

ANNUAL REPORT

2015-16



National Academy of Agricultural Sciences

NASC, DPS Marg, New Delhi - 110 012, India

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PREFACE

The National Academy of Agricultural Sciences (NAAS), an important think-tank and platform forging an interface between agriculture science and policy in the country, promotes excellence and linking research, education and extension in agriculture for the growth of dynamic farm sector in order to contribute to rural and national economy. To pursue this mission the Academy has been organizing various scientific activities, communicating and sharing the outcomes with all stakeholders, policy makers, scientific leadership both at national and international level, farming communities, agri-entrepreneurs, to promote ecologically sustainable, economically robust and socially equitable agriculture. The Report presents an account of the Academy's activities during the year 2015-16.



Dr. S. Ayyappan

The year being the silver jubilee year of the foundation of Academy, special programmes like elocution contest, essay competition, panel discussion among NAAS associates were organized for motivating and stimulating the youth in agriculture. Other important events like panel discussion on *25 years of achievements in agricultural sciences and way forward for 2030*, *inter-academy meet*, *special lectures by eminent experts*, were part of celebrations. In order to commemorate the unique achievement of the nation, the Academy organized the Golden Jubilee celebration of Green Revolution on November 27, 2015 during which the efforts and achievements of stalwarts in agriculture sciences, industry, institutions and farmers were highly appreciated and recognized. It was indeed a memorable event cherished by all.

The Academy also organized seven Brainstorming Sessions on different critical themes. The Regional Chapters *viz.* Ludhiana, Karnal, Jodhpur, Hyderabad and Kochi have been very vibrant in organizing different NAAS activities. The Foundation Day Lecture was delivered on June 5, 2015 by Prof Y.K. Alagh, Chancellor, Central University, Gujarat, and former Union Minister of Power and for Planning and Programme Implementation, GoI on "Structure of Indian Agriculture - Growth and Policy Epochs". On the publication front, the Academy has been active and several special publications were released during the year.

I place on record my gratitude to Prof R.B. Singh, Immediate Past President, NAAS, the NAAS Executive Council; Prof Anupam Varma, Dr C.D. Mayee (Vice-Presidents); Prof M.P. Yadav and Dr K.V. Prabhu (Secretaries); Dr P.K.Joshi (Foreign Secretary); Dr K.K. Vass and Dr V.K. Gupta (Editors); Dr B.S. Dwivedi (Treasurer): for their support and contributions. I would like to thank Prof Anupam Varma, Editor-in-Chief of the NAAS journal, 'Agricultural Research' for his efforts in bringing out the journal on time. I am grateful to the Conveners, organizers and coordinators of various brainstorming sessions and varied successful events organized during silver jubilee celebrations and the Golden Jubilee celebration of Green Revolution.

My sincere thanks are due to colleagues in NAAS secretariat, Shri H.C. Pathak (Executive Secretary), Shri Miraj Uddin, Ms Minu Tiwari, Shri P. Krishna, Shri Umesh Rai, Shri Jai Singh, Shri Kamal Singh and Shri Banwari Lal Yadav for effectively managing the activities of the secretariat. The financial and logistics support of the DARE and ICAR is gratefully acknowledged.



(S. Ayyappan)

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ABOUT THE ACADEMY

Inspired by the vision of late B.P. Pal, FRS, the National Academy of Agricultural Sciences (NAAS) was established in 1990. The main focus of the Academy is on the broad field of agricultural sciences including crop husbandry, horticulture, animal husbandry, fisheries, agro-forestry, agricultural engineering, and interfaces between agriculture and agro-industry. The Academy's role is to provide a forum for agricultural scientists to deliberate on important issues of agriculture, agricultural research, education and extension, and offer views of the scientific community as policy inputs to planners and decision / opinion makers at various levels. The Academy organizes and supports national and international congresses, conferences, seminars, symposia, workshops and brainstorming sessions on the critical issues in the field of agricultural sciences. It articulates issues of agricultural research and education in various fora.

The Academy has emerged as a vibrant national level body devoted to agricultural sciences. The Fellows of the Academy, recognized for their contributions to science, include distinguished personalities in the field of agriculture and allied sciences, both from India and abroad.

OBJECTIVES

- ❖ To promote ecologically sustainable, economically vibrant and socially equitable agriculture.
- ❖ To recognize and support excellence in scientific research in the field of agriculture performed by scientists.
- ❖ To provide promising scientists with the conditions necessary for the advancement of their work.
- ❖ To promote contact among research workers in different institutions and organizations within the country and with the world scientific community.
- ❖ To organize and undertake inter-disciplinary analyses of issues of importance to farmers, farming and agrarian transformation to strengthen science-policy interface and bring out documents for the advancement of agricultural research, extension and education for development.
- ❖ To secure and manage funds and endowments for the promotion of agricultural sciences.
- ❖ To carry out other activities relevant to the accomplishment of the above goals.

Structure of the Academy

- ❖ The General Body: The General Body of the Academy comprises its Fellows.
- ❖ The Executive Council (EC): EC is the main policy and decision making body. It is assisted by different Committees to deal with various aspects of governance and activities of the Academy.
- ❖ Regional Chapters: Fourteen Regional Chapters of the Academy are functioning at Bengaluru, Bhubaneswar, Chennai, Hyderabad, Jodhpur, Karnal, Kochi, Kolkata, Lucknow, Ludhiana, Mumbai, Nagpur, NEH Region and Patna.

SCIENTIFIC ACTIVITIES

Silver Jubilee Events

The silver jubilee year (2014-15) was celebrated by organizing various events during different periods and culminating with the celebrations from June 2, 2015 to the Academy Foundation Day on June 5, 2015. The highlights of various events are described in the sequel.

i) Elocution Competition

On June 2, 2015 the Silver Jubilee Celebrations began with Elocution Competition. It was inaugurated by Dr S. Ayyappan, President NAAS and DG, ICAR. This session was convened by Dr R.K. Jain, Dean and Joint Director (Education), IARI along with



Dr Sanjay Kumar Singh and Dr K.M. Manjaiah of IARI as Co-conveners. Post-graduate students from 23 institutions participated in the competition. Of the 23 presentations, 16 were made by female students. The young minds were generally of the view that by 2040, Indian Agriculture would be more challenging and knowledge-intensive.

To retain youth in agriculture the opinion emerged that we need a major thrust to promote agri-enterprises with desired technological up-gradation and innovations. The judging committee adjudged Ms. K.N. Anusha and Mr. Ashutosh Kumar of the University of Agricultural Sciences, Dharwad, Karnataka as the winners followed by Ms. Anmol Grewal and Mr. Amritpal Singh Randhawa of Punjab Agricultural University, Ludhiana as first runners up and Ms. Binjan K. Patel and Mr. Ankit Jayrambhai Raval of Anand Agricultural University, Anand, Gujarat as second runners up. The certificates of participation and medals were presented to the winners.

ii) Essay Competition

During April-May 2015 an essay competition on “*Farming as My Profession*” was conducted among the Post-graduate students of SAUs, CAUs, and ICAR Deemed Universities. It was a two stage competition, the first at the university level and later at intra-institutional level. A total of 60 essays from 30 universities were evaluated by the judging committee. Based on their evaluation, Mr C.M. Parsottam of Anand Agricultural University, Gujarat was adjudged first followed by Mr. S. Karthick of Tamil Nadu Fisheries University, Tamil Nadu as second and Ms. Sujayashree of the S.V. University of Horticultural Sciences, Bagalkot, Karnataka as third. The convener of this entire programme was Dr A.K. Srivastava, Director and Vice-Chancellor, NDRI, Karnal.



iii) Panel Discussion (25 Years of Achievements in Agricultural Sciences and Way Forward for 2030)

This important session held on June 3, 2015 was chaired by Prof M.S. Swaminathan and Co-chaired by Prof R.B. Singh and Dr S. Ayyappan. Based on the outputs of eight Silver jubilee symposia organised by various conveners during 2014, each one of them highlighted the achievements of last 25 years in their respective disciplines and also proposed a way forward for 2030. Respective conveners, namely, Dr Ajay Parida (Crop Sciences); Dr H.P. Singh (Horticulture Sciences); Dr Biswapati Mandal (Natural Resource Management); Dr C.S. Prasad (Animal Sciences); Dr W.S. Lakra (Fisheries



Sciences); Dr S.N. Puri (Plant Protection); Dr Anwar Alam (Agricultural Engineering and Technology); and Dr Mahtab S. Bamji (Social Sciences) made the presentations. The eminent panellists also provided their inputs to the discussion on each theme area. The chair and co-chair in their concluding remarks appreciated outputs from this important discussion session and complimented all the conveners and panellists, including fellowship, for important interventions during discussions.

iv) Inter Academy Meet

The Inter-Academy meeting (discussion on *Science-led Development in India*) was held on June 3, 2015 under the chairmanship of Dr S. Ayyappan and Prof Anupam Varma as the convener. The Presidents / Vice-Presidents of seven academies participated. The National Academy of Sciences, Allahabad was represented by Dr A.K. Tyagi; Indian Academy of Sciences, Bangalore by Dr Rakesh Tuli; Indian National Science Academy, New Delhi by Dr R. Ramaswami; National Academy of Veterinary Sciences by Dr K.M.L. Pathak; National Academy of Biological Sciences, Chennai by Dr D.J. Bagyaraj; National Academy of Dairy Science by Dr A.K. Srivastava; and National Academy of Agricultural Sciences, New Delhi by Dr S. Ayyappan. Responding to the theme of the



meeting “Science-led Development in India”, the respective representatives of these academies highlighted their perspectives. There was very fruitful interaction among the NAAS Fellowship and representatives of the various academies. Intervening in the discussion, Dr (Mrs) Manju Sharma (Former Secretary, Department of Biotechnology, GoI) suggested that these academies to take joint programmes on science education; to involve more women in science; and to launch an inter-academy child nutrition programme with support from all ministries, and urged NAAS to take lead in these initiatives. All the academies evinced keen desire to collaborate on major science-led development issues for the country. At the end, Prof Anupam Varma appreciated and thanked the academies for their participation in this important meeting organized by NAAS on its Silver Jubilee.

v) Special Lectures

Three special lectures were delivered by three eminent personalities in the afternoon of June 3, 2015. The **first lecture** was delivered by the Father of Green Revolution in India, a living legend, one of the three Indians among the 20 influential persons in Asia, Founder President of NAAS, Former Member, Rajya Sabha, UNESCO Chair in Eco-technology and Chairman, MSSRF, Chennai, **Prof M.S. Swaminathan**. This session was chaired by Prof Swaminathan and Co-chaired by Prof R.B. Singh and Dr S. Ayyappan. At the start of his lecture on ‘*Sixty Years of Adventure in Agriculture Science*’, Prof Swaminathan stated that NAAS has rendered invaluable service in enhancing the prestige and purpose of agricultural sciences as well as public policy formulation and greeted entire Fellowship on the occasion.



He shared with the Fellowship his initiation to research as Associateship of IARI during 1947-49, followed by various programmes, interventions at various levels that led to successful green revolution in the country. The post green revolution issues were also highlighted by him. The Fellowship drew inspiration from Prof Swaminathan’s ever-intensifying commitment to serve the society through science by establishing the pioneering MSSRF, Chennai, with centres in Kerala, Orissa, Pondicherry, etc. focusing on issues like coastal research, biodiversity and biotechnology, eco-technology,

nutrition and health, information technology, gender-sensitive development, and climate change resilience. Prof Swaminathan emphasized that we ought to strive for “*Evergreen Revolution*” based on “*Ecotechnology*” convergently rooted in the principles of ecology, economics and environment. This profound message must guide our research and development efforts to meet the Zero Hunger Challenge. He concluded that we need to work on developing community food and water security system, ensuring food safety and culmination in Bio-happiness. Entire Fellowship and the audience listened to him with rapt attention to grasp some thoughts of his wisdom and gave a standing ovation to the learned speaker.

The **second special lecture** was delivered by **Dr David Bergvinson**, DG, ICRISAT, Hyderabad on “*Demand-Driven Innovation in Agriculture: Creating Economic Opportunity for Smallholder Farmers and Nutritional Security for Consumers*”. In his lecture, Dr Bergvinson focused on using IT tools and mobile technologies in promoting crop value chains and digital design for agriculture development which will help in real time monitoring, reference to technologies involving effective soil and water use, soil mapping, and soil micro-nutrient status. He lauded the recent initiative of the Government of India in the launch of dedicated TV channel for agriculture. The **third lecture** was delivered by **Dr K.H.M. Siddique**, Hackett Professor and Director, Institute of Agriculture, Australia, on “*Innovations in Adaptation to Climate Change in Dry-Land Agriculture*”. He gave brief account of his institute and the work done by him and his group in the field of climate change adaptation strategies in Western Australia. Drawing priority attention to vulnerability and uncertainty, Dr Siddique emphasized that these oscillations be quantified, monitored and managed. He suggested that the unseen should be seen and root systems should also be adequately researched in relation to soil and water conservation and management. The lecture was very well received by the entire house.

Summing up the three special lectures, Prof R.B. Singh observed that the over 60 years of adventure in agricultural research and development of Prof M.S. Swaminathan is verily a saga of outstanding science, vision, leadership and commitment for transforming agriculture to free the humanity of hunger. The presentation will remain an eternal source of inspiration to all scientists and development partners. Dr David Bergvinson’s lecture conveyed a strong message that science, technology and innovation are *sine-qua-non* for agricultural transformation to reshape India and the world. Dr K.H.M. Siddique placed genetic amelioration of biotic and abiotic stresses and risks at the centre stage for creating climate smart agriculture.

vi) Panel Discussion (NAAS Associates)

A Panel Discussion on “Views of Young Scientists on Research Challenges in the Changing Climate Scenario” was organized on June 4, 2015 under the chairmanship of Prof Anupam Varma, Vice-President and convenership of Dr C. Viswanathan and Dr Radha Prasanna. Fifteen



NAAS Associates covering three areas viz., Natural Resource Management, Animal Sciences and Crop Improvement and Protection made presentations followed by interaction with the Fellowship. Under NRM, five presentations were made by Dr Anup Das, Dr Parveen Kumar, Dr G. Mahajan, Dr G. Selvakumar and Dr V.K. Singh, respectively.

Under **Animal Sciences**, seven presentations were made by Dr S. Bandyopadhyay, Dr A.K. Bera, Dr R. Rajan, Dr I. Samanta, Dr Y.S. Malik, Dr B.M. Naveena and Dr A. Patra, respectively. Under the **Crop Improvement and Protection**, four presentations were made by Dr Anirban Roy, Dr P.L. Kulwal, Dr S. Sahu, and Dr S.K. Yadav, respectively. The house complimented the young scientists and provided them alternate ideas to further improve their research.

vii) Silver Jubilee Felicitation

On this occasion three progressive farmers, namely, Shri Sudhir Chadha, Shri N.C. Sipani, and Shri Sudhir Agarwal were honoured by the Academy President for their contributions to the agriculture farming. The fourth to receive this honour was Shri Anil K. Mittal, Chairman and Managing Director, KRBL Ltd., an Agri entrepreneur. The Academy also honoured all its past Presidents, office bearers, various conveners of different events, officers of NAAS Secretariat, for rendering valuable service to the growth of the Academy.



viii) Reflections of Peers

Among the peers who spoke on this occasion were Prof M.S. Swaminathan, Prof V.L. Chopra, Prof R.B. Singh, Dr Panjab Singh, Dr S.M. Virmani, Dr S.L. Mehta, Dr S.S. Acharya, Dr K. Pradhan and Dr I.P. Abrol. They expressed their happiness on the growth and stature that Academy has achieved by dedicated support of its fellowship and sustained support of ICAR. They complimented the EC for smooth conduct and organization of Silver Jubilee Celebrations and wished the Academy well in the future.

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 from “ship-to-mouth” to self-sufficiency, surpluses and export. This revolution, a kind of mass movement, centring around 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.

Inauguration



Shri Radha Mohan Singh, Hon'ble Minister for Agriculture and Farmers Welfare, Government of India was the Chief Guest at the Inaugural Function. The other dignitaries on the dais were Prof M.S. Swaminathan, Dr M.V. Rao, Dr N.G.P. Rao, Dr S. Ayyappan, Shri S.K. Singh (F.A., ICAR). On behalf of NAAS and other

co-organizers, Dr T. Mohapatra, Director, IARI extended a very warm welcome to the Chief Guest, all dignitaries, special invitees and NAAS fellowship for participation in this important event.

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. 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



He saluted all the old stalwarts including (Late) Prof Norman E. Borlaug who were in the thick of Green Revolution, and especially Dr M.V. Rao and Dr N.G.P. Rao, who were physically present on this occasion. Dr Ayyappan hoped that after listening to the views of our stalwarts, interaction of entire house 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 Union Agriculture Minister in person while other former experts *viz.*, Dr D.R. Bhumbla, Dr S.V.S. Shastri, 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. He said that 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 Bahadur 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. 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 suggested that during the second Green Revolution, we should focus on "Bio-fortification, Zero Hunger Challenge", and advocated "Farming Systems for Nutrition", "Genetic Gardens" in villages, "Protein Panchayat" where whole village should grow Pulses. Prof Swaminathan laid stress on 'Genome services' for which our tribal people could be the best custodians for conserving our precious plant, animal and fish genomes. He emphasized the need for initiating All India Coordinated Project on GM Crops by ICAR and putting in place National Bio-safety Authority / Committee. 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 contributed 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



number of publications, the notable ones among which were, "Reminiscences" on Golden Jubilee of Green Revolution, two policy papers of NAAS, and special issue of "Khethi". Later Shri Radha Mohan Singh Ji in his address expressed 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. 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. 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. He mentioned that efforts are underway to inter-connect 550 farm bazaars in the country by e-marketing. He concluded by appreciating the efforts of Dr S. Ayyappan, Secretary DARE, DG 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 and experience of Prof M.S. Swaminathan.

Dr M.P. Yadav, Secretary, NAAS proposed a formal vote of thanks in which he thanked profusely the Hon’ble Agriculture Minister, Shri Radha Mohan Singh, Prof M.S. Swaminathan and all other dignitaries, VIPs and entire Fellowship including Vice-Chancellors of SAUs and Directors of ICAR Institutes.

The session “As They Saw It - Impressions”

was chaired by Dr M.V. Rao and co-chaired by Prof R.B. Singh. In this session many seniors *viz.*, Dr M.V. Rao, Dr N.G.P. Rao, Prof 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. 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.



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 and 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. His concern was that now cost of production is increasing and profits are declining.

Prof 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 by citing various examples.

Dr E.A. Siddiq shared his views on developing dwarf varieties of Rice in a journey spread across 50 years. 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 advocated that technology extension through our wonderful KVK system should be made more vibrant.

Dr Manjunath stressed that present day generation does not appreciate the benefits of Green Revolution as plenty of food is available around. He mentioned that at present, we waste more food - perhaps we do not appreciate how this food surplus has been achieved and emphasized on a holistic approach for second Green Revolution to succeed.

The session “Path Ahead” was Co-chaired by Prof R.B. Singh and Dr S. Ayyappan. In this session, heads / representatives of some institutions shared their views. Dr J.P. Srivastava, GBPUA&T, Pantnagar; Dr B.S. Dhillon, Vice-Chancellor, PAU; Dr T. Mohapatra, Director, IARI; Dr A.K. Nayak, NRRI, highlighted the contributions of their institutions in Green Revolution efforts. 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, Prof 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 highlighted the importance of reducing wastage and sharing of germplasm post-IPR regime. 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.

The formal vote of thanks was proposed by Dr. K.V. Prabhu, Secretary, NAAS. He profusely thanked all stalwarts present, invitees, fellowship, experts, EC members, institutions for their participation and providing valuable inputs. He expressed his thanks to the Director IARI for extending support to NAAS in organizing this important event. 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.

Brainstorming Sessions

During the year 2015-16, following brainstorming sessions were organized

Sl. No.	Title	Convener	Dates
1.	<i>Role of Social Scientists in NARES</i>	Dr Mruthyunjaya	May 23, 2015
2.	<i>Issues and Challenges in Shifting Cultivation and its Relevance in the Present Context</i>	Dr K.M. Bujarbaruah Dr U.C. Sharma	August 17, 2015

3.	<i>Integration of Medicinal and Aromatic Crop Cultivation and Value Chain Management for Small Farmers</i>	Dr A.K. Tripathi Co-convenor: Dr E.V.S. Prakasa Rao	August 18, 2015
4.	<i>Augmenting Forage Resources in Rural India: Policy Issues and Strategies</i>	Dr P.K. Ghosh	September 8, 2015
5.	<i>Practical and Affordable Approaches for Precision Farming Equipment and Machinery</i>	Dr K.K. Singh Co-conveners: Dr S.R. Verma; Dr G.S. Manes	September 30, 2015
6.	<i>Organic Farming in India: Policy Issues and Strategies</i>	Dr B.S. Dwivedi Co-conveners: Dr P.K. Chhonkar; Dr R.K. Pathak	October 17, 2015
7.	<i>Mentoring Scheme</i>	Dr S.N. Puri Dr H.S. Gupta Dr C. Devakumar	March 7, 2016

Role of Social Scientists in National Agricultural Research System (NARS) (Convener: Dr. Mruthyunjaya)



A Brainstorming Meeting was held under the Convenership of Dr Mruthyunjaya at NASC, New Delhi on May 23, 2015. The meeting was chaired by Prof R.B. Singh, Immediate Past-President of the Academy. It was attended by 20 senior social and agro-biological scientists. The purpose of the meeting was to discuss

the present role of social scientists, constraints and way forward to strengthen their role to meet the increasing demand for social science inputs in agriculture research and education in NARS. Five key presentations were made by eminent experts in the disciplines of agricultural economics by Dr Mruthyunjaya, agricultural extension by Dr Raseed Sulaiman, agricultural statistics by Dr Prajneshu, food and nutrition by

Dr Mahtab Bamji, and home science by Dr Sharada Devi. After detailed discussion, eight major recommendations emerged. Some key points were: the ICAR should consider to restore the position of ADG (ESM); home science education be opened for boys; all the sub-disciplines of social sciences be strengthened under NARS.

Issues and Challenges in Shifting Cultivation and its Relevance in the Present Context (Conveners: Dr K.M. Bujarbaruah and Dr U.C. Sharma)

A Brainstorming was organized by the Academy on August 17, 2015 at NASC, New Delhi. It was chaired by Prof R.B. Singh, immediate past President and co-chaired by Dr S.P. Ghosh, former DDG (Horticulture). Ten thematic presentations were made by eminent experts from across the country. After detailed deliberations the important



recommendations that emerged were: (i) research on social component is critical in understanding and managing shifting cultivation; (ii) imparting value addition to local forest and agriculture produce including value chain analysis; (iii) harnessing potential of local plants including microorganisms for medicinal and ornamental use; (iv) preparation of ecosystem based carbon balance to be linked to future carbon credit/trading; (v) make efforts to strengthen data-base and identification of potential areas for technology intervention; (vi) documentation and validation of traditional knowledge of Jhumias; (vii) replication of success stories including identification of climate analogues. At the end, Prof R.B. Singh made valuable suggestions for improving the base paper in the light of discussions and above recommendations.

Integration of Medicinal and Aromatic Crop Cultivation and Value Chain Management for Small Farmers (Convener: Dr A.K. Tripathi; Co-Convener: Dr E.V.S. Prakasa Rao)

The brainstorming session was organized on August 18, 2015 at NASC, New Delhi. The discussions were focused on the current status of Medicinal and Aromatic Plants (MAPs), cultivation of MAPs in different agro-climatic regions, cropping systems and problem soils, and industry-research-farmer linkages in MAPs. Support programmes of Ministry of AYUSH and promotional activities of Spices Board, and Ministry of



Commerce were also discussed. Farmers' views were also presented by progressive farmers from Uttar Pradesh and Tamil Nadu. The recommendations and action points that emerged from the discussions are as follows: Bio-diversity hot spots of MAPs require to be mapped in order to understand strengths and opportunities in MAPs sector; Medicinal and Aromatic Crops

(MACs) need to be positioned for synergy with food, nutrition, income and health; The current poor share of India for herbals in global markets needs to be improved; Successful pilot studies involving MAPs cultivation, processing and marketing need to be documented up-scaled and out scaled. Success stories of contract farming methodologies need replication at different agro-climatic conditions. APMC models may be harnessed for marketing of MAPs; MACs may be considered as suitable crops for cultivation on waste lands; Demand-supply analysis, value chain management, market intelligence, etc. in MAPs sector requires to be researched; production of health foods, organic products, etc. need attention to enhance returns to farmers; Availability and supply of authentic and elite planting materials needs to be augmented; Aromatic and medicinal plants should be treated separately for evolving suitable strategies. Separate entity of government support for aromatic crops is needed; there is a need to strengthen human resources for research using modern tools of biotechnology for technology development in MAPs sector.

Augmenting Forage Resources in Rural India: Policy Issues and Strategies (Convener: Dr P.K. Ghosh)

This Brainstorming was organized on September 8, 2015 at NASC, New Delhi chaired by Prof Panjab Singh, Former DG, ICAR, in which two progressive farmers also participated. Dr P.K. Ghosh gave an overview on 'Present Status of Forage Resources in Rural India and the need for policy issues and appropriate strategies for its improvement'.



Other experts made presentations on different aspects like (a) Grasslands as forage resources in India: need for enabling policies; (b) Strategies for meeting the fodder needs of small farmers; (c) Forest forage resources: policy and strategies in the state of Madhya Pradesh; and (d) Forage seed chain strengthening: conceivable way out. After detailed deliberations it was recommended that there is need for enabling policies on the following aspects: *Judicious use of available crop residues; Allowing grazing or harvesting of forage resources from forests; National grazing-cum-fodder and pasture management policy; Insurance and minimum support price for fodder crops.* At the close of deliberations, Prof R.B. Singh, Immediate Past President remarked that in order to achieve sustainable development goal, we should keep in view soil-plant-animal-human chain / interfaces based on agro-ecosystems like hill, arid, semi-arid, etc. Forage resource management should be based on demand driven / innovations including climate smart fodder and livestock production in near future.

Practical and Affordable Approaches for Precision Farming Equipment and Machinery (Convener: Dr K.K. Singh, Co-conveners: Dr S.R. Verma and Dr G.S. Manes)



The Brainstorming was organized on September 30, 2015 at NASC, New Delhi. It was attended by eminent scientists from the ICAR Institutes, SAUs, DoAC, CIMMYT and Fellows of the academy. Dr S.R. Verma, Former Dean, College of Agricultural Engineering, Punjab Agricultural University, Ludhiana briefed about the background of the base paper with main focus on enhancement

and promotion of the policies related to precision in existing farm equipment and machinery. Dr K.K. Singh, Convener and Director, CIAE, Bhopal presented the concept of precision index for different farm equipment and machinery and need for promotion of precision farm equipment. Prof B.S. Pathak, Dr N.S.L. Srivastava, Dr K. Alagusundaram, DDG (Engg.), Dr M.L. Jat and other eminent scientists provided valuable inputs. After detailed deliberations the following major recommendations emerged: *Promote use of precision farm equipment like laser guided land leveller, pneumatic planter, drip irrigation system, air assisted sprayers; Manufacturer must provide part's catalogue and operator's manual with every equipment to ensure proper adjustment, calibration*

and maintenance; Ensure specified tolerances, fits, limits during manufacturing of standard components and farm equipment; Provide interchangeable components of standard design on all farm equipment and machinery; Develop / revise National and International standards for critical components and precision farm equipment; Provide additional incentives to farmers for use of precision farm equipment and machinery to enhance input use efficiency.

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 October 17, 2015 at NASC, New Delhi. In all, 35 participants representing ICAR Institutes, SAUs, Ministry of Agriculture and Farmers' Welfare, and farmers attended the event and contributed substantially to the deliberations and discussions. The discussions were largely focussed on



(i) Context setting and Government initiatives, (ii) Organic farming opportunities in different agroecologies, and (iii) Input supply and management options. The detailed deliberations culminated in the following important recommendations: (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. It was emphasized that organic farming has to be understood as a more holistic production system.

Mentoring Scheme (Conveners: Dr S.N. Puri, Dr H.S. Gupta, Dr C. Devakumar)

This Brainstorming was organized on March 7, 2016 in NASC, New Delhi. Dr S.N. Puri gave a brief background on the need for mentoring in NARES. Dr S. Ayyappan, in his remarks, underlined the vastness of the system *vis-à-vis* the stakeholders and the need



pursuing the scheme in the NARES. He mentioned that while mentoring has become an integral part of course curricula in western Universities in a structured way, it is yet to take roots in NARES. Considering the enormous challenges being faced in agriculture, Dr Gupta advocated that mentoring, if properly administered, would benefit our institutions to build bridges across the hierarchy levels, to empower in change management, enhance work ownership and sharing of responsibilities, retention of team members, expansion of learning ecosystem and good practices etc. Dr Gupta highlighted the need to identify potential mentors and give them orientation training to enable them undertake mentoring in a more systematic way and properly evaluated. He also informed about a system being practiced by the technical institutions in the country under the MHRD and advocated to use their Handbook of Mentoring and Performance Audit as a starting template for our system. Dr S.N. Puri, Dr A.S. Dhawan and Dr V.D. Patil shared their experiences of introducing this concept in VNМКV, Parbhani.

Prof R.B. Singh focused on the paucity of minimum number of faculty members across the Universities and outlined the need to expand the scope of STEM to STEAM by encompassing agriculture, and after standardizing the scheme, scope exists to internalize it within our course curricula. Dr P. Bapaiah informed that this scheme is being sponsored by DST benefitting the students in IISER, Mohali and similar provisions exist under its INSPIRE programme. Therefore, Academy may also explore possibility of funding such programmes. Prof K.L. Chadha advocated the introduction of the schemes in selected institutions with long term objectives that can be tangibly measured. Prof Anwar Alam advocated for a simple scheme so that its execution and evaluation is easy. Dr P.K. Joshi elaborated on the use of success stories, case studies, book reviews, and biographies of Noble Laureates so that the mentees could be motivated. Many experts immensely contributed to the deliberations.

to be more specific in targeting the mentees, both at individual and institutional levels, with in-built appropriate monitoring and evaluation mechanisms for enhanced performance.

Dr H.S. Gupta touched upon the definition and scope of Mentoring, its relevance to our system and if agreed, the ways and means of introducing and

Workshop/Discussion Meeting

'State of Indian Agriculture: Soil' (Convener: Dr Himanshu Pathak)

To celebrate the Year 2015 as the "International Year of Soil", NAAS decided to bring out a publication on '*State of Indian Agriculture: Soil*'. As a prologue to the publication, a Workshop was organized on August 21, 2015 at NAAS, New Delhi. The Workshop was attended by more than 30 eminent experts and scientists. There were 15 presentations and each presentation was followed by a lively discussion. The Workshop was chaired by Prof R.B. Singh, Immediate Past President, NAAS. He highlighted the importance of soil for sustainable food and nutritional security. It was emphasized that the Academy should focus on the importance of land use and soil health card to enable the programs of the Government to be more effective and efficient.



Strategy for Future of GM Crops in India (Convener: Dr K.V. Prabhu)



A symposium discussion on GM Technology was held at NAAS on September 29, 2015. It was chaired by Prof M.S. Swaminathan, Founder-Honorary Chairman, MSSRF, Chennai and Co-chaired by Dr R.S. Paroda, Chairman, TAAS, New Delhi. Among others distinguished participant were Dr Manju Sharma, former

Secretary DBT and Dr Deepak Pental, former Vice-Chancellor, Delhi University and the Vice Presidents of Academy Prof P.L. Gautam and Prof Anupam Varma. Dr S. Ayyappan, Secretary DARE & DG ICAR and President NAAS informed the Chair and Co-Chair the progress made at ICAR and NAAS to pursue the issues relating to confined field trials and environmentally safe release of GM crops at the highest office of the country for its intervention and directive in national agricultural interest.

It was unanimously agreed to provide appropriate additional information over the communication already made by the Academy on the matter to the Honourable Prime Minister of India in 2014. Prof Swaminathan in his opening remarks mentioned that several discussions have been held on the issues related to GM crops technology and its relevance in India. The action plan was required to be initiated to move forward with the technology so that innovations taking place and research going on is encouraged in prioritized areas where conventional technologies have not been successful in solving the problems. Since all our science endeavours are for public good, it was necessary that more scientific information was made available to the public and political classes on this issue, than that is available at the moment. Dr R.S. Paroda shared detailed information provided under the signatures of 50 prominent agricultural scientists led by Prof Swaminathan in 2014, which has been considered by the Honourable Prime Minister for action by the Ministry of Environment, Forests and Climate Change for promoting GM crops / technology following all safety regulations in the country in specific areas to solve the problems of farmers and food security issues. After these brief remarks by the Chair and Co-Chair, Dr Prabhu made a detailed presentation highlighting the GM crop situation in India, the regulation, technology generated, status and the future strategies required for the benefit of the technologies to reach the farmers. At the end of deliberations it was concluded by Prof Swaminathan, that in addition to the seven points already listed in the communication sent earlier to the Honourable Prime Minister, the other points taken as output from this discussion may be included in the follow up with the Honourable Prime Minister of India. It was concluded that convergence on action points among Ministries of Agriculture & Farmers' Welfare, Science and Technology, Environment, Forest and Climate Change and ICMR was need of the hour. It was advocated to set-up testing facilities and mechanism for bio-safety assessment under public sector; development of a strong mechanism for creating more awareness about GM crops / technology among public and political class; interaction of involved scientists with other scientists, and development of popular literature on GM crops technology in regional languages. It was suggested that wherever feasible NAAS should support in building awareness on the technology among public, academically.

REGIONAL CHAPTERS

Ludhiana Chapter

A Special Lecture was delivered by Dr S.K. Dash, Prof and Head, Department of Agricultural Processing and Food Engineering, Orissa University on "*Packaging and*

its Vital Role in Extending the Shelf Life of Food Products and Waste Reduction" on June 10, 2015 at PAU. Dr Dash deliberated on different types of packaging, namely smart packaging like active and intelligent packaging, controlled atmosphere packaging, modified atmosphere packaging and vacuum packaging. He informed the house that intelligent packaging is tracking the food item and communicating to consumers about health and safety of packed food through sensors, indicators and RFID tags. On this occasion Dr Dash was felicitated by Dr B.S. Dhillon, Vice Chancellor, PAU and Convener of the Chapter.

Another special lecture was delivered by Dr (Ms) Madhuri Sharon, Director, Walchand Centre for Research in Nanotechnology and Bio-nanotechnology on *"Entry of Nanotechnology in Agricultural Arena"* on January 19, 2016. Dr Sharon threw light on varied areas of agriculture where nanotechnology can play vital role such as in precision farming, crop improvement, nano fertilizers, nano pesticides and herbicides, soil and water management, post-harvest techniques and in food technology. She discussed the importance of carbon based nanomaterial sensors in precision farming and enhanced efficiency of nano fertilizers due to their high surface to volume ratio. The higher surface area of nanoparticle based fertilizers is expected to have enhanced probability to interact with the roots as well as with desired microbes. She presented varied classes of carbon based nanomaterial (such as carbon nanofibres, graphenes, carbon nanotubes of required band gaps, functionalized carbon nanohybrids, etc.), which can be used for water management.

Karnal Chapter

A Brainstorming Session on *"Targeting Maximum Achievable Yield in Wheat"* was organized under the aegis of NAAS Regional Chapter, on December 19, 2015 at ICAR-IIWBR, Karnal under the chairmanship of Dr J.S. Sandhu, DDG (Crop Science), ICAR. The aim of the discussion was to initiate thinking about strategy for developing package and practices, identify suitable niches and to propose appropriate measures to attain and sustain high yield and production, similar to the one recently realized by some progressive farmers. There was also a discussion on whether or not there will be a shift in the breeding strategy for developing better wheat varieties specifically targeting the high productive areas and conditions. Farmers representing Madhya Pradesh, Uttar Pradesh, Haryana, Punjab and Bihar were invited to participate in the meeting. The following recommendations / salient / action points emerged from the discussion:

- Achieving yield of 6.0 t/ha is possible by properly following the seed replacement (new varieties), soil test based fertilizer (nutrient) application and other recommended agronomic practices for the area.

- Target of 7.0t/ha can be met at individual farmer's level depending upon their crop management skills, application of organic manure, seed treatment and other input applications.
- Getting 8.0t/ha is not an easy task and only few selected farmers having special skills, perfect timing and doses of input applications, use of growth regulators can achieve the target and that too if weather wise good crop year is there.
- Weather forecasting, both medium and short term, can be very helpful in planning the crop activities so as to maximize the yield.
- Soil test data, its interpretation and fertilizer application should be scheduled as per the requirement.
- Prophylactic measures to avoid crop losses due to possible diseases / weeds / abiotic stresses (heat, flooding / water scarcity) may be adopted. Growth regulator based sprays be tried to harness maximum possible yield.
- Convergence of all agencies in providing timely and accurate information for the benefit of the farmers must be ensured.

Jodhpur Chapter

On January 16, 2015, a lecture on “*Present Status and Future scope of Nanotechnology in Production Paradigm of 2015*” was organized at Central Arid Zone Research Institute, Jodhpur, under the Convenership of Dr J.C. Tarafdar. The lecture was delivered by Dr S.R. Vadera, Director, Defence Research and Development Organization, Jodhpur and attended by the scientists of CAZRI and NAAS Fellows. The lecture focused on understanding and control of matter in the nanoscale, its scope and applications under different fields of research with special reference to agriculture and defence.

A two days motivational / mentoring programme for attaining excellence in science was also organized by the Chapter during September 28-29, 2015 at Central Arid Zone Research Institute, Jodhpur and Rajasthan Agricultural University, Mandor (Jodhpur). Prof P.K. Chhonkar, IARI Adjunct Faculty, 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 among scientists. Dr B.R. Chippa, Vice Chancellor, emphasized the importance of such programmes for attaining scientific excellence.

Hyderabad Chapter

The Chapter organized an invited lecture on “*Crop Planning for Rainfed Agriculture*” on January 8, 2016 at CRIDA, Hyderabad. The lecture was delivered by Dr M. Velayutham, Former Director, NBSS & LUP, Nagpur. Dr K.P.R. Vittal, Former Director, NIASM, Baramati and NAAS Fellow, suggested that scientists should develop customized resource conservation technologies. Dr Velayutham emphasized on: (i) Soil based crop and land use planning in semi-arid tropics, (ii) Tailoring of crop varieties for different rainfall situations, (iii) Differential nutrient recommendations based on soil test values in rainfed areas, (4) exploring the options for sustainable intensification in dryland areas.

National Science Day was celebrated at ICAR-CRIDA in association with National Academy of Agricultural Sciences, Hyderabad on February 29, 2016. On this occasion, a quiz competition was held in which Class IX students from 19 Kendriya Vidyalayas in Hyderabad participated. Each school was represented by a two-member team. The team from Kendriya Vidyalaya, AFC, Begumpet bagged first prize while second and third prizes were bagged by Kanchanbagh and KV - 1 AFA, Dundigul, respectively.

Dr Ch. Srinivasa Rao, Director, CRIDA and Convener of the NAAS Chapter gave away prizes and participation certificates. He congratulated all students for their participation.

Kochi Chapter

The first interactive meeting among local fellowship of Kochi chapter was held at CMFRI on May 05, 2015 under the chairmanship of its convener Dr A. Gopalakrishna, Director, CMFRI. This chapter covering the region of Kerala and Lakshadweep has 11 Fellowship and 1 Associate.

During the fourth NICRA Workshop held at CMFRI, Kochi, a follow-up interaction meeting of the NAAS fellows was held on 13 August 2015. The meeting was attended by Dr S. Ayyappan, President of the Academy, Dr S.M. Virmani, Foreign Secretary, NAAS, Dr B. Venkateswarlu, Dr A.K. Singh, Dr P.K. Aggarwal, Dr K.K. Vass, Dr B. Mohan Kumar, Dr C. Srinivasa Rao, Dr C.S. Ravishankar, and Dr K.V. Peter, Dr A. Gopalakrishnan, Convener, Kochi Regional Chapter and Dr T.K. Srinivasa Gopal. In this meeting various proposed initiatives of the Chapter were discussed.

Organized a one day Seminar on *Chitin in Agriculture, Medicine and Allied Fields* 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 on September 29, 2015 at CIFT, Kochi, Kerala.

LINKAGES

TAAS - NAAS Collaboration Meetings

The Academy actively participated in the following activities of TAAS: (i) Regional Consultation on “*Agroforestry; The Way Forward*” during October 8-10, 2015, and (ii) National Dialogue on “*Innovation Extension Systems for Farmers Empowerment and Welfare*” during December 17-19, 2015. The national dialogue was inaugurated on December 17, 2015 at A.P. Shinde Hall by Shri Radha Mohan Singh Ji, Hon’ble Minister 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 were other dignitaries who participated. 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.

MSSRF-NAAS 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 November 5, 2015 at NASC complex. The Organizing committee of CARYA was headed by Prof M.S. Swaminathan with

representatives from different International and National organizations. The other key collaborators of this initiative were ICRISAT, ILO, UNDP, UNFPA, IFAD, IFPRI, World Agroforestry Centre. The organizing committee proposed to form 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 committed action in the region.

RECOGNISING EXCELLENCE (2016)

Fellows

Section I: Crop Sciences

Dr Niranjan Chakraborty

Scientist VII, National Institute of Plant Genome Research, Aruna Asaf Ali Marg, New Delhi

Dr Manoj Kumar Dhar

Director, School of Biotechnology, University of Jammu, Jammu (J&K)

Dr Mukesh Jain

Associate Professor, School of Computational & Integrative Sciences, Jawaharlal Nehru University, New Delhi

Dr Arun Kumar Joshi

Professor, Department of Genetics and Plant Breeding, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (U.P.)

Dr Ashwani Pareek

Professor, Stress Physiology & Molecular Biology Laboratory, School of Life Sciences, Jawaharlal Nehru University, New Delhi

Dr Prabodh Kumar Trivedi

Principal Scientist, Plant Gene Expression and Transgenics Division, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow (U.P.)

Section II: Horticulture Science

Dr Swarup Kumar Chakrabarti

Director, ICAR-Central Potato Research Institute, Shimla (H.P.)

Dr Anand Kumar Singh

Managing Director, National Horticulture Board, Ministry of Agriculture and Farmers Welfare, GOI, Gurgaon (Haryana)

Dr Bir Pal Singh

Ex. Director, ICAR-Central Potato Research Institute, Shimla (H.P.)

Section III: Animal Sciences

Dr N.K. Shivakumar Gowda

Principal Scientist, ICAR-National Institute of Animal Nutrition and Physiology (NIANP), Adogodi, Bangalore (Karnataka)

Dr Vipin Chandra Kalia

Chief Scientist (Scientist-G) and Deputy Director, CSIR-Institute of Genomics and Integrative Biology, University Campus, Delhi

Dr (Ms) Minakshi Prasad

Professor & Head, Department of Animal Biotechnology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary & Animal Sciences, Hisar (Haryana)

Dr Suresh Kumar Singla

Principal Scientist, Animal Biotechnology Centre, ICAR-National Dairy Research Institute, Karnal (Haryana)

Section IV: Fisheries Sciences**Dr Kishore Kumar Krishnani**

Head, School of Edaphic Stress Management, ICAR-National Institute of Abiotic Stress Management, Baramati, Pune (Maharashtra)

Dr Pramoda Kumar Sahoo

Principal Scientist & ICAR National Fellow, ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar (Odisha)

Section V: Natural Resource Management**Dr Ayyanadar Arunachalam**

Principal Scientist, Indian Council of Agricultural Research, Krishi Bhawan, New Delhi

Dr Kalikinkar Bandyopadhyay

Principal Scientist, Division of Agricultural Physics, Indian Agricultural Research Institute, New Delhi

Dr Ashis Kumar Biswas

Head, Division of Soil Chemistry & Fertility, ICAR-Indian Institute of Soil Science, Nabibagh, Berasia Road, Bhopal (M.P.)

Dr Mangi Lal Jat

Senior Cropping Systems Agronomist & CIMMYT-CCAFS South Asia Coordinator, International Maize and Wheat Improvement Center (CIMMYT), NASC Complex, DPS Marg, New Delhi

Dr Dinesh Kumar Sharma

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Section VI: Plant Protection**Dr Virendra Kumar Baranwal**

Principal Scientist & In-charge, Virology Unit, Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi

Dr Bishwanath Chakraborty

Professor, Immuno-Phytopathology Laboratory, Department of Botany, University of North Bengal, Darjeeling (W.B.)

Dr Chityal Ganesh Kumar

Senior Scientist, CSIR-Indian Institute of Chemical Technology, Tarnaka, Hyderabad (Telangana)

Dr Rasappa Viswanathan

Principal Scientist & Head, Division of Crop Protection, ICAR-Sugarcane Breeding Institute, Coimbatore (Tamil Nadu)

Section VII: Agricultural Engineering and Technology**Dr Narendra Singh Raghuvanshi**

Professor, Agricultural & Food Engineering Department, Indian Institute of Technology Kharagpur, (W.B.)

Dr Rangaraju Visvanathan

Professor (Agricultural Processing), Anbil Dharmalingam Agricultural College and Research Institute, Tamil Nadu Agricultural University, Tiruchirapalli (Tamil Nadu)

Section VIII: Social Sciences

Prof (Ms) Jamuna Prakash

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Dr Neelesh Sharma

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Dr Gnanavel Venkatesan

Scientist (Senior Scale), Pox Virus Disease Laboratory, Division of Virology, ICAR-Indian Veterinary Research Institute, Mukteswar Campus, Nainital (Uttarakhand)

FOUNDATION DAY AND AGM

(i) Presentations by Newly Elected Fellows

On June 4, 2015 in the afternoon in session-I held under the chairmanship of Prof P.L. Gautam and Prof M.P. Yadav, the newly elected Fellows under Crop Sciences (5), Horticulture Sciences (3), Animal Sciences (4), and Fisheries Sciences (2), made presentations about their work before the entire fellowship of the academy. There was active discussion on each presentation. In the session - II held under the chairmanship of Prof Anupam Varma and Dr K.V. Prabhu, the newly elected Fellows under Natural Resource Management (5), Plant Protection (3), Agricultural Engineering and Technology (2), and Social Sciences (1), made presentations about their work before the esteemed fellowship. The Fellowship had detailed interaction on all presentations. All these Fellows were admitted to the Academy at a ceremony held on June 5, 2015 and presented with Fellowship.



(ii) Presidential Address

During the 22nd AGM, Dr S. Ayyappan, on June 5, 2015 delivered the Presidential address on '*Response for Resilience: Happy Agriculture*'. At the outset Dr Ayyappan congratulated the fellowship for celebrating the Silver Jubilee of the foundation of Academy with great enthusiasm and expressed that the Academy is indebted to Late Dr B.P. Pal and Prof M.S. Swaminathan for their vision and wisdom in laying the foundations of this Academy. He mentioned that from a humble beginning from the precincts of the IARI, the Academy has emerged as a vibrant national level body, and at present has earned the distinction of an Academic Platform, dedicated to the cause of agriculture and agricultural sciences in the country. In his address he highlighted the need for *Preparedness and response strategy to manage extreme events*. He stated that in the year 2014 and ongoing 2015 many aberrant climatic events have been encountered,

the frequency and intensity of which were unprecedented. These included late-and-deficient monsoon in the country, floods in J&K, cyclone Hudhud on the east coast and lashing of hailstorm just before the harvesting of rabi crops this year. He advocated that advanced planning and preparedness can reduce the extent of damage, and would be a help in faster restoration of life and property to these extreme events. He stressed a multi-disciplinary approach for risk management to reduce vulnerability and improve access to services, information, education and empowerment of life and property for combating the situation. In the National Policy on Disaster Management it is stated that the country is vulnerable, in varying degrees, to several forms of disasters, both natural and manmade. He flagged five distinct vulnerable regions: the Himalayan region to earthquakes and landslides, the alluvial plains region to annual incessant floods, the desert region to droughts, and the coastal region to cyclones and storms. Therefore, need of the hour is formulation of disaster reduction policies.

Dr Ayyappan mentioned that devising appropriate adaptation strategies would enable farmers to cope better with aberrant climate along with efficient use of natural resources. In this direction he stressed upon Climate-smart-agriculture and initiation of NICRA during 2010- 2011. He highlighted that through this project in 100 vulnerable districts, available technologies have been demonstrated on farm and implemented. He mentioned that the ICAR has taken some more initiatives including coping strategies for climatic risk as outlined below:



District level contingency plan for weather aberrations: The ICAR-CRIDA in collaboration with multi-disciplinary scientific team at 45 SAUs have till date developed contingency plans for 580 districts that is available for implementation by the State Governments.

Climate smart practices and technologies: Pilot implementation of appropriate technologies in farmers' fields on real time basis is underway in 28 districts of the 130 climatically vulnerable districts.

Small farm mechanization through custom-hiring: Some kind of mechanization makes agriculture more efficient and remunerative. In this context, custom hiring centres (CHCs) have been established in 100 NICRA villages.

Space technology: During Hudhud forewarning about cyclone enabled the state machinery to respond and take timely requisite measures. Therefore, integration of science and technology in disaster risk reduction and management holds the key towards creating not only resilient agriculture but a resilient society as well.

Conservation agriculture: The conservation agriculture (CA) provides a truly sustainable production system. Greater emphasis on water harvesting and improving farm water use efficiency could help face uncertain rainfall.

Developing and testing weather index based insurance products: The weather-based crop insurance scheme (WBCIS) has been implemented in 19 states, covering 19 million farmers with a total pay-out of Rs. 4,078 crore.

Concluding his address, Dr Ayyappan mentioned that the Academy has been and would continue to endeavour towards science led agriculture for greater efficiency as well as resilience. He reminded the Fellowship that Silver jubilee is an occasion to redeem our pledge to dedicate ourselves to the cause of Indian agriculture.

(iii) Foundation Day Lecture

Prof Y.K. Alagh, Chancellor, Central University, Gujarat, Professor Emeritus and Vice Chairman, Sardar Patel Institute of Economic and Social Research, Ahmadabad and Former Union Minister of Power and for Planning and Programme Implementation, delivered the foundation day lecture on “*Structure of Indian Agriculture-Growth and Policy Epochs*” on June 5, 2015. In his lecture, Dr Alagh tried to examine the structure of economic growth in agriculture sector *vis à vis* the role of policies in each epoch. In the growth epoch, he discussed about green revolution, and mentioned that this term in India leads to two images. In the popular mind it is associated with a period in which India crossed the hump in terms of shortages of, and external dependence for its grain and food requirements. The second more technical perception of the green revolution considers



it as the productivity breakthrough emerging from the high yielding variety of seeds in food grains, particularly wheat and then rice. Thus technology and productivity improvement became the driving force in the green revolution areas. Prof Alagh said that green revolution in India is seen as spanning four time epochs; the first being introduction of the high yielding technology, with the support of political leadership of that time. In the second phase comprising half of the mid-sixties, a “ship to mouth” phase of grain shortage and large grain import under PL 480 from USA. Around the same time the leadership took the risk of importing the dwarf varieties of wheat from IWRI in Mexico and ably assisted by Indian scientists, Prof M.S. Swaminathan and ICAR teams in replicating the seeds. During this period the technology was internalized in the decade of seventies. The initial spurt of grain growth recorded stagnation around 101-104 million tonnes in the seventies and experts predicted that India will not reach the target of 125 million tonnes by 1978/1979. It was at that time that policy support to agriculture with priorities set at the level of the then Prime Minister Smt Indira Gandhi, who saw food security as a central issue. The resource allocation for agriculture, particularly irrigation got high priority in the investment budget. The result of all these concerted efforts was that by 1978-79 India was producing 127 million tonnes and was a net exporter in grains. Later in the eighties, Indian agriculture grew faster and as economy picked up non-food grains were leading. The growth rate witnessed acceleration in new crops, particularly in rice, cotton and oilseeds. The output was now rising at 3.37% annual compound growth rate as compared to 2.46 % earlier. He drew a comparison of production and area under cultivation among all crops and non-food crops during the three time periods from fifties to late nineties to make a point that trend towards diversification, away from grains, is now more pronounced. In his lecture, he also discussed important issue of terms of trade and investment in recent epochs. He argued that it is not just land productivity, but profitability of resource use that gives signals at the margin for resource use and investments. As the terms of trade moved in favour of agriculture investment, rates went up. Prof Alagh dealt in detail on the issues of land and water, integrated water resource management, and resource information system. In conclusion he mentioned that challenges facing us are severe, but the priority that the Government is giving to the agriculture sector and infrastructure support for it, is encouraging and of great strength to institutions like NAAS. I am sure NAAS must be the advocate for this in its Silver Jubilee.

(iv) Excerpts from the Minutes of the 22nd AGM

The 22nd AGM was convened under the chairmanship of the President of the Academy on June 5, 2015 and was attended by 232 Fellows. The Silver Jubilee Year AGM was graced by past Presidents including Prof M.S. Swaminathan, Prof V.L. Chopra,

Prof R.B. Singh, past Vice-President Dr Panjab Singh and a number of former senior peers and office bearers of the Academy. Prior to start of deliberations, a 2-minute silence was observed by the entire house as a mark of respect in the memory of Dr S.A.H. Abidi, Dr S.P. Singh, Dr S.S. Prihar, Dr (Ms.) Prem Dureja and Dr Lloyd Thomas Evans, the Fellowship who passed away since last AGM. The meeting started with the presentation of a detailed Secretary report by Prof M.P. Yadav. It was adopted by the house after brief interaction by the esteemed fellowship. This was followed by the presentation of reports of the Editor by Dr K.K. Vass and Foreign Secretary by Dr S.M. Virmani, which were adopted by the house. The Annual Report 2014-15, presented by Dr K.V. Prabhu, Secretary of the Academy, was also adopted by the house. The Treasurer, Dr Himanshu Pathak presented the detailed Balance Sheet and Audited Accounts of the Academy for the year 2014-15 and after brief interaction by the Fellowship it was accepted and adopted by the house. The AGM in its 22nd meeting also lent its approval to some of the important decisions taken by EC since last AGM. These include appointment of new auditors, guidelines for institutional membership, election of foreign and pravasi fellows, defining the coverage of each regional chapter, revised guidelines for Academy awards, and admission of new fellows and associates. The house was also informed about the efforts taken by NAAS on the issue of public debate on GM crops that has received response and overwhelming appreciation from the Ministry of Environment, Forests and Climate Change, Government of India. On this occasion, four special publications of the Academy namely, 100 Years of Agricultural Sciences in India; Down the Memory Lane (25 Years of NAAS); State of Indian Agriculture – Energy; State of Indian Agriculture – Water; were released.

(v) General discussion

Many esteemed fellows participated in the general discussion and proposed valuable suggestions. The issues flagged by Dr (Ms.) M.S. Bamji, Dr T.K. Adhya, Dr T. Mohapatra, Dr S.S. Acharya, Dr Mruthyunjaya, Dr K. Gopakumar, Dr C.L. Acharya, Dr Siddique, Dr K. Pradhan, Dr C. Devakumar, Dr Gurbachan Singh, Dr S.L. Mehta were noted by the Academy. The President, Dr S. Ayyappan, expressed thanks to the esteemed fellowship for expressing their opinions while he and Prof R.B. Singh responded to some of the points raised in the discussion and assured that Academy will look into the issues for any follow-up action that may be required.

PUBLICATIONS

Policy Papers

- (i) Policy Paper 73: Monitoring and Evaluation of Agricultural Research, Education and Extension for Development [AREE4D]
- (ii) Policy Paper 74: Biodrainage: An Eco-Friendly Tool for Combating Waterlogging
- (iii) Policy Paper 75: Linking Farmers with Markets for Inclusive Growth in Indian Agriculture
- (iv) Policy Paper 76: Bio-Fuels to Power Indian Agriculture
- (v) Policy Paper 77: Aquaculture Certification in India: Criteria and Implementation Plan

Status/Strategy Paper

Role of Social Scientists in National Agricultural Research System (NARS)

Newsletter

NAAS-News, Vol. 15, Nos. 2 to 4 and Vol. 16, No. 1 (quarterly)

Journal (published by Springer India Pvt. Ltd.)

NAAS official Journal 'Agricultural Research' Vol. 3, Nos. 2 to 4 and Vol. 4, No. 1 (quarterly)

Special Publications

- (i) State of Indian Agriculture – Water
- (ii) State of Indian Agriculture – Energy
- (iii) State of Indian Agriculture – Soil
- (iv) Down the Memory Lane (25 Years of NAAS)
- (v) 100 Years - Agricultural Sciences in India
- (vi) Panel Discussion on Views of Young Scientists on *Research Challenges in the Changing Climate Scenario*
- (vii) Presidential Address on 'Response for Resilience: Happy Agriculture' delivered by Dr S. Ayyappan at Foundation Day
- (viii) Foundation Day Lecture on *Structure of Indian Agriculture-Growth and Policy Epochs* by Prof. Y.K. Alagh
- (ix) NAAS Year Book and Planner

EVENTS AND MEETINGS

New Year Get-together

New Year get-together of Delhi/NCR based Fellowship was held on January 01, 2016 at NAAS auditorium. Dr R.S. Paroda, Chairman TAAS and Former President NAAS, Prof R.B. Singh, Immediate Past-President NAAS, Dr S. Ayyappan, President NAAS, Secretary DARE and DG, ICAR, Prof Anupam Varma, Vice- President, Dr M.P. Yadav, Secretary NAAS and Dr K.V. Prabhu, Secretary NAAS were on the dais. The Fellowship of NAAS turned up in large numbers to participate in this annual event of the Academy. Dr M.P. Yadav extended a warm welcome to all including the newly elected Delhi/NCR-based fellowship and associates. He introduced to the house the newly elected fellowship under various disciplines and associates present on this occasion.



Dr S. Ayyappan briefed the house about different activities / programmes executed by the Academy during 2015 and sketched plans for 2016. He drew attention to the challenges in agriculture sector and urged the fellowship to play an enabling role to

achieve the set objectives. He informed the house about the resounding success of different events organized by the Academy *viz.*, 12th Agricultural Science Congress during Feb 3-6, 2015 at NDRI, Karnal. He highlighted various Silver jubilee events that were successfully conducted including special lectures by eminent personalities, Prof M.S. Swaminathan, Founder Chairman, MSSRF; and Dr David Bergvinson, Director General, ICRISAT; during June 3-6, 2015. Dr Ayyappan also mentioned that the Academy had organised a number of brainstorming sessions on important thematic issues and further mentioned that the Brain-storming on "Strategy for Future of GM Crops in India" was attended by Prof M.S. Swaminathan, Dr R.S. Paroda, Dr Manju Sharma and other important experts in the field of Biotechnology. He also shared that the celebration of Golden Jubilee of Green Revolution by the Academy on November 27, 2015 and honouring the yester-year stalwarts including the institutions that made it happen, was an important event. He stated that green revolution (GR) was a 'Harvest of Hope' and advocated that agricultural development during green revolution and post-GR was a matter of pride for the country. He further enlightened that during 2016 the Academy would hold expert consultation on pulses and legumes to mark the international year of pulses; organise identified theme based brainstorming sessions, initiate advance action to organise XIII Agricultural Science Congress at Bengaluru during 2017. He also shared some of the key points *viz.*, vision, practical action plan, implementation strategy, achieving goals and targets, tangible impact on common man of our technologies, relevant to agriculture, that emerged from the recent meeting of Secretaries of GoI with the Hon'ble Prime Minister Shri Narendra Modi Ji, held sometime in the last week of December, 2015. He thanked all EC members and the Secretariat for their whole hearted support and cooperation in smooth conduct of Academy business during the year 2015.

On this occasion several publications were released *viz.*, State of Indian Agriculture-Soils; Status paper No.1; Policy papers 76, 77; NAAS-NEWS (December 2015 issue); Year Book 2016; NAAS-YEAR Planner 2016.

Dr R.S. Paroda, Ex-Secretary DARE & DG ICAR, Ex-President NAAS and Chairman TAAS in his remarks wished all the Fellowship a very happy and prosperous New Year and expressed satisfaction that a large number of Fellowship has assembled on this event. At the outset, he congratulated the President NAAS, EC members and the Secretariat for having successfully conducted many important activities/programs during 2015, including the Silver Jubilee celebration of Academy and the Golden Jubilee of Green Revolution. All these events have been well appreciated. In the process, Academy has gained good visibility and importance. He also stated that it is right time to have an introspection of our past achievements and future course of action. Dr Paroda expressed his concern that much still remains to be done. He flagged

a number of issues concerning Agriculture Research for Development (AR4D) which now requires a paradigm shift towards ARI4D. He mentioned that Indian agriculture is at cross roads and we need to revisit our “Agriculture Education, Research and Extension System” and examine whether it is delivering expected results and addressing all emerging challenges. In spite of the past achievements leading to Green, White, Blue and Yellow revolutions, the country is currently facing major challenge of poverty, mal-nutrition, livelihood security and degradation of natural resources including climate change induced variability. Considering the hurdles and delays for implementation of various recommendations by NAAS, he emphasised on policy advocacy as well as public awareness. Therefore, agricultural research agenda needs a revisit to make it relevant to the requirements of small holder farms.

Dr Paroda mentioned in order to meet the challenge of nutritional security; sustainably managing our natural resources; mainstreaming women and youth in agriculture with greater emphasis on innovation for impact. He further emphasized the need for the Academy to be a 'Think Tank' and be independent in communicating policy related recommendations to the Government and all policy makers in the larger national interest. Dr Paroda expressed his concern that the issue of GM crops needs to address more on scientific reasoning and Academy can help in proper public awareness based on informed knowledge to clear doubts in the minds of general public. We must promote any good innovation that is in the interest of our farmers and the nation. NAAS has distinct advantage in this regard. We also need to consider ways by which issue of accountability in the system can be addressed more effectively, while having in place a system of incentives and rewards for the performers. For this, we need to have an “Out of Box” thinking approach. Academy to also have a unified voice on scientific matters needing policy support. Dr Paroda also felt that Academy could consider existing challenge of leadership for research management at all levels.

He mentioned that the investments in Agricultural Research for Development (AR4D) in India are just half than that of China and highlighted that in last one decade, while China has increased its investments four times, there is hardly any increase in the allocations for ICAR despite the recommendation of the Planning Commission to double the XIIth Five Year Plan grant to Rs. 25,000 crores. It was suggested that not only the investments per-se are needed but need prioritization to ensure proper convergence and coordination at all levels to have an impact at scale. Other areas needing priority attention include efficient and timely delivery of extension services, linking farmers to the markets, promoting secondary and speciality agriculture for generating off-farm employment, value addition of agricultural produce for enhanced profitability to the farmers and environmental sustainability through conservation agriculture and much needed resilience in agriculture.

Dr Paroda concluded that academy has come a long way, grown now to maturity and has earned global respect. Yet, we need to be vibrant, relevant and independent in our policy advocacy.

Prof R.B. Singh in his remarks, while endorsing the concerns expressed by Dr Paroda, elaborated on different components of millennium development goals (MDG) and sustainable development goals (SDG). He highlighted how India has been working to achieve the specified targets under each and what remains to be done. He mentioned that we have to focus on holistic development within the ambit of AREEEEE (Agriculture, Research, Education, Economy, Employment and Environment) that is hard to achieve, but we need to put in our efforts in this direction.

Several important suggestions provided by the esteemed fellowship were: (i) Academy should make available the Year Book to Kisan Channel of Doordarshan to enable programme developers to seek the services of appropriate experts in different fields of agriculture for improving the quality of programmes and they will also have consolidated information about expertise in the country; (ii) the Year Book may lay more emphasis on the area of work of each fellowship instead of his/her C.V.

Executive Council Meetings

During the year 2015-16, four Meetings were held (June 2, 2015, September 19, 2015, November 28, 2015 and March 16, 2016 at New Delhi. Some important items considered and actions taken during the meetings are elaborated as under:

92nd Meeting

The 92nd meeting of the Executive Council was held on June 2, 2015 and was attended by 20 EC members and special invitee. The action taken report was deliberated and progress was noted with satisfaction. It was decided that XIII Agricultural Science Congress on “Climate Smart Agriculture” will be organized at UAS, Bengaluru in 2017. It was also agreed to treat Shri L.C. Sikka Endowment Award and Dr A.B. Joshi Memorial Award at par with other Memorial Awards.

93rd Meeting

The 93rd meeting of the Executive Council was held on September 19, 2015. The meeting was attended by EC Members and Conveners of Sectional Committees. The recommendations of the Sectional Committees and the Convener’s Group for finalization of Academy Fellowships / Associateships for the year 2016 were presented by Prof P.L. Gautam, Chairman of the Conveners’ Group and endorsed

by EC. Prof P.L. Gautam presented the action taken report and also the progress in implementation of the academy programmes. For the year 2016, five broad themes areas were approved. The EC decided that the Academy should strongly propose the name of Professor M.S. Swaminathan to the Government of India for conferring Bharat Ratna title to him. It was also decided that on 27 November 2015 a one-day programme to commemorate the Golden Jubilee of Green Revolution in India will be organized jointly by NAAS, ICAR and IARI at A.P. Shinde Symposium Hall, NASC, New Delhi. The programme for the day was discussed and finalized.

94th Meeting

The 94th meeting of the Executive Council was held on November 28, 2015. Dr H. Shivanna, Vice-Chancellor, UAS, Bengaluru was Special Invitee to discuss the logistics for holding the XIII Agricultural Science Congress at UAS, Bengaluru during February 2017. After a brief presentation by Dr Shivanna, 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 approved as “*Climate Smart Agriculture*.” It was decided that the Programme Committee of the Academy may review the progress periodically. A National Steering Committee and Local Organizing Committee may also be 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.

95th Meeting

The 95th meeting of the Executive Council of the National Academy of Agricultural Sciences was held on March 16, 2016. A two-minute silence was observed in the memory of four deceased NAAS Fellows, *viz.*, Dr P. Joshi, Dr K.L. Sahrawat, Prof S.K. Sen and Dr M.V. Rao.

The Action Taken Report was discussed and approved as presented, with some suggestions. The recommendations of the Committee to review the election process of Office Bearers / EC Members were discussed and the revised rules would be submitted to the General Body for further consideration and approval. A committee was constituted to look into the earlier decision of the EC to re-introduce new section on ‘Frontier Sciences’ and submit its recommendations for consideration of the EC in its next meeting. Thereafter the approval of the General Body would be sought.

It was also decided that the Policy / Strategy Papers developed by the Academy shall include an action plan. Further, the outputs of the Workshops / Brainstorming Sessions hereafter would be published under different categories, *viz.*, Policy Paper, Strategy Paper, Status Paper and Introduction Paper.

The progress of the organization of XIII Agricultural Science Congress at Bengaluru was reviewed at length and it was decided to constitute a Committee to make further suggestions for improvement and strengthening the proposed programme.

The President appraised about the steps/action taken by the Academy so far towards GM crops advocacy. It was decided to: (i) prepare an updated scientific document on GMOs: Issues and Way Forward, and (ii) prepare communication material for the public awareness including public representatives, through a Committee.

Journal Score Committee

The evaluation of scientific journals for NAAS Score is done every three years and the present NAAS Score is valid up to December 31, 2016. Academy has constituted a Committee under the Chairmanship of Dr P.L. Gautam. The Committee has revised the Proforma and Guidelines for NAAS Journal Score, which are available on Academy's website www.naasindia.org.

Programmes planned for 2016

Brainstorming Sessions

- ❖ *Strategy Workshop: Towards Self-sufficiency of Pulses in India* (Convener: Dr M.C. Saxena; Co-convener: Dr N.P. Singh, Director, IIPR, Kanpur)
- ❖ *Strategy for Transformation of Indian Agriculture and Improving Farmers Welfare* (Convener: Dr Suresh Pal; Co-Convener: Dr Anjani Kumar)
- ❖ *Abiotic Stress (including drought, flood and hail storm management)* (Convener: Dr P.S. Minhas, Co-conveners: Dr T. Mohapatra, Dr S.M. Virmani, Dr Ch. Srinivasa Rao)
- ❖ *Food and Nutritionally Secure India by 2030* (Convener: Dr Ramesh Chand Co-convener: Dr P.S. BIRTHAL and Dr Mahtab S. Bamji)
- ❖ *Biotic Stresses* (Convener: Dr R.K. Jain (Plant); Co-conveners: Dr R.K. Singh (Livestock and Poultry); Dr A. Gopalakrishnan (Fisheries); Dr A.R. Sharma (Weeds))
- ❖ *Agricultural Extension Research* (Convener: Dr C. Ramasamy; Co-conveners: Dr A.K. Singh, DDG (Extn), Dr Ranjan K. Singh, CSSRI, Karnal)

FINANCIAL STATEMENT

The main source of generating funds for the Academy is Grant-in-Aid received from the Department of Agricultural Research and Education (DARE), New Delhi. During the year 2015-16, Grant-in-Aid of Rs. 242.26 lakh was received. The Accounts of the Academy are audited by Chartered Accountants appointed with the approval of the General Body. The Utilization Certificate for the year 2015-16 has been submitted to the DARE.

A brief Audited Statement of Accounts and Auditor's Report for 2015-16 is annexed with the report as Annexures I and II.

ACKNOWLEDGMENT

The Academy gratefully acknowledges the Department of Agricultural Research and Education and the Indian Council of Agricultural Research (ICAR), Delhi for their continuing support to its programmes, and for extending the financial support. The Academy also places on record the cooperation and support in terms of logistics provided by other organizations.

Academy's publication activities are largely due to the voluntary and honorary services of its Editor in Chief, Editors, Associate Editors, Advisory Board, NAAS Office Bearers and EC members, large number of reviewers who examine and provide comments and suggestions on the manuscripts sent to them for review. Several Fellows also contributed their services to other activities of the Academy such as Annual General Body Meeting, Silver Jubilee Programme, Golden Jubilee of Green Revolution in India, Brainstorming Sessions, Workshops, Symposia and conducting programmes on Public lectures, interaction meetings, etc. The Academy gratefully acknowledges the services of each Academy Fellow and other staff involved in above activities during the year 2015-16.

AUDITOR'S REPORT

Saluja & Associates

Chartered Accountants

Head Office : 69-Desh Bandhu Gupta Road, Jolly Building, Pahar Ganj, New Delhi-110055

Tel. : 011-23617870-23628613 Fax : 011-23520631

URL : Web:www.salujaandassociates.com email : saluja@salujaandassociates.com



AUDITOR'S REPORT

The Members,
National Academy of Agricultural Sciences,
NASC Complex, DPS Marg, Pusa
New Delhi

We have audited the attached Balance Sheet of NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI as on 31st March, 2016 and the annexed Income and Expenditure Account for the Year ended on that date. These financial statements are the responsibility of the management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with the auditing standards generally accepted in India. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. Our audit includes examining on a test basis, evidence supporting the financial transactions and disclosures in the financial statements. Our audit also included assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

We further report that:

1. We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit.
2. In our opinion, proper books of account, as required by law have been kept by the Academy, so far as it appears from our examination of those books.
3. The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of the accounts of the Academy.
4. In our opinion, the Balance Sheet and the Income and Expenditure Account dealt with by this report, comply with the Accounting Standards, to the extent applicable.
5. In our opinion and to the best of our information and according to the explanations given to us, the said statements of Accounts read together with notes thereon and documents annexed thereto give a true and fair view:



- (i) In the case of Balance Sheet, State of Affairs of the Academy as at 31st March 2016,
- (ii) In the case of Income and Expenditure Account, of the excess of Income over Expenditure of the Academy for the period ended on that date arrived on the basis of cash/receipt basis of accounting as disclosed in the method of Accounting followed by National Academy of Agricultural Sciences.

However it is suggested that National Academy of Agricultural Sciences should adopt mercantile system of accounting in place of cash/receipt basis of accounting in future so as to ascertain the proper income or expenditure of the year.

For Saluja & Associates
Chartered Accountants



(V.K.Verma)
Partner
M.No. 017742



Place: New Delhi
Dated 11/05/2016

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES

Accounting Policies and Notes to Accounts Forming Part of the Balance Sheet as on March 31, 2016

1. Method of Accounting

The Academy is following cash basis of accounting. Income and Expenditure is therefore recognized on cash/receipt basis.

2. Investments

(a) The Academy has made investments as required to be invested under section 11(5) of the Income Tax Act, 1961 and value of the investments are shown at cost.

(b) Income from investments has been recognized on cash/receipt basis

3. Fixed Assets and Depreciation

Fixed Assets are stated at written down value less Depreciation calculated as per the rates of Depreciation provided in the Income Tax Act 1961, read with Rules made thereunder.

4. Income tax Provision

Provision for Taxation has not been considered necessary in view of the acceptance of the claim for exemption U/s 11 of the Income Tax Act, 1961 by the Income Tax Department.

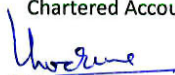
5. Payments of Auditors

	<u>31/03/2016</u>	<u>31/03/2015</u>
Audit Fee (inclusive of service Tax)	36068/-	33708/-
Other Services	-	33708/-
Total	<u>36068/-</u>	<u>67416/-</u>

6. Others

- The cost of Publications has been charged off in the year in which such expenditure is incurred.
- The income from contribution from fellowship fee has been accounted for on cash basis.
- During the financial year 2015-16, the Academy has received the Grant-in-Aid of Rs. 2,42,26,000/- and Rs. 7,50,000/- from Department of Agricultural Research and Education (DARE) and Indian Council of Agriculture Research (ICAR) respectively and the same has been utilized except Rs. 65,259/-.
- The final bill for supply of chairs in FY 14-15 by RITES Limited of Rs.6,00,000/- as pointed out in earlier year has not been received so far.
- The management is taking the necessary action to reconcile the defaults of Rs.24,370/- as appearing on the Income Tax website.

For Saluja & Associates
Chartered Accountants


(V.K. Verma)

Partner
M.No.017742

Place: New Delhi
Date : 11/05/2016



National Academy of Agriculture Sciences




Treasurer


Secretary

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES

BALANCE SHEET AS ON 31.03.2016

LIABILITIES		AMOUNT (Rs.)		ASSETS	AMOUNT (Rs.)	
CAPITAL FUND				FIXED ASSETS		
Opening Balance		12,77,98,084.17		Opening Balance	2,82,40,974.63	
Add: Transferred from Accumulated Fund		89,58,098.09		Addition during the year	12,75,573.00	
Add: Excess of Income over Expenditure during the year		3,80,29,143.28		Sale during the year	(25,013.00)	
Less: Funds transferred to Specific Reserve Fund		3,91,85,233.29	13,56,00,092.25	Depreciation w/off	(31,51,887.84)	2,63,39,646.79
SPECIFIC RESERVE FUND				Deposits in Approved Securities		18,45,40,259.09
Opening Balance		6,22,63,030.06		CURRENT ASSETS		
Add: Addition during the year		3,91,85,233.29		Bank Balances		1,07,46,648.87
Less: Utilized during the year		89,58,098.09	9,24,90,165.26	Cash Balances		5,467.00
ENDOWMENT FUND				ADVANCES		
Received during the year		10,00,000.00	10,00,000.00	Advances with NAAS Regional Chapters/Silver Jubilee Symposiums		7,18,628.00
CURRENT LIABILITIES				Advance to M/s RITES Limited for Digital PA systems		11,50,000.00
Dr. P. B. Kirti (Cash Prize)			1,00,000.00	Mobilisation Advance to - XIII ASC		5,00,000.00
TOTAL			22,91,90,257.51	Tax Deducted at Source		51,89,607.76
				TOTAL		22,91,90,257.51

As per our report of even date attached

For Saluja & Associates
Chartered Accountants

(V.K. Verma)
Partner

M.NO.-017742
Place: New Delhi

Dated: May 11, 2016



National Academy of Agricultural Sciences



(Signature)
Treasurer

(Signature)
Secretary

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED ON 31st MARCH, 2016

EXPENDITURE	AMOUNT (Rs.)	INCOME	AMOUNT (Rs.)
To Expenditure towards NAAS activities	2,35,07,875.00	By Grant-in-Aid from D.A.R.E.	2,42,26,000.00
To Depreciation	31,51,887.84	By Interest on Investments	3,34,08,943.99
To Excess of Income over Expenditure transferred	3,80,29,143.28	By contribution from Subscriptions, Publications and other receipts	63,03,962.13
		By contribution from ICAR for Golden Jubilee programmes	7,50,000.00
Total:	6,46,88,906.12	Total:	6,46,88,906.12

As per our report of even date attached

For Saluja & Associates
Chartered Accountants

(Signature)

(V.K. Verma)

Partner

M.NO.-017742

Place: New Delhi

Dated: May 11, 2016



National Academy of Agricultural Sciences



Treasurer

Secretary

(Signatures of Treasurer and Secretary)

EXECUTIVE COUNCIL

Position	2015	2016
President	Dr S. Ayyappan	Dr S. Ayyappan
Past President	Prof R.B. Singh	Prof R.B. Singh
Vice-President	Prof Anupam Varma	Prof Anupam Varma
Vice-President	Dr P.L. Gautam	Dr C.D. Mayee
Secretary	Dr M.P. Yadav	Dr M.P. Yadav
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LIST OF ACRONYMS

APMC	Agricultural Produce Market Committee
AREE4D	Agricultural Research, Education and Extension for Development
AREEEE	Agriculture, Research, Education, Economy, Employment and Environment
CARYA	Coalition for Attracting and Retaining Youth in Agriculture
CHCs	Custom Hiring Centres
CIMMYT	International Maize and Wheat Improvement Center
CSAUA&T	Chandra Shekhar Azad University of Agriculture and Technology
FRS	Fellow of the Royal Society
GBPUAT	Govind Ballabh Pant University of Agriculture and Technology
GM	Genetically Modified
ICCS	Indian Chitin and Chitosan Society
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IISER	Indian Institute of Science Education and Research
IIWBR	Indian Institute of Wheat and Barley Research
ILO	International Labour Organization
INSPIRE	Innovation in Science Pursuit for Inspired Research
IPR	Intellectual Property Rights
MACs	Medicinal and Aromatic Crops
MAPs	Medicinal and Aromatic Plants
MDG	Millennium Development Goals
MSSRF	M.S. Swaminathan Research Foundation
NAIP	National Agricultural Innovation Project
NARES	National Agricultural Research and Education System
NIASM	National Institute of Abiotic Stress Management
NICRA	National Innovations in Climate Resilient Agriculture
NITI Aayog	National Institution for Transforming India Aayog
NRRI	National Rice Research Institute
RFID	Radio-frequency Identification
STEM	Science Technology Engineering and Mathematics
STEAM	Science Technology Engineering Agriculture and Mathematics
TAAS	Trust for Advancement of Agricultural Sciences
UNDP	United Nations Development Programme
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund-India
VNMKV	Vasantrao Naik Marathwada Krishi Vidyapeeth
WBCIS	Weather-based Crop Insurance Scheme

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