpur from 1944-47 and Government Agricultural College, Ludhiana from 1947-50; Colombo Plan Research Fellow, Waite Agricultural Research Institute, Adelaide, Australia, 1950-53; Assistant Professor, 1953-55, Professor of Agricultural Chemistry and Soil Science, 1955-62; First Director of Research and Dean Agricultural College (Hisar) 1962-66, PAU, Ludhiana; First Deputy Director General (Soil Agronomy, Water and Engineering), ICAR 1966-73; First Deputy Director General, ICRISAT, 1973-88; worked as Advisor, Consultant, Member and Chairman, Committees of FAO, UNESCO, UNDP, World Bank, ADB, USAID at International level and also at ICAR and SAUs at national level in India.

Dr Kanwar was honoured with several awards namely Rafi Ahmed Kidwai Memorial Award, 1967; Borlaug Award, 1977; International Fertilizer Development Century Club Award, 1983; International Society of Soil Science Honorary Membership Award, 1990; Dr K. Ramaiah Memorial Award, 1993-94; Platinum Jubilee Honour for Lifetime Achievement in Soil Science, 2009; Recognised Distinguished Service to Rainfed Farming by the Indian Society of Dryland Agriculture, 2010; Doctorate of Science, HAU, Dr Y.S. Parmar University, Solan, 1988 and PAU, Ludhiana, 2012; Deputy Director General (Emeritus), ICRISAT; President, Indian Society of Soil Science, 1977-78; President. International Society of Soil Science, 1978-82.

He was Fellow of Indian National Science Academy, (Council Member), 1977-80 and was also elected in 1991 as Fellow of National Academy of Agricultural Sciences (NAAS). He was member NAAS, Executive Council from 1st Oct, 1992 to 16th Feb., 1997 and Vice President from 10th March, 1997 to 31st December, 1999.

Dr J.S. Kanwar, a pioneer Soil Scientist, who made immense contributions towards the agriculture sector died at the age of 97 years on 1st March, 2019. The Academy and the country have lost a very valuable and high calibre scientist. The entire Fellowship mourns the sad demise of a great scientist and Fellow of the Academy and pays homage to the departed soul.

Editors: Dr V.K. Bhatia and Dr Kusumkar Sharma

Published by: Dr Anil K. Bawa, Executive Director, on behalf of the National Academy of Agricultural Sciences, NASC, Dev Prakash Shastry Marg, New Delhi 110012; Tel. (011) 25846051-52, Fax. 25846054; Email: naas-mail@naas.org.in; Webside: http://www.naasindia.org