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Wish you a Happy New Year 2016

From President's Desk

Harvest of Hope

India attained freedom in 1947 after centuries of foreign rule but continued the struggle of liberating the country from widespread prevalence of food shortage, poverty and hunger. It was at that time when our first Prime Minister, Pt. Nehru remarked *'Everything else can wait, but not agriculture'*.

Prior to the mid-1960s India relied on imports and food aid to meet domestic requirements. Following occurrence of droughts during 1965 and 1966, serious thinking was given by the Government to reform its agricultural policy, aiming to make India self reliant in food production and not dependent on the food imports. The initial focus was to achieve self-sufficiency in food grain production. The research institutions and competent manpower supported by enhanced investments and an enabling policy environment, successfully ushered Green Revolution in India. It began with the decision to adopt high yielding and disease resistant dwarf wheat varieties in combination with better farming knowledge to improve productivity.

The National Academy of Agricultural Sciences (NAAS) celebrated the Golden Jubilee of the Green Revolution in India, which is regarded as the greatest achievement in human history and a turning point in the history of the country, fifty years back, when the seeds of food self-sufficiency were sown. The occasion provided us a unique opportunity to offer tributes to the Nobel Laureate, Late Dr. Norman E. Borlaug and Prof. M.S. Swaminathan, architects of the Green Revolution in India. This was also an occasion to salute the Farm-Technology-Policy unison of Green Revolution, Scientist-Farmer combine and Vision-Action synergy. On behalf of the entire agricultural fraternity I deem it an honour to record our deep sense of debt and gratitude to the institutions and individuals who enabled Green Revolution.

The food grain production increased over the decades, while the net sown area remained constant at 140±2 mha and population increased (Table 1). The import of foodgrains gradually stopped, thus ending the

Table 1: Improvement in national foodgrain situation

	1950	1960	1970	1980	1990	2000	2010
Foodgrain production (mt)	50.82	82.02	108.02	129.59	176.39	196.81	244.49
Foodgrain imports (mt)	4.8	10.4	7.5	0.8	0.3	-	-
Population (million)	361	439	548	683	846	1000	1200
Net sown area (million ha)	118.75	135.20	140.86	140.29	143.0	141.34	141.56

era of 'Ship to mouth existence' and the prediction by Paddock Brothers of mass starvation deaths in India was proved wrong. The success instilled a sense of confidence of the national R&D systems. It may be recalled that underlying this success story of agricultural revolution in India, among other factors, is the helping hand of the Consultative Group on International Agricultural Research (CGIAR) through its research institutions, especially on wheat, maize and rice. India still continues to benefit from this collaborative partnership with the CGIAR.

In the last five decades institutions of agricultural research, education and extension have spread across the country. Now there are 108 research institutions, 73 agricultural universities and 642 KVKs, providing technologies for agricultural growth and to develop human resources. As a result of technology generation and dissemination to the farmers' fields, besides the Green Revolution, today we have witnessed a Golden revolution in horticulture, White revolution in milk, Blue revolution in fish production that have placed us among the leading producers of cereals, fruits, vegetables, milk, meat, eggs, fish, cotton and jute at global level. An ICAR study in 2011 covering the recent two decades indicates 42 to 46 per cent internal rate of return to public investment in agricultural research and education in the country had the second largest impact on poverty reduction after roads. We are now aiming for a Rainbow Revolution by way of an all-round growth and development in agriculture.

The challenge, now and in future, before agriculture are climate variability, declining and degrading state of natural resources, sub-optimal input use efficiency, emergence of new biotic and abiotic stresses, post-harvest losses, adequate supply of energy and its management; access to markets and market uncertainties, knowledge lag, policy support, enhancing farm profitability and above all an ever increasing food-feed-fuel demand. While there is a need to focus on sustaining the productivity gains in the irrigated agriculture, it is time to address the agricultural development needs of rainfed areas, integrated farming to optimise resource use, high value agriculture, secondary and specialty agriculture. Anticipatory and strategic research on genomics, quality seed and planting material, climate change, diagnostics and vaccines, precision farming, conservation agriculture, dryland agriculture, farming system, protected cultivation, farm mechanization, alternative sources of energy, biosensors, health foods, feed and fodder need to be accorded high priority.

Problems and challenges facing agricultural sector require action on several fronts – technology, policy, infrastructure, market. All these factors result in interacting influence on farm output, farm income and sustainability. Though all factors are important, basic solution and basic ground for other factors to play their role is provided by technology. Climate-resilient agriculture, one health vision and a Healthy India are the key ingredients of a comprehensive agriculture strategy.

Nevertheless, no technology can show impact if enabling conditions, policies and economic environment is not favourable. Under an evolving agricultural scenario innovations and investments need to be stepped up for realizing the complete paradigm of Agriculture-Food-Nutrition-Health-Environment-Employment. Country must ensure sharp increase in public as well as private investments in agriculture to avert food crisis and scarcity of other agricultural commodities.

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Golden Jubilee of Green Revolution

The Academy in collaboration with ICAR and IARI organized a one day scientific discourse on November 27, 2015 at A.P. Shinde Symposium Hall, NASC Complex, New Delhi to commemorate the Golden Jubilee of Indian Green Revolution that transformed our agriculture to self-sufficiency, surpluses and export. This revolution, a kind of mass movement, centring on technologists, farmers, policy makers and above all political will, was a unique model of team effort that transformed the vision of fighting hunger in India into a reality. The one day programme was conducted in three sessions and attended by more than 300 eminent experts of yesteryears and present day.

Shri Radha Mohan Singh, Hon'ble Minister for Agriculture and Farmers Welfare, Government of India was the Chief Guest of the Inaugural Function. The programme started with floral welcome to the dignitaries on the dais, Hon'ble A.M., Prof. M.S. Swaminathan, Dr. M.V. Rao, Dr. N.G.P. Rao, Dr. S. Ayyappan, Shri S.K. Singh (F.A., ICAR). It was followed by ICAR song, lighting of lamp of knowledge and welcome address by Dr. T. Mohapatra, Director, IARI. He extended a very warm welcome to the Chief Guest, all dignitaries, special invitees and NAAS fellowship for participation in this important event. On behalf of NAAS and other co-organizers, Dr. Mohapatra expressed his profuse thanks to the Hon'ble A.M. for his gracious presence and traced the history of Green Revolution, elaborating on the role played by Prof. M.S. Swaminathan, Dr. M.V. Rao, Dr. N.G.P. Rao and other stalwarts of yesteryears and the central role played by IARI in this national effort. He mentioned that Dr. S. Ayyappan, Secretary DARE, D.G. ICAR and President, NAAS has been the main driving force to guide us in organizing this important event. Dr. Mohapatra extended a warm welcome to the distinguished participants especially Shri S.K. Singh, Addl. Secretary and F.A., ICAR for support and participation in this function.

Dr. S. Ayyappan in his opening remarks expressed gratitude to the Hon'ble Minister Shri Radha Mohan Singh Ji for sparing his time to participate in this programme, which has given encouragement to young scientists to carry forward the fruits of Green Revolution. He made a presentation in which he traced the growth of Indian Agriculture from food deficit situation to food self sufficiency, surplus and export. He also highlighted the challenges of second Green Revolution. He saluted all the old stalwarts including (Late) Prof. Norman E. Borlaug who were in the thick of Green Revolution, especially Dr. M.V. Rao and Dr. N.G.P. Rao physically present on this occasion. Dr. Ayyappan hoped that after listening to the views of our stalwarts, interaction of entire house in the afternoon session on the path-ahead can provide us valuable inputs to chalk out appropriate strategies for future.

One of the main focus of the Academy on this occasion was to felicitate father of Green Revolution Prof. M.S. Swaminathan and other experts who significantly contributed to its success, *viz*., (Dr. M.V. Rao, Dr. N.G.P. Rao), farmers (Shri N. Subba Rao, Shri Khajan Singh), and institutions (GBPUAT, Pantnagar; HAU, Hissar; IARI, New Delhi; NRRI, Cuttack; PAU, Ludhiana; CSAUA&T, Kanpur; and TNAU, Coimbatore). These institutions were effectively involved in evolving and executing Green Revolution technologies in different parts of the Country. Dr. B.R. Barwale, Chairman, Barwale Foundation, was also felicitated on this occasion. Shri Raju Barwale received the honour on behalf of Dr. B.R. Barwale. These eminent persons and representatives of institutions were felicitated by the Hon'ble A.M. in person while other former experts *viz*., Dr. D.R. Bhumbla, Dr. S.V.S. Shastry, Dr. G.S. Kalkat, Dr. S.S. Johl, chosen for this honour, were felicitated in absentia. Other distinguished experts who were also felicitated on this occasion included Prof. R.B. Singh, immediate past president NAAS, Dr. E.A. Siddiq and Dr. Ramesh Chand, Member, Niti Aayog, GoI.

Prof. M.S. Swaminathan in his key note address presented the backdrop of Green Revolution when India was food deficit with large population to feed and Bengal famine was fresh in the minds of people. He said that even after independence many international experts predicted that India could never feed its people and forecasted civil war like situation on food. But in this gloomy background the scientists, farmers, political leadership and policy makers dedicated themselves to a vision of hunger free India and with our highest team spirit qualities we proved the doomsday forecasters wrong. A Nation was transformed from ship to mouth situation in 1970's to self-sufficiency in wheat and rice by mid-nineties. It was indeed greatest achievement in the world. He mentioned names of Dr. Norman Borlaug, Dr. B.P. Pal and Dr. K. Ramiah among scientists; Mrs. Indira Gandhi, Shri Lal Bhadur Shastri, Shri C. Subramaniam and Shri A.P. Shinde among the political leadership for their support and enterprising farmers who produced the dwarf wheat seeds on large scale for cultivation across the country. In respect of wheat and rice he traced the history of technology import, assessment, development, adoption and dissemination in potential states that significantly contributed to the success of Green Revolution. This was indeed a mass movement that helped to realise our dream of

food self-sufficiency. But the vision of zero-hunger is still to be achieved. He expressed his concern that while we have achieved success in producing cereals in enough quantity to meet our demand but we need to keep pace with increasing demand of our growing population on one hand but on the other expand our food basket. In this connection, he warned that our people have deficiency of required calories, protein and micro-nutrients in their diet resulting in many health problems. He expressed that we have huge population of mal-nutritious children in this country, which is a major concern that needs to be addressed on priority. He suggested that during second Green Revolution, we should focus on "Bio-fortification and Zero Hunger Challenge". In this connection, he advocated "Farming Systems for Nutrition", developing "Genetic Gardens" in villages, "Protein Panchayat" whole village to grow Pulses. He advised to give importance to "orphan crops" *viz.*, Jowar and Bajra. Among other suggestions that Prof. Swaminathan stressed were, Genome services – tribal people could be best custodians of conserving our genome. He emphasized the need to initiating All India Coordinated Project on GM Crops by ICAR and putting in place National Bio-safety Authority / Committee. He also stressed that government should address the issue of price management, attracting youth to farming, and adapting to the challenge of climate change. He expressed satisfaction at the presence of Hon'ble Agriculture Minister Shri Radha Mohan Singh at this historical function. He appreciated the efforts of NAAS / ICAR / IARI for organizing this function under the leadership of Dr. S. Ayyappan. He thanked all for showering love, affection and for honouring him and felt satisfied that he was able to serve the country in whatever capacity and contribute to its growth and agri-economy. Prof. Swaminathan was given a standing ovation by all the participants present in the house.

The Hon'ble Minister Shri Radha Mohan Singh on this occasion released special Postal Stamp brought-out by Postal Department, Government of India. He also released a number of publications, the notable ones among which were, "Reminiscences" on Golden Jubilee of Green Revolution, two policy papers of NAAS, special issue of "Khethi". Other publications were on "Pesticide Resistance" and popular Kannada quarterly named "Krishi Kayaka". Later Shri Radha Mohan Singh Ji in his address expressed his happiness over his presence in this important function to celebrate 50 years of Indian Green Revolution and honour its stalwarts especially Prof. M.S. Swaminathan who is the father of Green Revolution. He mentioned that he was indeed happy that this function gave him an opportunity to interact and seek opinion from Prof. Swaminathan on various issues confronting Indian agriculture at present. He acknowledged the role of technology and scientists in overall progress that country has achieved in different sectors of agriculture *viz.*, cereals, horticulture, milk, fisheries and poultry. He mentioned that Green Revolution has turned India from "begging bowl" to leading producer. While in 1960-61 our overall food production was 82 m.t., this has reached 264 m.t. in 2013-14. During this period the wheat production took a quantum leap of 79 m.t., moving from 11 m.t. in 1960-61 to 90 m.t. in 2013-14. Similarly, the rice production moved from 34 m.t. in 1960-61 to 100 m.t. in 2013-14. However, he expressed that our challenge remains in pulses, food processing, value addition and marketing that could lead to more economic returns to farmers. He highlighted different initiatives, including additional financial support to agriculture sector that present government has taken. He stressed that new strategy for second Green Revolution should be based on the analysis and lessons drawn from our first Green Revolution. He mentioned that benefits of first Green Revolution have largely been restricted to the areas of the country having adequate irrigation facilities. He advocated that second Green Revolution in the country will come from eastern states *viz.*, Assam, Bihar, Chhattisgarh, Jharkhand, Odisha, West-Bengal and eastern Uttar Pradesh as they have tremendous potential but we need to harness that in an appropriate manner. Hon'ble Minister highlighted that investment needs, infrastructure and institutional support to usher in second Green Revolution is receiving top attention at the Prime Minister level as well. In this connection he cited the establishment of IARI in Hazaribagh in Jharkhand, Indian Institute of Agricultural Biotechnology in Ranchi and National Research Centre for Integrated Farming at Motihari, Bihar. The important issue of soil health has received top priority and the government has taken an ambitious programme to issue soil health card to farmers to help them improve their farm productivity and receive other appropriate inputs. In this massive effort, KVK's have also been involved. Hon'ble Minister laid stress on improving irrigation at district level, soil health, generating market information for farmers, developing national farmers bazaars to aim at e-marketing of agriculture produce/products. He mentioned that efforts are underway to inter-connect 550 farm bazaars in the country by e-marketing. The Hon'ble Minister said that our aim should be to produce enough food to meet the demands for whole world so that our farmers earn more money. He concluded by appreciating the efforts of Dr. S. Ayyappan, Secretary DARE, D.G. ICAR and President NAAS for organizing such a scientific interaction and bringing all yesteryear stalwarts at a single platform to exchange ideas especially to listen to the wisdom of Prof. M.S. Swaminathan.

A formal vote of thanks for this important inaugural session was proposed by Dr. M.P. Yadav, Secretary, NAAS in which he expressed profuse thanks to the

Hon'ble Agriculture Minister, Shri Radha Mohan Singh, Prof. M.S. Swaminathan, Dr. M.V. Rao, Dr. N.G.P. Rao, Shri Subba Rao, Shri Khazan Singh, Dr. S. Ayyappan, Shri S.K. Singh and other esteemed invitees, NAAS fellowship, members of NAAS EC, DDG's, ADG's, other senior officers from ICAR and Directors of ICAR institutes for sparing their valuable time to grace this important function. He also expressed grateful thanks to Vice-chancellors from SAU's, the representatives of press and media for their participation to cover this important event. Grateful thanks were conveyed to the Director IARI and his faculty / staff for effective organization of this function.

The second session "As they saw it - impressions" was chaired by Dr. M.V. Rao and co-chaired by Dr. R.B. Singh. In this session many seniors *viz*., Dr. M.V. Rao, Dr. N.G.P. Rao, Dr. R.B. Singh, Dr. E.A. Siddiq, Dr. M. Mahadevappa, Dr. T.M. Manjunath and Shri N. Subba Rao shared their work experiences, strategies and innovations that each one of them pursued to realise the dream of Green Revolution. On this occasion, two films on Green Revolution produced by ICAR were screened and well appreciated by distinguished audience. Dr. M.V. Rao outlined the massive efforts made in producing and multiplying the high-yielding seed of wheat and rice, transporting long distances and making it available at the time of sowing to meet the demand of farmers at various regions of the country, that itself was a big challenge. He also highlighted the efforts made to control rust disease by launching an AICRP - that resulted in reducing crop damage and production loss. He also shared the achievements made through launch of Mission programme on oilseeds.

Dr. N.G.P. Rao focused his views on the development of millet programme, especially Sorghum. He narrated the journey from 1960 with regard to efforts made in importing American Hybrid Sorghum, developing our own hybrids and eventually leading to successful varietal development programme. He mentioned that hybrid development and variety improvement programme were taken up side by side. Dr. Rao in his address mentioned that over the years even in millet grown areas the farmers were encouraged to cultivate cash crops. This could be one of the contributing reasons for the distress among farmers once their cash crops fail and at present they do not have millet crop to sustain them. He emphasized that we should increase the cultivation under millets and advocated more basic research on these crops to be carried out by the institutions. He was of the opinion that yields achieved at the experimental level have not been extended on large scale.

Shri Subba Rao in his remarks mentioned that in West Godavari district of Andhra Pradesh, he is cultivating Paddy with application of all scientific management practices and over the years he has standardized his own protocol. He is achieving production of 5-6 t/ha. For his innovative cultivation methods and achieving higher production, he has received national and international recognition. His concern was that now cost of production is increasing and profits are declining. At the end, he expressed grateful thanks to Hon'ble A.M. and DG, ICAR for recognizing his contribution to Green Revolution in the country.

Dr. R.B. Singh in his impressions mentioned that Green Revolution was an unprecedented phenomenon in the Country. It transformed the nation from food deficit to surplus for which we salute our seniors who led this scientific transformation of agriculture. He stated that Hon'ble A.M. in his remarks has expressed that Eastern India will lead the second Green Revolution but he informed the house how Banaras Hindu University, Varanasi was involved and seriously contributed to the development of first Green Revolution in this part of country. He also informed how Dr. K.M. Shrimali, the then Vice-chancellor of the university, supported the development of agriculture research and cultivation by making available facilities and land in and around the university campus. In this connection he mentioned the development of Puja-ground and holding Farmers melas in the campus with the involvement of Maharaja of Varanasi, Vice-Chancellor and students. Dr. Singh made a point that everybody in its own humble way made a contribution to the success of Green Revolution.

Dr. E.A. Siddiq shared his views on developing dwarf varieties of Rice in a journey spread across 50 years. He mentioned that Green Revolution has been an unparallel story and we should celebrate it. Dr. Siddiq stressed that rice and wheat could be our important export commodities and predicted that we should be able to export 40-45 m.t. provided growth rate is kept high.

Dr. M. Mahadevappa in his observations advocated that technology extension through our wonderful KVK system should be made more vibrant. He suggested that efforts should be made to compile a book on "Green Revolution - Development and Achievements" for the benefit of all SAU's, Farmers and entire NARES for general awareness. He cited the example of 'Krishi Kayaka" – a magazine being published for over 50 years from Karnataka.

Dr. Manjunath in his observations stressed that present day generation does not appreciate the benefits of Green Revolution as plenty of food is available around. He traced the history how people of this country lived through food shortages, rationing, dependence on public distribution system, limiting number of guests in functions, and miss a meal in a week. In comparison, at present, at lavish receptions and weddings we waste more food - perhaps we do not appreciate how this food surplus has been achieved. This achievement in

agriculture should be recognized by the authorities by bestowing the highest civilian award to its leaders. He emphasized on a holistic approach for second Green Revolution to succeed.

The Third Session "Path ahead" was Co-chaired by Dr. R.B. Singh and Dr. S. Ayyappan. In this session heads / representatives of some institutions shared their views. Dr. J.P. Srivastava from GBPUA&T, Pantnagar stated that how during Green Revolution period the students, faculties and development departments worked with zeal as a well oiled team. But over the years we have grown complacent and diluted our standards and monitoring mechanism. While it is time for young generation to take responsibility but there is need for mid-course correction to overcome the second generation challenges. May be we need to change our curricula and make it more skill oriented. Both the public and private sectors also need to play effective roles. At the same time we need to improve, upgrade and support our institutions with effective accountability mechanism, giving more opportunities to young generation. About solving second generation challenges in agriculture, he expressed confidence and emphasized that India has done it before and we will do it again.

Dr. B.S. Dhillon, Vice-Chancellor of PAU spoke on the part played by his university, farmers of Punjab, policy makers and political leadership in the state that enabled the Punjab to lead the Green Revolution movement in the North India with great success. The farmers of Punjab became very prosperous as a result of this movement. He also highlighted the present day problems that the State is facing in sustaining higher agriculture growth rate. For future, he suggested that we all should work in co-ordination, within enabling policy environment and aim at achieving sustainable development through spread of extension coverage.

Dr. T. Mohapatra, Director IARI, ascribed the success of Green Revolution to the leadership of IARI at that point of time. He mentioned that this revolution is going on silently even today and benefits are harnessed by society. He emphasized that we should define production levels within sustainability limits of our soils and climate - which indeed is a big challenge. He mentioned that apart from rice and wheat, IARI will play a leadership role in the development of pulses and oilseed.

Dr. A.K. Nayak from NRRI highlighted the contribution of this institute in developing better rice varieties that helped in marked increase in production contributing significantly to Green Revolution efforts. He also raised the issue of water use in rice cultivation, stating that it takes 3000 litres of water to produce 1 kg of rice. In this context, he advocated to have serious thought on rice export as it results in export of virtual water.

At the end of observations made by institutional heads, the Co-chairs sought the inputs from esteemed participants on path ahead. Many valuable suggestions were made by Dr. S.N. Puri, former Vice-Chancellor, CAU; Dr. David Bergvinson, D.G., ICRISAT; Dr. A.K. Singh, Vice-Chancellor; Dr. B. Venkateswarlu, Vice-Chancellor; Dr. Ajay Parida, MSSRF; Dr. M.P. Yadav, former Vice-Chancellor; Dr. C.D. Mayee, former Chairman ASRB; Dr. B.S. Rana, former Director NRC, Sorhgum; Dr. Vasudevappa, Vice-Chancellor, Dr. Mruthyunjaya, former ND, NAIP; Shri Srinivasa Rao, Dr. B.S. Dwivedi and many others.

Consolidating the opinions expressed by the distinguished participants Dr. R.B. Singh in his concluding remarks mentioned that our effort should be Green Economy with socio-economic balance for which we need to plan differently, fight vulnerability to climate change, achieve Indian enigma of zero hunger, bridge the technology gaps and enhance the total factor productivity.

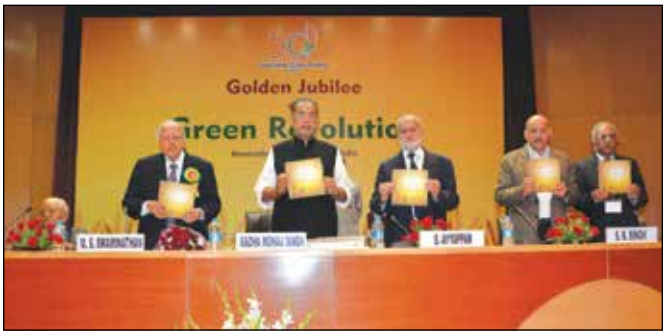
Concluding the session Dr. S. Ayyappan stressed the importance of reducing wastage and sharing of germplasm post-IPR regime. He indicated that success of Green Revolution was possible because in that era germplasm was freely exchanged among the countries. He impressed on team work, technology generation, transfer of appropriate technology and proper planning to be key factors to our future development. Our technology has to be robust suiting to natural endowments. Our planning process has to be at district level with clear-cut priorities. Processing of primary produce has to receive top attention with monitoring of progress at each level. He also detailed about launching mentoring programme to motivate young minds in agricultural research. At the end he congratulated every body for successful conduct of this important event.

The formal vote of thanks was proposed by Dr. K.V. Prabhu, Secretary NAAS. He profusely thanked all stalwarts present, invitees, fellowship, experts, institutions for their participation and providing valuable inputs. He thanked the co-chairs for smooth conduct of session. Dr. Prabhu thanked all EC members for continued support for planning the event. He expressed his thanks to the Director IARI and other officers of the institute who were deeply involved in organizing this important function. He expressed profound thanks to NAAS secretariat headed by Shri H.C. Pathak for behind the scene support for smooth execution of this important function. He expressed thanks to ICAR authorities for providing all the support. He expressed special thanks to Dr. S. Ayyappan, President NAAS for continuous guidance and support that enabled the Academy to organize this meeting successfully.

Glimpses of Golden Jubilee of Green Revolution


RADHA MOHAN
S. AYYAPPAN


Golden Jubilee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Brainstorming Session on Organic Farming in India: Policy Issues and Strategies (Convener: Dr. B.S. Dwivedi, Co-conveners; Dr. P.K. Chhonkar and Dr. R.K. Pathak)

The Brainstorming session was organized on 17 October 2015 at NAAS, New Delhi. In all, 35 participants representing ICAR Institutes, SAUs, Ministry of Agriculture and Farmers' Welfare, farmers and media attended the event and contributed substantially to the deliberations and discussions. Prof. Anupam Varma, Vice-President of the Academy chaired the session,

while Dr. J.C. Katyal, Former VC, CCS HAU, Hisar, and Dr. A.K. Sikka, DDG (NRM), ICAR, co-chaired the session and provided many useful inputs to the discussions. The discussions were largely focussed on (i) Context setting and Government initiatives, (ii) Organic farming opportunities in different agro-ecologies, and (iii) Input supply and management options. Broad theme areas for discussion were: organic farming and food security, holistic approach for organic farming practices, prioritization of areas and crops for organic farming, availability and efficiency of bio-pesticides and bio-control agents, availability of organic nutrient resources *vis-à-vis* nutrient demand of different crops with present and future yield projection scenario, quality of produce under organic *vis-à-vis* conventional agriculture, soil health under organic farming, organic agriculture under integrated farming systems, and scientific basis for ITKs/variants of organic farming.

After detailed deliberations it was recommended that there is need for (i) redefining organic agriculture in Indian context, especially broadening of organic farming concept to accommodate it within farming systems approach; (ii) promotion of organic farming in less-endowed areas on priority; (iii) development of regional-scale inventories of organic resources (both on-farm and off-farm) and their current usage; (iv) bringing-in convergence of indigenous PGS certification with international protocols; (v) scientific validation of the claims made regarding benefits of organic farming; (vi) initiating studies on environmental impact of organic farming; and (vii) exploring potential of organic livestock production by small and marginal farmers. Variants of organic farming *viz*. *Homa Jaivik Krishi*, biodynamic agriculture, *etc*. need adequate scientific explanation and validation prior to their inclusion in standard organic farming packages. Organic farming has to be understood as a more holistic production system. Hence, there is need to revisit the experimental set-up for technology generation.

Coalition for attracting and retaining youth in Agriculture (CARYA) in the Asia-Pacific region

In connection with (CARYA- 2015-2025) initiative the first meeting of MSSRF, TAAS and NAAS was held on 05 November 2015 at NASC complex. In this meeting many relevant issues were discussed. The Organizing committee of CARYO is headed by Prof. M.S. Swaminathan with representatives from different International and National organizations. The other key collaborators of this initiative are ICRISAT, ILO, UNDP, UNFPA, IFAD, IFPRI, World Agroforestry Centre. The organizing committee is forming a broad-based alliance of governments, international and national organizations, NGO's, the private sector, education and training institutions, and other members of civil society to meet the challenge of providing livelihoods for a rapidly growing population of young people in the region. The committee plans to host a coalition and launch a coalition of committed action in the region.

TAAS – NAAS Collaboration Meetings

The Academy actively participated in following activities of TAAS: (i) Regional Consultation on "Agroforestry; The Way Forward" during 8-10 October 2015, and (ii) National Dialogue on "Innovation Extension Systems for Farmers Empowerment and Welfare" during 17-19 December 2015. The National Dialogue was inaugurated on 17 December 2015 at A.P. Shinde Hall by Shri Radha Mohan Singh Ji, Hon'ble Minster for Agriculture and Farmers Welfare, GoI as the Chief Guest. Dr. S. Ayyappan, Secretary DARE, D.G., ICAR and President NAAS; Dr. R.S. Paroda, Chairman TAAS and former DG, ICAR; Dr. A.K. Singh, DDG (Extension), ICAR and Dr. N.N. Singh, Secretary, TAAS were other dignitaries present on the dais. This dialogue was attended by large number of participants, national and international extension experts, policy makers, heads of institutes, agriculture universities, private sector representatives, farmers, NGOs and senior officers from ICAR and DAC, GoI. Speaking on the occasion Dr. S. Ayyappan elaborated on the recent initiatives of the government *viz*., "Farmers First" and "Mera Gaon-Mera Gaurav" and highlighted the need to relook at specific extension models for crops, animal, fisheries

and poultry including identifying researchable issues in extension. Dr. R.S. Paroda described the historical perspective of extension system and emphasized the need to strengthen and bring innovation in the existing extension system to meet the present day requirements of farming community. Hon'ble Shri Radha Mohan Singh Ji in his inaugural address mentioned about various initiatives taken by the government to improve the welfare of farmers. He appreciated the efforts of scientists and existing extension mechanism especially KVKs to transfer the technologies to farmers but stressed that much more remains to be done by using modern tools and innovations. He gave a message to all scientists that each month they should spare one day to visit any village in their vicinity and interact with farmers / farming community. At the end he thanked the organizers for convening this national dialogue which is the need of the hour as our farming community is suffering due to three continuous droughts. He hoped that action plan developed at the end of deliberations will help the government to take suitable policy initiatives for the welfare of farmers.

Activities of Regional Chapters

Jodhpur

Jodhpur Chapter of NAAS organized a two days motivational / mentoring programme for attaining excellence in science during 28 - 29 September, 2015 at Central Arid Zone Research Institute, Jodhpur and Rajasthan Agricultural University, Mandor (Jodhpur). The programme was conducted by Professor P.K. Chhonkar, IARI Adjunct Faculty who made interactive presentations on, (a) Attitudinal and behavioral attributes of those who have excelled in science; (b) Attaining excellence in science; and (c) Improving work place and home environment for attaining professional excellence. The programme at Rajasthan Agricultural University focussed on improving interpersonal relationship for synergy, getting cooperation for the group to click, dealing with fatigue through personal energy management, combating stress and worry at work place and home, enhancing cognitive faculties and delaying memory loss. Dr. B.R. Chippa, Vice Chancellor, emphasized the importance of such programmes for attaining scientific excellence.

Dr. J.C. Tarafdar
Convenor, Jodhpur Chapter

Kochi

Kochi Regional Chapter organized a one day Seminar on "Chitin in Agriculture, Medicine and Allied Fields" on 29 September 2015 in association with the Society of Fisheries Technologists (India), Kochi, ICAR-Central Institute of Fisheries Technology (CIFT), Kochi, Indian Chitin and Chitosan Society (ICCS) Erode and ICAR – Central Marine Fisheries Research Institute (CMFRI), Kochi at CIFT, Kochi, Kerala.

Dr. A. Gopalakrishnan
Convener, Kochi Chapter

94th Meeting of Executive Council

The 94th meeting of the Executive Council of the National Academy of Agricultural Sciences (NAAS) was held on 28 December 2015. The meeting was Chaired by Dr. S. Ayyappan, President, NAAS, Secretary, DARE and Director General, ICAR. Dr. H. Shivanna, Vice-Chancellor, UAS, Bengaluru and Dr. D.P. Kumar, Director of Education, UAS, Bengaluru were Special Invitees for holding discussion on XIII Agricultural Science Congress to be held in February 2017 at UAS, Bengaluru.

The President initiated the discussion on XIII Agricultural Congress and in this regard, Dr. H. Shivanna, Vice-Chancellor, UAS, Bengaluru made a brief presentation about the infrastructural and other facilities available at the University to host XIII Agricultural Science Congress. All the members expressed satisfaction on the existing facilities with the university to hold such mega event. Accordingly, it was decided that Dr. H. Shivanna shall be the Convener of the XIII Agricultural Science Congress. The theme of the Congress was decided as "Climate Smart Agriculture." The NAAS Fellows at Bengaluru chapter *viz.* Dr. M. Mahadevappa, Dr. C.S. Prasad, Dr. Mruthyunjaya will provide their valuable inputs regularly to the Convener in organizing the Congress. The experience gained by Dr. A.K. Srivastava in organizing XII Congress at NDRI will be shared with the Convener of XIII Congress. The Programme Committee of the Academy may review the progress periodically. A National Steering Committee and Local Organizing Committee may also the constituted to oversee the progress from time to time.

The EC highly appreciated the excellent arrangements made for organizing the Golden Jubilee of Green Revolution for which the President was thanked profusely. The President thanked the EC Members, Conveners and Chairmen of the various organizing Committees and NAAS Secretariat for their untiring efforts for organizing the event.

The EC noted the results of ballots for election of Office Bearers, effective from 01.01.2016 and ratified the election of the following fellowships to various vacant positions in EC: Dr. C.D. Mayee, Vice President; Dr. P.K. Joshi, Foreign Secretary; Dr. B.S. Dwivedi, Treasurer; Dr. Trilochan Mohapatra, Member; Dr. D.P. Ray, Member; Dr. (Ms.) Chandrika Varadachari; Member; Dr. J.K. Jena, Member.

The EC also ratified the election of following to the Academy Fellowship for 2016 under different disciplines - **Crop Sciences:** Dr. Niranjan Chakraborty, Dr. Manoj Kumar Dhar, Dr. Mukesh Jain, Dr. Arun Kumar Joshi, Dr. Ashwani Pareek, Dr. Prabodh Kumar Trivedi; **Horticultural Sciences:** Dr. Swarup Kumar Chakrabarti, Dr. Anand Kumar Singh, Dr. Bir Pal Singh; **Animal Sciences:** Dr. N.K. Shivakumar Gowda, Dr. Vipin Chandra Kalia, Dr. (Ms) Minakshi Prasad, Dr. Suresh Kumar Singla; **Fisheries Sciences:** Dr. Kishore Kumar Krishnani, Dr. Pramod Kumar Sahoo; **Natural Resource Management:** Dr. Ayyanadar Arunachalam, Dr. Kalikinkar Bandyopadhyay, Dr. Ashis Kumar Biswas, Dr. Mangi Lal Jat, Dr. Dinesh Kumar Sharma; **Plant Protection:** Dr. Virendra Kumar Baranwal, Dr. Bishwanath Chakraborty, Dr. Chityal Ganesh Kumar, Dr. Rasappa Viswanathan; **Agricultural Engineering & Tech.:** Dr. Narendra Singh Raghuwanshi, Dr. Rangaraju Visvanathan; **Social Sciences:** Prof. (Ms) Jamuna Prakash, Dr. Atmakuri Ramakrishna Rao; **Pravasi Fellow:** Dr. Hanu R. Pappu. In line with charging one-time subscription for the new national fellowship admitted each year, the Parvasi and Foreign fellows will need to pay one time subscription of US 100 dollars at the time of their admission.

The EC also approved programmes to be organized during 2016.

To celebrate the **International Year of Pulses**, it was decided that NAAS will collaborate with IFPRI for organizing the event on 6th January 2016.

The EC approved Dr. P.L. Gautam as the new Chairman of NAAS Journal Score Committee and contribution of previous chairman Dr. S.L. Mehta was highly appreciated by EC.

The Executive Council whole-heartedly lauded the contributions of the outgoing Office-Bearers and Members of the Executive Council *viz.*, Dr. P.L. Gautam, Dr. S.M. Virmani, Dr. Himanshu Pathak, Dr. (Mrs.) Renu Khanna Chopra, Dr. T.A. More, Dr. Mruthyunjaya and Dr. S.N. Puri, towards the advancement of the activities of the NAAS by presenting them a memento. The outgoing members expressed their gratitude to the President and the Academy for their whole hearted support in discharging their responsibility.

The Cashew: Equally Healthy for Mankind

Prof. P.L. Saroj[1] and Dr. Kirti Singh[2]
[1]Director, ICAR-Directorate of Cashew Research, Puttur (Karnataka)
[2]Former VC, NDUAT, HPAUP, IGAUR & Member and Chairman, ASRB

Though cashew (*Anacardium occidentale,* family Anacardiaceae) is native to Brazil and presently cultivated in about 32 countries including Latin America, Tropical Asia, Africa and Australia, yet India is the first country that exploited cashew as commercial horticultural crop. Cashew was introduced in India by the Portuguese in the beginning of 16th century. At global scenario, India not only occupies largest area (20% of the total area under cashew in the world) under cashew cultivation but also largest processor, exporter, importer and consumer of cashew. Moreover, India is lagging behind in productivity of raw cashew nut (782 kg/ha) compared to country like Vietnam (3000+ kg/ha).

Nutritional facts of cashew kernel

Cashew kernel is an absolute capsule of nutritional package having unique combination of protein, fat, carbohydrate, minerals and vitamins and packed with energy. Cashew kernel is very popular among mass due to its desirable sensory and nutritional attributes.

Red type cashew apple

Yellow type cashew apple

Purple type cashew apple (Rare)

The nutritive value of cashew kernel is at par with all other dry nut fruits (Table 1).

Table 1. Nutritive value of different nuts/ounce basis (*i.e.* 1/6th of a pound)

Nuts	Almond	Brazil nut	Cashew	Hazelnut	Macademia	Pecan	Pistachio	Walnut
Calories (K cal)	163	186	157	178	204	196	159	185
Protein (g)	6.0	4.1	5.2	4.2	2.2	2.6	5.8	4.3
Total fat (g)	14.0	18.8	12.4	17.2	21.5	20.4	12.9	18.5
Saturated Fat (g)	1.1	4.3	2.2	1.3	3.4	1.8	1.6	1.7
Polyunsaturated Fat (g)	3.4	5.8	2.2	2.2	0.4	6.1	3.9	13.4
Monounsaturated Fat (g)	8.8	7.0	6.7	12.9	16.7	11.6	6.8	2.5
Carbohydrates (g)	6.1	3.5	8.6	4.7	3.9	3.9	7.8	3.9
Dietary fiber (g)	3.5	2.1	0.9	2.7	2.4	2.7	2.9	1.9
Potassium (mg)	200	187	187	193	104	116	291	125
Magnesium (mg)	76	107	83	46	37	34	34	45
Zinc (mg)	0.9	1.2	1.6	0.7	0.4	1.3	0.6	0.9
Copper (mg)	0.3	0.5	0.6	0.5	0.2	0.3	0.4	0.5
Vitamin B6 (mg)	0	0	0.1	0.2	0.1	0.1	0.5	0.2
Vitamin E (mg)	7.7	1.6	1.9	4.3	0.1	7.6	7.3	6.7
Folate (mg)	14	6	7	32	3	6	14	28
Riboflavin (mg)	0.3	0	0	0	0	0	0	0
Niacin (mg)	1	0.1	0.3	0.5	0.7	0.3	0.4	0.3
Alpha-tocopherol (mg)	7.4	1.6	0.3	4.3	0.2	0.4	0.7	0.2
Calcium (mg)	75	45	10	32	2.4	20	30	28
Iron (mg)	1.1	0.7	1.9	1.3	1.1	0.7	1.1	0.8

Source: USDA National Nutrient Database (2010). Home Page, http://www.ars.usda.gov/ba/bhnrc/ndl

Cashew kernel contains high percentage of fat, but 82 per cent of this fat is unsaturated fatty acid. The principal polyunsaturated fatty acid found in cashew is Omega-6, which is vital for the health. In addition, the levels of saturated fat and poly unsaturated fat need to be nearly equal. In cashew nuts, the ratio of mono saturated fat to saturated fat is about 4:1. There is also a balanced ratio of approximately 1:1 between the saturated fat and the polyunsaturated fat. The unsaturated fat content of cashew kernel not only eliminates the possibility of the increase of cholesterol, but also balances or reduces the cholesterol level in the blood. The protein in cashew kernel comprises of all the essential amino acids. These have important role in body building, and are thus important in prevention and treatment of several chronic diseases. Cashew kernels are comparable with casein in terms of protein efficiency ratio (PER). The PER of cashew kernel protein is 3.2, which is comparable with milk casein. As cashew kernel has a very low content of carbohydrates, almost as low as 1 per cent soluble sugar, the consumer of cashew kernel is privileged to get a sweet taste without having to worry about excess calories. Cashew kernels are source of as many as 11 minerals with abundant source of essential minerals, especially phosphorus, potassium, magnesium, manganese, calcium, etc. Cashews are also good in many essential vitamins like pantothenic acid (vitamin B5), pyridoxine (vitamin B-6), riboflavin, thiamin (vitamin B-1) and a good proportion of vitamin E. The nutritive value of cashew is given in Table 2.

Health benefits of cashew kernel

Because of high fat content, cashew is considered as 'fatty food' and is occasionally listed under foods to be avoided along with meat, fish and poultry. The research has proved beyond doubt that the fat in cashew is composed mainly of unsaturated fatty acids (> 80%), which in humans raise the levels of high density lipoproteins (HDLs), a good fat and reduce the levels of LDLs, thus lowering the risk of heart diseases. A study published in "Archives of Internal Medicine" in 2010 found that eating nuts helped lower total cholesterol, triglycerides and low-density lipoprotein, or bad cholesterol, with greater reductions in people who consumed more nuts. Epidemiological studies have associated the frequency of cashew nut intake with reduced risk of some chronic diseases, such as coronary heart diseases, diabetes and prostate cancers. Research has also shown that chemicals in cashew nuts kill gram positive bacteria, a pervasive mouth affliction that causes tooth decay, acne, tuberculosis and leprosy. It has been reported that the risk of developing diabetics is comparatively low even if cashew is consumed continuously. It is attributed due to the low content of sugar and presence of complex carbohydrates.

Table 2. Nutritive value of cashew kernel 100^{-1} g

Principle	Nutrient Value	Percentage of RDA
Energy	553 Kcal	28%
Carbohydrates	30.19 g	23%
Protein	18.22 g	32.5%
Total Fat	43.85 g	146%
Cholesterol	0 mg	0%
Dietary Fiber	3.3 g	8.5%
Vitamins		
Folates	25 µg	6%
Niacin	1.062 mg	6.5%
Pantothenic acid	0.864 mg	17%
Pyridoxine	0.417 mg	32%
Riboflavin	0.058 mg	4.5%
Thiamin	0.423 mg	35%
Vitamin A	0 IU	0%
Vitamin C	0.5 mg	1%
Vitamin E	5.31 mg	35%
Vitamin K	4.1 µg	3%
Electrolytes		
Sodium	12 mg	1%
Potassium	660 mg	14%
Minerals		
Calcium	37 mg	4%
Copper	2.195 mg	244%
Iron	6.68 mg	83.5%
Magnesium	292 mg	73%
Manganese	1.655 mg	72%
Phosphorus	593 mg	85%
Selenium	19.9 µg	36%
Zinc	5.78 mg	52.5%
Phyto-nutrient		
Lutein-zeaxanthin	22 µg	-

Source: USDA National Nutrient Database

Cashew kernel does not contain any anti-nutritional factors. The carbohydrates present in cashew are composed of sugars, starch and dietary fibre. Daily intake of cashew nut can reduce the risk of developing gallstones. Cashew kernels are good source of various minerals. Eating cashews lower your blood pressure with the help of magnesium present in them. The high magnesium content keeps healthy heart and also protects against high blood pressure, muscle spasms, migraine headaches, tension, soreness, fatigue promotes normal sleep patterns in women suffering from menopausal sleep disturbances and reduces the severity of asthma. Calcium and magnesium are important for bone health but magnesium is stored on the bones surface which prevents calcium from entering the nerve cells and thus keeps the blood vessels and muscles relaxed.

Though, minerals like selenium, copper and zinc present in low quantity but help to prevent deficiency diseases. Selenium is an important micronutrient, which functions as a co-factor for antioxidant enzymes such as Glutathione peroxidases, one of the most powerful antioxidants in the body. Copper is a cofactor for many vital enzymes, including cytochrome c-oxidase and superoxide dismutase (other minerals function as co-factors for this enzyme are manganese and zinc). Because of copper content, cashew nut consumption helps the body to utilize iron, eliminate free radicals, develop bone and connective tissue and produce the skin and hair pigment melanin. Copper also play an important role in enzyme activity, hormone production and brain function. Apart from this, they also help in the production of red blood cells and thus, prevent anaemia. Zinc is a co-factor for many enzymes that regulate growth and development, gonadal function, digestion, and DNA (nucleic acid) synthesis.

Cashews are also good source of essential vitamins which are required for metabolism of protein, fat and carbohydrates at the cellular level. Among vitamins, Pyridoxine reduces the risk of homocystinuria and sideroblastic anemia while Niacin helps to prevent “pellagra” or dermatitis. Proanthocyanidins are a class of flavonols which fight against tumor cells by stopping them to divide further. These proanthocyanidins and high copper content in cashew nuts help fight against cancerous cells and keeps you away from colon cancer. The antioxidants like selenium and vitamin E which prevents free radical oxidation reduces the risk of cancer and boost immunity. Therefore, cashew kernel is considered as good appetizer, an excellent nerve tonic, a stimulant and a body building safe food.

Myth about eating cashew kernel

Increases cholesterol: Nut consumption in general helps lowering cholesterol. Cashew nuts are rich in good fats and have zero cholesterol. A study on eating cashew nuts helped lowering total cholesterol, triglycerides and low-density lipoprotein, or bad cholesterol in people who consumed more nuts. This is due to the desired fat ratio in the nut *i.e.* 1:2:1 for saturated, monounsaturated and polyunsaturated fats respectively, which is the ideal ratio for optimal health.

Increases heart problem: Eating cashew nut helps to lower LDL, the bad cholesterol and triglyceride making one’s heart healthy. Cashew nuts also have a fatty acid profile that contributes to good health through phytosterols, tocopherols, and squalene, all of which lower the risk of heart disease. Triglycerides are a form in which fats are carried in the blood and high triglyceride levels are associated with an increased risk for heart disease, so ensuring some monounsaturated fats in the diet by enjoying cashews is a good idea, especially for persons with diabetes. Many think that

cutting out fat intake is good for health which is untrue. Our body needs nutrients from all food groups including fats but it should be from good sources like cashew instead of unhealthy ones.

Control high blood pressure: Cashew nuts are low in sodium and high in potassium and thus keep blood pressure under check. When there is excess sodium, the body retains more water which causes the volume of blood to increase in turn increasing the blood pressure.

Weight gain: Even though cashew nuts are high fat containing food, but they contain good cholesterol, so contrary to popular belief of weight gain, they help in weight loss. Nuts are known to provide a variety of cardio-protective benefits; many avoid them for fear of weight gain. A prospective study published in the journal 'Obesity' shows that such a fear is groundless. In fact, people who eat nuts at least twice a week are much less likely to gain weight than those who almost never eat nuts.

Promote stone formation: Studies suggested that daily intake of cashew nut can reduce the risk of developing gallstones up to 25%. The oxalates in cashews on over eating can also become concentrated in body fluids, crystallizing and causing health problems in people with pre-existing kidney or gallbladder problems.

Prone to Diabetes: Clinical trials indicated that eating cashew and other nuts have beneficial effect on those with diabetes or at risk for diabetes. Use of monounsaturated fats found in cashews can reduce triglyceride levels in diabetics, protecting them from further complications. Integrating frequent nut consumption into your diet, especially raw cashews, may lower the risk of developing Type 2 Diabetes, the most commonly diagnosed form of diabetes.

Caution

There are no ill-effects of eating cashew kernels as such but one must not forget that they are rich in calories and so not too many should be eaten at a time. Eating between 5-10 kernels is enough for a day (8 g/capita/day). Over consumption of cashew nuts can cause unwanted weight gain. Those suffering with cough problem may avoid it during severe conditions. If you are suffering from hypertension, avoid salted kernels and if trying for weight loss, avoid honey-coated ones. In some cases, eating cashew kernel can cause allergic reactions by showing symptoms like vomiting and diarrhea, swelling, skin rashes, difficulty in breathing, etc. If you experience any of these after eating kernel, it is better to discontinue and consult to a doctor.

Disclaimer: *The information compiled in this article has been derived from several sources and the contributors of this information are gratefully acknowledged. The authors, however, do not claim the authenticity of this information.*

Fellow's Views

Options for reducing rural income inequalities

Inequality is a global phenomenon, and a highly complex issue. But large inequalities are not desirable for cohesion, and stability of the societies. In recent years wealth inequality has further enhanced due to the land required for non-agricultural uses and consequent increase in its value. Small land owners often sell their small plots for sustenance or immediate social obligations. The Government has aimed at inclusive development for the benefit of the poor by providing subsidies. The National Rural Employment Guarantee Scheme is aimed to address the rural inequality. This scheme provides enough for sustenance.

The only option for increasing rural incomes is to enhance agricultural productivity. Productivity can be enhanced by increased inputs, improved management, diversification to high value crops, animal farming, aquaculture, reducing post-harvest losses, value addition by conversion to processed food items, etc. However, these are not easy to implement by small farmers with limited financial resources and management skills. Cooperative or corporate farming, retaining the land ownership by the farm families are the alternatives. In Maharashtra improvements in marketing of alphonso mangoes in the Konkan region, cultivation, marketing of grapes and wine making in Nasik district, and cultivation of strawberries around Panchgani and Mahabaleshwar have enhanced incomes and employment among the locals. Tissue culture multiplication of strawberry clones, imported at high cost, made it possible to cover large area at relatively lower cost. Lot more can be done in these and other areas to enhance rural incomes. Direct marketing, avoiding middle men, fetches more money in farmers hand but faces strong opposition from established, financially well off, traders.

Netherlands with high population density and low per capita availability of land, as in India, is the second largest exporter of agricultural produce, next to USA. Diversification to floriculture, large exports of flowers, growing off season tomatoes in glass houses for export during winters, provides increased income to their farmers. All this is achieved with only four percent of

the work force engaged in agriculture as against over 50 percent in India. In the long run India too has to decrease the workforce in agriculture. Migration to urban areas and increased employment in formal sectors is the long term solution, as in the developed countries. The author believes that NAAS fellowship can play a pro-active role towards creating an enabling environment for farming community so as to help reduce inequality in rural India.

Dr. C.R. Bhatia

The views expressed are of Fellow only

Forthcoming Programmes

1. Abiotic Stress (including drought, flood and hail storm) Management
2. Food and Nutritionally Secure India by 2030
3. Biotic Stresses (Plant,Live-stock & Poultry, Fisheries, Weeds)
4. Agricultural Extension Research
5. Strategies for Enhancing Total Factor Productivity
6. Strategies for Enhancing Pulse Production to Meet the Demand

Obituaries

1928-2015

Prof. Balbir Krishna Soni, a Veterinarian and doyen of animal science, and an esteemed Fellow of the Academy, passed away on March 11, 2015 at Bangalore. He was born on 8th April 1928 in Punjab. He graduated in Veterinary Science from Veterinary College, Lahore/Hisar, and got his M.S. and Ph.D. degrees from Washington State College, USA.

Upon his return to India in 1954-55, he joined as Professor and Head of Veterinary Physiology in the newly established Veterinary College at Bikaner, Rajasthan, and actively participated in the initial stages of its development. In 1963, he joined as Dean of the Veterinary College, Pantnagar, then in U.P. State, the India's first Agricultural University and served this University up to 1971, when he joined as Deputy Director General (Animal Sciences) in ICAR, New Delhi, and was on this position until 1979. Dr. Soni served FAO of the UN as Regional Animal Production and Health Officer, Bangkok, and Secretary of Animal Production and Health Commission for Asia and the Pacific (APHCA) from 1979 to 1991. He was the Chairman of the Organising Committee of the "International Workshop on Studies on Feeds and Feeding of Livestock and Poultry Feed Composition, Data Documentation and Feeding Systems in the APHCA Region" held at Manila, Philippines, 22-24, January 1980.

Dr. B.K. Soni, a great Animal Physiologist and a very eminent Science Manager, was one of the renowned scientists closely associated with Society of Animal Physiologists of India. He was also associated with several other professional societies. Dr. Soni was a true doyen among Veterinary and Animal Science professionals. His academic excellence and administrative acumen saw him occupying leading academic and administrative positions. During his remarkable career he was awarded D.Sc. (*honoris causa*) degree by G.B. Pant University of Agriculture and Technology, Pantnagar and by National Dairy Research Institute, Karnal (Haryana). Dr. Soni was elected as a Fellow of the National Academy of Agricultural Sciences (NAAS) in 1992, and was one of the Founder Fellows of the National Academy of Veterinary Sciences elected in 1996. He was also a Fellow of the National Academy of Sciences and was decorated with several other honours during his career. The Fellowship of the National Academy of Agricultural Sciences deeply mourns the passing away of Dr. B.K. Soni and expresses heartfelt condolences to his family.

1929-2015

Dr. Ishwar Chandra Mahapatra, an eminent Agronomist of international repute left for his heavenly abode on 04th November, 2015. He was born on 18th August 1929 in Sarbeshwarpur village in Mayurbhanj district of Odisha state. He obtained his Ph.D. degree from the Louisiana State University, USA, where on the basis of his meritorious record he was elected to the Honour Society of Phi Kappa Phi. Dr. I.C. Mahapatra was a renowned educationist, who served as founder Vice Chancellor of Birsa Agricultural University, Ranchi and later Vice Chancellor of Orissa University of Agriculture and Technology, Bhubaneswar. He also served as Head, Division of

Agronomy, CRRI, Cuttack and the first Coordinator of the All India Coordinated Agronomic Research Project, which led to birth of PDFSR, Modipuram. Dr. Mahapatra was a widely travelled scientist who visited more than 50 countries. He had the rare distinction to have worked in the all districts of India.

He served as consultant to many international organizations, *viz*. UNDP, FAO, World Bank, IFDC, CGIAR, IRRI, IITA, ICRISAT, WARDA, ADB, IADS, AFC, and others. He also served as Expert Witness and Chief Consultant in Agriculture, Cauvery Water Dispute (1993-1999). He was elected as Fellow of NAAS in 2001 and served as Member of Executive Council from 2005-2007. He was fellow of many scientific societies.

The Fellowship of the National Academy of Agricultural Sciences deeply mourns the sad demise of Dr. I.C. Mahapatra and express heartfelt condolences to the bereaved family.

Dr. U.K. Behra

Announcement

National Academy of Agricultural Sciences
Invites Nominations for Different Awards for the Biennium 2015-2016

I. MEMORIAL AWARDS (6 Nos.)

The nominee should be a distinguished Scientist above 55 years in age. The period of assessing the contributions would be life time upto the year of nomination. Each Award consists of a citation and a silver plaque.

II. ENDOWMENT AWARDS (2 Nos.)

The awards will be given to outstanding scientists for their contributions towards ensuring (i) food and nutritional security and (ii) over all contribution to agriculture. The nominees can be from any branch of science relevant to agriculture. The awards comprise a citation and a silver plaque.

II. RECOGNITION AWARDS (6 Nos.)

The awards would be given to distinguished scientists, in the age group of 35-55 years, who are Fellows of the National Academy of Agricultural Sciences. Each award consists of a citation and a silver plaque.

IV. YOUNG SCIENTISTS AWARDS (6 Nos.)

Scientists below the age of 35 years are eligible for this award. Each award consists of a citation and gold plated silver medal.

For details, please visit Academy web site at www.naasindia.org or write to the Executive Secretary, National Academy of Agricultural Sciences, NASC, DPS Marg, New Delhi - 110 012.
Tel. (011) 25846051, Fax: (011) 25846054, Email: naas@vsnl.com

Last date for receipt of nominations in the Academy is March 31, 2016

Note: Self Nominations are not acceptable.

Editors: Dr. K.K. Vass & Prof. V.K. Gupta

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