

ANNUAL REPORT

2013-14



National Academy of Agricultural Sciences
NASC, DPS Marg, New Delhi - 110 012, India

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MESSAGE FROM THE PRESIDENT

The National Academy of Agricultural Sciences (NAAS), a credible think-tank and platform for science-policy interface, leads in promoting excellence and convergence of agricultural research, education and extension for the growth of national economy with a dynamic farm sector. In pursuance of this mission, the Academy has been organizing congresses, conferences, brainstorming sessions, consultations, lectures and dialogues on important research, innovation, development and policy issues, and communicating their outcomes to the concerned stakeholders towards promoting ecologically sustainable, economically vibrant and socially equitable agriculture. This Report presents an account of the Academy's activities during the year 2013-14 focused to meet these objectives.



Dr. S. Ayyappan

During the year, the Academy organized ten brainstorming sessions, interactive sessions and lectures, including the Foundation Day Lecture by Prof. Ved Prakash, Chairman, University Grants Commission on 'Landscape of Higher Education in India' on 5th June 2013 indicating that quality higher education in India still remains elite in nature and not accessible to a large population. The Presidential Address on 'Climate Smart Agriculture towards an Ever-Green Economy' was delivered by Prof. R.B. Singh, President, NAAS, on the Foundation Day, and Dr. A.B. Joshi Memorial Lecture on 'The Challenging Agriculture in the Changing Times' on 4th June, 2013 by Dr. Mangala Rai, Advisor (Agriculture) to Hon'ble Chief Minister of Bihar & Former Secretary, DARE and Director General, ICAR, and related publications reemphasised the centrality of the AREE4D system in transforming Indian agriculture.

I place on record my gratitude to Prof. R.B. Singh, Immediate Past President, NAAS; the NAAS Executive Council; Prof. Lalji Singh and Dr. P.L. Gautam, Vice-Presidents; Prof. Anwar Alam, Immediate Past Secretary, Prof. N.K. Singh, and Prof. M.P. Yadav, Secretaries; Dr. S.M. Virmani, Foreign Secretary; Dr. C. Devkumar, Prof. P.K. Chhonkar and Dr. (Ms.) Prem Dureja, Editors; and Dr. Himanshu Pathak, Treasurer, for their guidance and contributions. I would like to thank Prof. Anupam Varma, Editor-in-Chief of the NAAS journal, 'Agricultural Research', for his untiring efforts in bringing out all issues of the Journal on time and the high visibility that the journal has brought for the Academy. I am grateful to the Conveners of the brainstorming sessions and related events.

My sincere thanks are due to Colleagues in NAAS Secretariat, Shri H.C. Pathak, Shri P. Pande, Ms. Minu Tiwari, Shri P. Krishna, Shri Umesh Rai, Shri Jai Singh, Shri Kamal Singh and Shri Banwari Lal. The financial and logistics support of the ICAR is gratefully acknowledged.



S. Ayyappan

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ABOUT THE ACADEMY

Inspired by the vision of late Dr. B.P. Pal, FRS, the National Academy of Agricultural Sciences (NAAS) was established in 1990. The Academy focuses on the broad fields 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.

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.

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

Organs of the Academy

- ❖ The General Body: The General Body of the Academy is constituted by its Fellows.
- ❖ The Executive Council is the main policy and decision making body. It is assisted by different Committees to deal with various aspects of governance of the Academy.
- ❖ Five Regional Chapters of the Academy are functioning at Lucknow, Bhubaneswar, Hyderabad, Mumbai and Imphal.

Brainstorming Sessions

The following ten sessions were held in the year under report:

Brainstorming Session on Improving Productivity of Rice Fallows (Convener: Masood Ali)

In India, rice fallows cover about 11.65 million ha area spreading mainly in the States of Assam, Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra,

Odisha, Uttar Pradesh and West Bengal. Recognizing their importance in augmenting pulses and oilseeds production, sustaining and diversifying mono-cropped rice production system and improving livelihood of resource poor farmers of the region, the Brainstorming Session on “*Improving Productivity of Rice Fallows*” was convened by



Dr. Masood Ali, Ex-Director, IIPR on 20th April, 2013 at New Delhi under the aegis of the Academy. A Policy Paper encompassing all dimensions has been brought out by the Academy.

Nanotechnology in Agriculture: Scope and its Current Relevance (Convener: J.C. Tarafdar)

The Academy organized Brainstorming Session on *Nanotechnology in Agriculture: Scope and its Current relevance* convened by Dr. J.C. Tarafdar, ICAR National Fellow, CAZRI, Jodhpur, on 23rd April 2013. The session highlighted the advances made in nano-fertilizers, nanopesticides including nanoherbicides, nanocoating, and smart delivery system for plant nutrients and cautioned against possible toxicity of these advanced materials. A Policy Paper encompassing all dimensions has been brought out by the Academy.



Sanitary & Phytosanitary (SPS) Measures in Fisheries (Convener: T.K. Srinivasa Gopal)

Fish and fishery products are one of the most important internationally traded food commodities. Taking into account their global trade, the regulations with respect to SPS



measures assumes tremendous significance. SPS measures refer to the provisions or regulations that a country adopts to protect human, animal and plant life and health within its territory against unsafe and contaminated food. The SPS Agreement sets out the basic rules for food safety and animal and plant health standards. It also

allows member countries to set their own standards based on scientific justification. SPS measures by individual countries should be based upon internationally acceptable standards set by Codex Alimentarius Commission and OIE (World Organization for Animal Health). The SPS measures are significant from the trade point of view because they can sometimes be trade restrictive. Since they have ramifications on trade, a thorough

understanding on the standards and issues related to them is required for mitigating issues arising out of implementation of the SPS regulations. A Brainstorming Session on Sanitary & Phytosanitary (SPS) Measures in Fisheries was convened by Dr. Srinivasa Gopal under the aegis of Academy on 27th June, 2013. In the technical session Shri Vishnu Bhatt, Fisheries Development Commissioner, DAHD&F, Ministry of Agriculture, presented the major challenge for India with respect to SPS issues in fisheries. This includes the emergence of new diseases and syndromes, increasing consumer sensitivity to food safety problems, new trade requirements and negotiations, emergence of private standards. A Policy Paper encompassing all dimensions has been brought out by the Academy.

Role of Endophytes in Agricultural Productivity (Convener: D.J. Bagyaraj)

Endophytes are microorganisms which colonize the plants without any apparent adverse effects on the host plants. They usually get nutrition and protection from the host plant. In return, they reciprocate by conferring enhanced fitness to the host plants through a number of benefits. Some of the benefits conferred in host plants are promotion of seedling



emergence and development, biological N fixation, facilitation in P and K nutrition, production of phytohormones to tone up the tolerance of plants against abiotic stresses like drought, salinity, heat, heavy metals etc. In addition, there are examples of different types

of endophytes having antagonistic effects against soil-borne plant pathogens. These are usually isolated from healthy plants after tissue surface sterilization on suitable media. Of the nearly 300,000 plant species which exist on earth, only a few have been completely studied with reference to their endophytic biology. A Brain-storming Session (BSS) on “*Role of Root Endophytes in Agricultural Productivity*” was convened by Dr. D.J. Bagyaraj CNBRCD, Bangalore on 5th July 2013 under the aegis of Academy.

Bioinformatics in Agriculture : Way Forward (Convener: D.P. Singh)

In the present era of fast accumulating biological data coming out from the research on many crop plants, livestock, microbes, climate, environment and other interrelations, bioinformatics has emerged for solving the myriad problems of analysis, prediction,

management, pattern recognition, submission, retrieval and storage of the data. This area is becoming increasingly important in the context of systems biology approach where a holistic approach is required to understand the biology and chemistry of the biological entities and their behavior during environmental interactions. This fascinating field would facilitate to resolve the harmful impacts of biotic or abiotic stresses on crop plants, animals, fishes, livestock sector, beneficial insects and microbes, and help in finding many useful applications in food and agriculture. Taking cognizance of the continuously growing importance and impact of bioinformatics on biological and agricultural sciences, the Academy organized on 12th July, 2013 a brainstorming session on *Bioinformatics in Agriculture: Way Forward* to review the perspectives and challenges in this area in relation to Indian agricultural research and development, under the Convenership of Dr. D.P. Singh, Senior Scientist at NBAIM, Mau.



Role of Millets in Nutritional Security of India (Convener: M.S. Bamji)

Nutrition security implies awareness and access at affordable cost to balanced diet, safe environment and drinking water and health care outreach. Millets contribute towards balanced diet as well as safe environment. Apart from being rich in micronutrients like B complex vitamins, minerals and health promoting phytochemicals, millets are also eco-friendly. They are drought tolerant, short duration, less labour demanding, and climate change compliant. Despite these attributes, till recently millets were treated as orphan grains. However, in recent years there has been renewed interest in millets as grains for

the future. On 19th October 2013, a brain storming meeting on the *Role of Millets in Nutritional Security for India* was organized by the Academy and convened by Dr. M.S. Bamji. A Policy Paper encompassing all dimensions on the subject has been brought out by the Academy.



Efficient Utilization of Phosphorus (Convener: A. Subba Rao)

Phosphorus (P) is an indispensable finite and nonrenewable plant nutrient. India has limited resources (310 million tonnes) and reserves (36.9 million tonnes) of rock phosphate. The country therefore needs to import 90% of its phosphatic fertilizer requirement. The applied fertilizer P efficiency has been wavering around 20-25% under different soil- crop-climatic situations. Though substantial amount of P is generated in intensive animal husbandry, urban areas, aquaculture, and poultry etc. in the form of solid and liquid wastes, these are not efficiently recycled in agriculture. Soils of more than 90% of the districts of the country are low to medium in P fertility, indicating the necessity of P fertilization to produce optimum crop yields. For increasing and sustaining higher productivity in future and meeting the food security needs of the growing population, a secure supply of P is the most urgent priority. In view of this, a brainstorming session convened by Dr. A. Subba Rao, Director, Indian Institute of Soil Science, Bhopal on '*Efficient Utilization of Phosphorus*' was held on 8th November 2013, under the aegis of the Academy.



Biofuels to Power Indian Agriculture (Convener: B.S. Pathak)

The fast growing demand for hydrocarbon fuels and their depleting reserves have raised the specter of a global crisis. Indian agriculture is largely dependent on fossil fuel for meeting its energy needs. India's coal reserves, supplemented with wind, water and solar resources are sufficient to power for stationary operations as pumping water for irrigation for a long period. But its crude oil reserves are meager making it dependent on oil imports to provide fuel to the transport sector and to agriculture with a fleet of 4.5 million tractors, power tillers and self propelled agricultural machinery. This has made Indian agriculture highly vulnerable to any disruption in the



import of crude oil owing to a global shortage of hydrocarbons and continued price rise due to the machinations of the international oil cartel. Bio-fuels offer the best potential to supplement and eventually replace fossil diesel to power Indian agriculture. Thus biofuels seek to supplement conventional energy resources for meeting rapidly increasing requirement of transportation of fuels and meeting the energy needs of India's vast rural population by using non-food feed stocks and so to reduce dependence on import of fossil fuels. The intent is to provide a higher degree of national energy security in an environmentally friendly, cost-effective and sustainable manner. In this backdrop, a Brainstorming Session (BSS) on **Biofuels to Power Indian Agriculture** was held on 23rd December, 2013 under aegis of the Academy which was convend by Dr. B.S. Pathak.

Biodrainage: An Eco-friendly Tool for Combating Waterlogging (Conveners: S.K. Chaudhari, J.C. Dagar and O.P. Toky)

Introduction of canal irrigation in arid and semi-arid regions without provision of enough drainage causes rise in water-table leading to water logging and secondary salinisation. Presently, about one-third of the world's irrigated area face threat of water logging resulting in reduced crop yields, lower profits and abandonment of agricultural lands. The problem is very serious in arid and semi-arid regions where groundwater is of poor quality. The problems of water logging and salinity can be effectively tackled by conventional sub-surface drainage systems but these are more expensive and sometimes cause environmental problems. The limitations and shortcomings of the conventional engineering based drainage systems call for alternate approaches to keep the agriculture sustainable over the longer periods. Bio-drainage comprising deep rooted vegetation with high rate of transpiration seems to be a promising option. The biodrainage technique is eco-friendly as the biodrainage plantations purify the environment by absorbing greenhouse gases and releasing oxygen into the environment. The biodrainage technique does not require any disposal of drainage effluents as the drainage plantations drain out the filtered fresh water using their bio-energy. On the other hand conventional sub-surface drainage techniques need disposal of drainage effluents, that has become an important issue around the world. A Brainstorming Session



(BSS) on **‘Biodrainage: An Eco-friendly Tool for Combating Waterlogging’** was organized by the Academy on 19th December, 2013 convened by Dr. S.K. Chaudhari, Dr. J.C. Dagar and Dr. O.P. Toky.

Carbon Economy in Indian Agriculture (Convener: A. Subba Rao)

The effect of climate change on various spheres of human life, including agriculture, animal husbandry and food production systems, has been already felt across regions of the globe. In India, agriculture sector contributes about 17% of the total greenhouse gas emissions. At the same time, there is a huge carbon sink potential in this sector including land use,



land use change and forestry sector. Globally, soil carbon sequestration has about 89% of the mitigation potential. However, identification and adoption of the best management practices (BMPs) with a low carbon footprint (*i.e.*, low C emission and high C sink) needs to be taken up for different agro-ecological regions of India.

An agriculture practice with lower carbon footprints can be a win-win strategy for India. A brainstorming session (BSS) on “*Carbon Economy in Indian Agriculture*” was organized by the Academy on 1st February, 2014 convened by Dr. A. Subba Rao, Director, IISS, Bhopal.

MOOC Opportunities for Capacity Building in Indian Agriculture: Exploring Options and Challenges (Convener: C. Devakumar)

Online learning is a practice for linking learners, learning materials and mentors/teachers using technology mediation (especially, the Web and social networking). It has rapidly matured as a mainstream practice in higher education, enabling learners to pursue complete degree programs (as in Georgia Tech, a well-reputed research university). Massive Open Online Courses (MOOC) are the most current stage in this continuing evolution. MOOC enable a small group of teachers/mentors to offer learning services to thousands, if not tens of thousands, of people in the duration of a single course. In the context of India, MOOC offer a novel opportunity to promote and practice learning for development. A brainstorming session (BSS) in partnership with Commonwealth of

Learning (COL), Vancouver was organized by the academy on 5th March, 2014 convened by Dr. C. Devakumar, Former Editor, NAAS, Dr. V. Balaji, COL, Vancouver and Dr. N.T. Yaduraju, Former Director, NRC on Weed Science, Jabalpur and ex-National Coordinator, NAIP. Fellowship of the Academy, senior experts from the ICAR-SAU system, higher education administration, the IIT system and private sector participated in the discussions.

RECOGNIZING EXCELLENCE OF INDIVIDUAL SCIENTISTS

Fellows Elected in 2014

Section I : Crop Science

Prof. (Ms) Paramjit Khurana

Professor, Department of Plant Molecular Biology, University of Delhi South Campus, New Delhi

Dr. A.N. Lahiri Majumder

Raja Ramanna Fellow (DAE), Division of Plant Biology, Bose Institute, Kolkata, West Bengal

Dr. Jai Chand Rana

Principal Scientist & Head, NBPG Regional Station, Phagli, Shimla, Himachal Pradesh

Dr. P.M. Salimath

Special Officer, University of Agricultural and Horticultural Sciences, Navile, Shimoga, Karnataka

Dr. Prakash Chand Sharma

Professor and Dean, University School of Biotechnology, Guru Gobind Singh Indraprastha University, New Delhi

Section II : Horticulture Science

Dr. Pritam Kalia

Head, Division of Vegetable Science, Indian Agricultural Research Institute, New Delhi

Section III : Animal Sciences

Dr. C.S. Prasad

Director, National Institute of Animal Nutrition and Physiology, Adugodi, Bangalore, Karnataka

Prof. Kusumakar Sharma

Assistant Director General (HRD), Indian Council of Agricultural Research, New Delhi

Section IV : Fisheries Sciences

Prof. I.S. Bright Singh

Coordinator, National Centre for Aquatic Animal Health, Cochin University of Science & Technology, Cochin, Kerala

Section V : Natural Resource Management

Dr. U.K. Behera

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

Dr. Ranjan Bhattacharyya

Senior Scientist, Center for Environment Science and Climate Resilient Agriculture, IARI, New Delhi

Dr. Babooji Gangwar

*Project Director, Project Directorate
for Farming Systems Research (ICAR),
Modipuram, Meerut, Uttar Pradesh*

Dr. Kotha Sammi Reddy

*Principal Scientist, Central Research
Institute for Dryland Agriculture,
Santoshnagar, Hyderabad, Andhra Pradesh*

Section VI : Plant Protection

Dr. Kaushik Banerjee

*ICAR National Fellow & Principal
Scientist, National Research Centre for
Grapes, Pune, Maharashtra*

Prof. Ramesh Chander Kuhad

*Professor in Microbiology, Department of
Microbiology, University of Delhi South
Campus, New Delhi*

Dr. Prasun Kumar Mukherjee

*Scientific Officer G, Nuclear Agriculture
& Biotechnology Division, Bhabha
Atomic Research Centre, Mumbai,
Maharashtra*

Foreign Fellow

Dr. Jose Graziano da Silva

Director General, FAO, Rome, Italy

Section VII : Agricultural Engineering and Technology

Prof. Sudhindra Nath Panda

*Professor, Agricultural & Food
Engineering Department, IIT, Kharagpur,
West Bengal*

Dr. K.S.M.S Raghavarao

*Chief Scientist, Department of Food
Engineering, CSIR-Central Food
Technological Research, Institute, Mysore,
Karnataka*

Section VII : Social Sciences

Dr. (Ms) Shylaja Mallaiah Dharmesh

*Principal Scientist, Department of
Biochemistry & Nutrition, CSIR - Central
Food Technological Research, Institute,
Mysore, Karnataka*

NAAS Associateship

Dr. P.C. Abhilash

Assistant Professor, Institute of Environment & Sustainable Development, BHU, Varanasi, Uttar Pradesh

Dr. P.L. Kulwal

Associate Professor, State Level Biotechnology Centre, MPKV, Rahuri, Maharashtra

Dr. Shukadev Mangaraj

Senior Scientist, CIAE, Nabibagh, Bhopal, Madhya Pradesh (M.P.)

Dr. B.M. Naveena

Senior Scientist, NRC on Meat, Chengicherla, Hyderabad, Andhra Pradesh

Dr. A.K. Patra

Lecturer, Department of Animal Nutrition, West Bengal University of Animal & Fisheries Sciences, Kolkata, West Bengal

Dr. Rakesh Ranjan

Assistant Professor, Deptt. of Teaching Vety Clinical Complex, GAD Veterinary & Animal Sciences University, Ludhiana, Punjab

Dr. Ritesh Saha

Senior Scientist, Division of Soil Physics, IISS, Bhopal, Madhya Pradesh

Dr. Govindan Selvakumar

Senior Scientist, Division of Soil Science & Agricultural Chemistry, IIHR, Bangalore, Karnataka

Dr. Anil Kumar Singh

Senior Scientist, ICAR Reserach Complex for Eastern Region, P.O. Bihar Veterinary College, Patna, Bihar

PROVIDING ENABLING ENVIRONMENT FOR SCIENTISTS

Regional Chapters

Consultative Meeting on Mechanization for Small Holder Farms (Convener: Dr. B. Venkateswarlu, Director, CRIDA)

The Southern Chapter of the Academy in collaboration with University of Agricultural Sciences (UAS), Bengaluru organized one day consultation on 6th October 2013 to identify critical issues in promoting mechanization of small holder farms in view of the emerging importance of mechanization due to the growing labour shortage in agriculture. Following recommendations emerged:



1. The agricultural mechanization strategy should overcome the labour shortage, reduce drudgery but should not completely replace the agricultural labour.
2. To encourage small holders/family farming in the country, more subsidies should be given on small farm equipment compared to the large size machinery.
3. A single window approach for supply of farm machinery to the farmers' needs to be evolved to reduce delay in the system. After sales service for the equipments supplied should be made mandatory to the suppliers by putting a clause in the bidding process.
4. Research should focus on development of multipurpose equipment for small farms with a female gender bias.
5. The use of renewable sources of energy needs to be tapped for agricultural operations.
6. The SAUs/ICAR Institutes to provide a window of opportunity for the small manufacturers to demonstrate their small agricultural tools in KVKs and other research farms. Custom hiring experience under NICRA project has provided valuable

experience and needs further strengthening with a provision to add tractor and additional need based implements since sowing window is very limited.

7. Custom Hiring Service may be identified as a small scale service industry by the government and the rural youth may be encouraged to establish them as one of the employment generation activity. Such activities should be exempted from service tax.
8. B. Tech. (Ag. Engg.) graduates may be appointed by the Government wherever possible in the farm mechanization schemes for effective implementation of the programme.
9. Currently, government subsidy fixation for agricultural equipments is based on L1 (Lowest quoted firm) in many states, because of which many of the precision and advance machinery are not available to the farmers within the limited subsidy. Hence, a separate price fixation policy should be adopted for all models of the implements which meet the quality and precision standards set by the authorized institutes for the purpose.
10. Primary and secondary post harvest processing machinery should be made available to the small farmers to improve their livelihoods.
11. Energy auditing of all agricultural operations/equipments is to be given top priority by the Government agencies to increase the energy efficiency in farm mechanization.

Dr. A.B. Joshi Memorial Lecture

The first Dr. A.B. Joshi Memorial Lecture was delivered by Dr. Mangala Rai, Agriculture Adviser to Chief Minister, in Cabinet Minister's rank, Govt. of Bihar and former



Secretary DARE and Director General, Indian Council of Agriculture Research on "*The Challenging Agriculture in the Changing Times*" on 4th June 2013. At the outset, Dr. Rai paid rich tributes to the memory of the Late Dr. A.B. Joshi. In the lecture Dr. Rai made a masterly presentation of the challenges faced by Indian Agriculture and discussed the Bihar model of agricultural transformation.

Development and Testing of GM Crops- Impleading of Academy in the Hon'ble Supreme Court and Inclusion of Dr. R.S. Paroda in the TEC

Academy has played an important role by impleading in the Hon'ble Supreme Court against a 10 year ban on development and testing of GM crops as recommended in the TEC interim report. On the plea of the NAAS, the Hon'ble Court inducted Dr. R.S. Paroda as a new member of the TEC for his expertise in Agriculture and directed the TEC to submit its final report on the regulation of GM crops. Subsequently, inclusion of Dr. Paroda has been questioned in some media reports, raising issue of conflict of interest and NAAS has defended the inclusion of Dr. Paroda in the TEC with overwhelming support from the Fellowship. Dr. Paroda is a very distinguished outstanding scientist. He has been the President of the Academy and had held a number of top positions both in India and abroad. There is no conflict of interest so far as science is concerned

Consideration of the Recommendations of NAAS Journal Score Committee

The recommendations of the Prof. S.L. Mehta Committee for the non-impact factor journals were approved. There was also considerable discussion about the additional/ alternate option of use of metrics such as h-index and citation count of publications of the nominees; as such metrics unlike impact factor of journals truly reflect the individual contribution. The Chair welcomed such ideas for future consideration.

Round table on GM Crops for Nutritional Security

National Academy of Agricultural Sciences organized a Round Table on **'GM Crops for Nutritional Security'** under the Chairmanship of Professor M.S. Swaminathan, Founder Chairman and Chief Mentor, M.S. Swaminathan Research Foundation, Chennai, on **12th February 2014**. The Round Table group discussed the potential of GM crop technology



in solving the entrenched low farm productivity, malnutrition and hidden hunger problems in a large section of Indian population, particularly, women and children in the under privileged sections of our society and resolved the following:

1. GM crop technology is a promising, relevant and efficient technology for low-input high output agriculture for crop improvement where conventional breeding tools have not been effective. GM technology will be a tool to improve agricultural crops for their nutritional value, nutrient & water use efficiency, productivity, tolerance/resistance to biotic and abiotic stresses.
2. The present de facto moratorium on the field trials of GM crops should be lifted at the earliest. It is putting the clock back in relation to progress in harnessing the benefits of GMO technology in agriculture. Confined field trials are essential for the evaluation of productivity performance as well as food and environmental safety assessment. The non-conductance of regular field trials is a handicap as well as disincentive in harnessing the benefits of a wide array of transgenic material available with different research organizations. Many of these research materials have excellent resistance to diseases, pests, drought and salinity as well as improved nutritional quality. Much of this work has been done in research organizations committed for general public good and by young researchers who are getting increasingly discouraged due to lack of clear policy on the future of GM crops.
3. The Indian biosafety regulatory system is in compliance with the international regulatory consensus based guidelines. The system, put in place under the Environment Protection Act (1986) should dynamically evolve, update, adopt and implement the biosafety protocols and procedures. The bill on Biotechnology Regulatory Authority of India (BRAI) introduced by the Government needs to be pursued further taking into account the observations by all stakeholders. Meanwhile the existing three tier system of IBSC, RCGM and GEAC has done a good job and should be strengthened with adequate infrastructure and technical support to continue with the confined field trials so that the research progress is not halted.
4. The Agricultural Biotechnology Committee chaired by Prof. M.S. Swaminathan submitted its report in 2004 for a Parliament approved Regulatory Agency as well as conducting All India Coordinated Trials with GMOs, taking all necessary precautions. In the process, it is required to consider risk assessment a genuine concern of the opponents of GMOs on a scientific basis.
5. After biosafety clearance by the GEAC, ICAR should play a key role in the commercial release of the GM crops to prevent undue proliferation of large number of hybrids/varieties.
6. The national regulatory system should integrate capacity building as a necessary operational requirement to keep pace with scientific advancement through international collaborations to evolve as the most effective system including collaborations with countries such as USA, Australia, Canada, Norway and Brazil.

7. Scientists should communicate with public and policy makers about the safety and benefits of GM crop products and remove the undue fears and apprehensions about GM crop adoption. A media resource centre may be set up for providing up-to date scientific information to media representatives and dispel any misinformation.
8. The Academy may set up two Committees on the pattern set up by the Royal Society of London, a. Committee on Public Understanding of Science, b. Committee on Political Understanding of Science.
9. Until the time a Parliament approved autonomous National Biotechnology Regulatory Authority comes into existence, RCGM & GEAC should have full time chairpersons as recommended by SAC to PM and GEAC should issue 'Decision Documents' at the time of allowing field trials of a GM event and at the time of final release of a GM event.
10. The GEAC should function like a statutory body and make final decision on approval of the GM event for environmental release. The "No-Objection" certification from state governments for conduct of confined field trials is not required as their products will not get to farmers or consumers.
11. Agriculture is a state subject and it is important that the State Agricultural Universities and State Departments of Agriculture are involved in the implementation of the field trials but without losing time. Some states are declaring themselves an organic state which precludes the use of GM crops. However, organic farming would require effective methods to face the challenge of pests and diseases.
12. Nutritional security involves attention to balanced diets and nutrition literacy. The Food Security Act. 2013 will ensure that all needing social protection against hunger will be able to get the needed calories. However, it is required to attend to other nutritional problems such as protein hunger and hidden hunger caused by the deficiency of micronutrients and vitamins.
13. There is need for a pan-political support for promoting genetic engineering research in our country to harness its full potential.
14. Return from investments in biotechnology research is very high. Public and private sectors should develop a joint strategy which will help to ensure the inclusiveness of access to improved technologies among all farmers, small or large.
15. To achieve a zero hunger challenge of the United Nations by 2025, we must double the small farm productivity. Such an increase will be possible only through the intelligent and intensive applications of new technologies such as Biotechnology.

PROMOTING LINKAGES WITH THE WORLD SCIENTIFIC COMMUNITY

Meeting with Dr. Hiroyuki Konuma, ADG, FAO

Dr. Hiroyuki Konuma, ADG, FAO and Regional Representative for Asia and the Pacific along with Dr. Peter Kenmore, FAOR, India and Dr. Gopi Ghosh Assistant FAOR, India visited the Academy on 8th August 2013. A meeting of selected NAAS Fellowship with the FAO delegates was organised under the chairmanship of Prof. R.B. Singh, President, NAAS.

Breakfast Meeting with Dr. Uma Lele

A meeting was organized with Dr. Uma Lele formerly of World Bank on 25th October 2013. Dr. Uma Lele expressed her satisfaction about the progress being made as follow-up actions of XI ASC and desired that the same may be circulated to international participants. About the proposed chapter in USA, she said it would provide opportunities for scientists of Indian origin and others interested in India to contribute their knowledge and expertise to Indian agriculture in general and higher education in particular.

Special Lecture by Dr. Sonny Ramaswamy

Dr. Sonny Ramaswamy, Director, USDA's National Institute of Food and Agriculture (NIFA), gave a presentation in the Academy on **"Setting the table for a flatter, hotter, more crowded earth"** on 27th January, 2014. In his lecture, Dr. Ramaswamy highlighted that by 2050, the global population will exceed 9 billion people, sustaining this population, in the context of changing climate and diminishing land and water resources, is the paramount question. Are we prepared to feed, cloth, and shelter everyone on Earth without wreaking havoc on the environment? It has been estimated that we will need to increase food production from anywhere between 50 and 70 percent or even double food production from today with diminishing resources. The challenges we face are complex, with all manner of feedback loops.

PUBLISHING POLICY DOCUMENTS FOR THE ADVANCEMENT OF AREE4D

The following publications were brought out during 2013-14:

1. Presidential Address on 'Climate Smart Agriculture towards an Ever-Green Economy' delivered by Prof. R.B. Singh on Foundation Day
2. Dr. A.B. Joshi Memorial Lecture on 'The Challenging Agriculture in the Changing Times' delivered on 4th June 2013 by Dr. Mangala Rai, Agriculture Adviser to Chief Minister, in Cabinet Minister's rank, Govt. of Bihar and former Secretary DARE and Director General, Indian Council of Agriculture Research
3. Policy Paper 59: Livestock Infertility and its Management
4. Policy Paper 60: Water Use Potential of Flood-affected and Drought-prone Areas of Eastern India
5. Policy Paper 61: Mastitis Management in Dairy Animals
6. Policy Paper 62: Biopesticide - Quality Assurance
7. Policy Paper 63: Nanotechnology in Agriculture: Score and Current Relevance
8. Policy Paper 64: Improving Productivity of Rice Fallow
9. Policy Paper 65: Climate Resilient Agriculture in India
10. Policy Paper 66: Role of Millets in Nutritional Security in India
11. Policy Paper 67: Urban and Peri-Urban Agriculture in India
12. Book entitled 'A Roadmap to Transform Agricultural Education to Reshape India's Future'
13. NAAS Journal 'Agricultural Research' Vol. 1, Nos. 2 to 4 and Vol. 2, No. 1
14. NAAS Year Book and Planner 2014
15. NAAS-News, Vol. 13, Nos. 2 to 4 and Vol. 14, No. 1
16. Agricultural News (six issues)

OTHER ACTIVITIES PURSUING THE MANDATE AND OBJECTIVES

Excerpts from the Minutes of the 20th Annual General Body (AGB) Meeting

The 20th AGM was convened under the chairmanship of the President of the Academy as per the Rules of the Society, on 5th June 2013 in New Delhi. Prof. Alam profusely acknowledged the overwhelming response and presence of the Fellowship for this meeting. He stated that the Academy is immensely benefited with the presence of the Fellowship, their continued support and guidance and this makes the Academy alive, vibrant and effective.



The following suggestions were made by the Fellowship in the AGM:

General Discussion

- ❖ There was some deliberation as to whether the Foundation Day be shifted to cooler month rather than June. It was decided to maintain *status quo* considering its historical importance and the past tradition.

- ❖ A point was raised whether the term of Associateship could be beyond 5 years. After detailed deliberations, it was agreed not to withdraw the recognition as the owner once bestowed can not be withdraw.
- ❖ It was stated that the UGC has initiated a scheme to provide an honorarium of Rs. 15,000/- per month to university staff if they are Fellows of at least two of the National science academies. The list of the scientific academies which entitle the scientists for this honour does not include National Academy of Agricultural Sciences (NAAS) though it is one of the premier science academies and provides a forum to scientists to deliberate on key issues of agricultural research, education and extension. The President stated that the point is well taken and he would take up this issue with UGC.
- ❖ Dr. H.K. Jain stated that it is worthy to note that the Academy has generated handsome reserve fund but the Academy should carefully examine the new initiatives so that funds are utilized in a more fruitful manner. He said that a few years back we decided to bring out a journal and Academy has brought it out successfully. Some of the other academies like INSA have honorary scientists Award for retired scientists for continuing their work. It will be of interest to the Academy if NAAS also creates such positions to promote specific studies to focus on particular problems and selecting a Fellow who is most competent for the purpose.

Transactions of the Executive Council

Some of the important items considered were as under:

Organizing XII Agriculture Science Congress – 2015 on the theme ‘Sustainable Livelihood Security of Smallholder Farmers at NDRI, Karnal

- ❖ *Organizing ICAR-TAAS-NAAS joint Brainstorming Session on ‘Soybean for Food & Nutritional Security’ on 21-22 March, 2014*
 - *Reaching the Farmers*
 - *Science Communication strategy*
- ❖ **Mobilization of NAAS Fellowship for mentoring of Young Faculty and Scientists of NARS**
 - *Agripedia enrichment by NAAS*
 - *Commissioning Short term Studies*
 - *Profiling of Institutions and Scientists in NARS*
 - *To plan Impact Assessment, Monitoring & Evaluation*

- *Organizing a meeting of major Professional Societies in Agriculture and Editors of select journals*
- *Dialogue/workshop on Preparation of National Action Plan for Genetic Resources Management in India*
- *Consideration of proposal to set-up a US Chapter of the Academy*
- ❖ **Launching of Mentoring Scheme**
 - *Excellence in Science*
- ❖ **Evaluation of R&D Projects by the Academy**
- ❖ **Bank Credit Support to farmers at Low Interest Rate**
- ❖ **Silver Jubilee Celebration of the Academy**
- ❖ **Blueprint (Roadmap) for transforming Indian agriculture**
- ❖ **Revised Guidelines for Election of the Fellowship and Associateship**
- ❖ **Setting up of New Regional Chapters**

In addition to the existing five Regional Chapters, ten new chapters have been created. List of all the 15 chapters alongwith their convenor is as under:

Regional Chapters	Name of Convener	Regional Chapters	Name of Convener
Ludhiana	Dr. B.S. Dhillon	Bhubaneswar	Dr. T. Mohapatra
Karnal	Dr. A.K. Srivastava	Nagpur	Dr. K.R. Kranthi
Jodhpur	Dr. J.C. Tarafdar	Mumbai	Dr. W.S. Lakra
Lucknow	Dr. P.S. Pathak	Hyderabad	Dr. Ch. Srinivasarao
Patna	Dr. B.P. Bhatt	Bangalore	Dr. M. Uday Kumar
Guwahati	Dr. K.M. Bujarbaruah	Cochin	Dr. A. Gopalkrishnan
Imphal	Dr. S.N. Puri	Chennai	Dr. Ajay Parida
Kolkata	Dr. Biswapati Mandal		

Foundation Day

The Academy celebrated its Foundation Day on 4th June 2013 and organized Annual General Body Meeting on 5th June 2013. About 186 Fellows attended the Foundation Day celebrations and 19th Annual General Body Meeting, Scientific Sessions, Foundation Day Lecture and Business Session on 5th June 2013.

Newly elected Fellows of the Academy also presented their scientific contributions

Presidential Address



Prof. R.B. Singh, President of the Academy delivered his Address on Climate-smart *Agriculture towards An Ever-Green Economy*. He stated that the concept of the term “Climate Smart Agriculture” (CSA), particularly in context of sustainable agriculture, has evolved in recent years, especially since the Global Conference on ‘Climate Change, Food Security and Agriculture’ held in 2010. He further stated that the Green Economy concept was adopted at the Rio+20 as green economy in the context of sustainable development and poverty eradication will enhance our ability to manage natural resources sustainably and with lower negative environmental impacts, increase resource use efficiency and reduce waste.

He concluded that given the high location-specificity of agriculture and climate change, baseline information on critical factors and input and output markets will be essential for appropriate decision making by farmers and other stakeholders. Climate smart village programmes should thus be judiciously piloted and up-scaled. Further, keeping in view the persistent high incidence of food and nutritional insecurity and the intensifying abiotic and biotic stresses, emphasis should be placed on adaptation-led mitigation. Investment in science and research for development and the associated human resources should be suitably enhanced and linked with an effective monitoring, evaluation and impact mapping system. Innovative approaches to social safety nets will be needed to augment household resilience. The science-policy interface must be institutionalized to ensure that the rigour of science sensitizes policy makers and guides the policy process, options, actions, investment, incentives, and even implementation.

Foundation Day Lecture

Prof. Ved Prakash, Chairman, University Grants Commission, delivered the 20th Foundation Day Lecture entitled “Landscape of Higher Education in India” on 5th June 2013. He began by stating that we have possibly created a barrier between higher agricultural education and the general stream. He said that through this lecture, he would raise some questions for which he has no answer. He traced the origin of higher education in general and

the university system in particular.

Good quality higher education in India still remains elite in nature and is still not accessible to a large bulk of population. The country presently has over 700 degree awarding institutions with about 35,000 affiliated colleges, one of the largest higher education systems in the world, but out of about 119 million youth in the age group of 19-22 years, only about 20 million are annually enrolled in



the formal degree programs with a gross enrolment ratio (GER) of less than 20 per cent. We have massified the higher education but GER is varying between 6-42 per cent in different pockets of the country with glaring disparity. We would like to increase the enrolment to 29 million by the end of XII Plan with a contribution of 6.5 million in distance mode of education and the GER would then be touching the figure of 30 per cent. Despite all efforts, the proportion of GER for the minorities and the socioeconomically backward classes is much less than the national average. To help to create a classless society with equal status, the universities must provide appropriate educational interventions to help bridge the huge economic divide that is prevalent in society. Maintaining their autonomous status, the higher educational institutions must focus on inclusive and quality education to contribute to the nation's economy. We need to tap the talent which is still beyond the reach of higher educational institutions. There are some sections of society whose participation in higher education is very poor. Inclusive and quality education is the need of the hour. It is only such institutions which are going to be in business in future, he asserted.

In conclusion, Prof. Ved Prakash reiterated that amidst fast changing nature of society, mind-boggling scientific changes, sea change in value system, redefined roles of materialism and spirituality requires equally profound change in the education system. He hoped that the Academy would find some answers to some of his concerns and posers.

The Chief Guest's Remarks



Prof. R.K. Pachauri speaking as Guest of Honour emphasized that knowledge is going to be a driver of every type of human attainment, and India having rich history of knowledge and its practice since ancient times must focus on knowledge economy. With knowledge based agriculture we can restructure our mission and goals. In case of agriculture in particular, I believe it is new knowledge that is going to bring about an improvement in the life of our farmers. It is knowledge that is going to ensure that we have enough food to meet the nutritional needs of our population. The negative impacts of climate change on the availability of water, impact of high temperature on crop yields require major efforts for mitigation and adaptation. India has done extremely well in agriculture. But I am not too sure whether the pace that has been established and the need that is now becoming absolutely crucial, is being met through higher level of agricultural research and extension. Through dissemination of knowledge, we can ensure that every sector of society and most importantly the farmers derive benefits from R&D.

We need to be concerned about the sea level rise in the 20th century. The average sea level rise around the globe was about 17 cm and that in the last few years this rate has accelerated. The glaciers are melting and I think the combined effect of melting of various bodies of ice across the globe and the thermal expansion of the ocean is leading to sea level rise which at least in coastal areas is going to cause very serious problems because it will have incursion of saline water much further on shore exposing large part of our coastal area resulting into serious problem of salinity. The increasing temperatures above the average will have negative impact on the productivity of several of our crops. The extreme precipitation events are on the increase both in frequency and intensity. A large part of the rain or snow that we are going to receive will take place in the nature of heavy falls. Therefore, we need to bring about reorientation of our understanding on some of these challenges. Climate change will be an important factor in Indian agriculture as large number of our farmers are dependent on rainfed agriculture. Higher education and ICT can play an extremely important role in climate resilient agriculture. Peer reviews and scrutiny of intellectual activity are the very essence and strength of higher education. As we have a very short window of opportunity, we need to act decisively and faster, otherwise the rate at which knowledge is expanding all over the world will leave us much farther behind. Prof. Pachauri concluded with the message that our administrators of institutions must look at the future and leave behind a legacy which is laced in excellence in education and research.

New Year Get-Together

To mark the advent of New Year 2014, the Academy organized a get together of Fellowship on 1st January, 2014. Dr. N.K. Singh, Secretary welcomed Dr. S. Ayyappan, the incumbent President, Prof. R.B. Singh the outgoing President and Dr. V.L. Chopra, the past President, Prof. Anwar Alam, outgoing Secretary, and newly



elected and outgoing office bearers of the academy and other distinguished Fellowship. Prof. R.B. Singh congratulated Dr. S. Ayyappan for accepting leadership of the Academy. He gave an account of various activities that the academy engaged itself during the year 2013, which included holding of XI Agricultural Science Congress at Bhubaneswar in February 2013 on the theme “Agricultural Education Shaping India’s future”, Foundation day and AGM meeting, various Brain Storming Sessions, invited lectures, publications including Policy papers, NAAS News, Journal of Agricultural Research, participation in the international meetings etc. He thanked the Fellowship in general and the Executive Council in particular for these impressive activities.

On this occasion, various Academy publications that included Year Book and Planner, NAAS News, six policy papers based on Brain Storming Sessions held and a book entitled “Reshaping India’s Agricultural Education: A Roadmap” were released. Dr. S. Ayyappan, the President wished the assembly a Happy, Productive and Prosperous New Year 2014. At the outset he conveyed his gratitude to the immediate past President and Executive Council, as well as all the former Presidents and the Fellowship for giving him the opportunity to serve the Academy. He solicited valuable guidance to improve the Academy further to make it one of the foremost science academies of the country. He said the Year, 2014 has been declared as the UN-International year of Family Farming, which is of direct relevance to Indian Agriculture. It is also the Birth Centenary year of the Nobel Laureate, the late Dr. Norman E. Borlaug, whose last message was to ‘Take science to the Farmer’ and we now have an opportunity to provide ‘Smart Farming for Small Farmers’. The outgoing office bearers were presented a memento by the President NAAS in recognition of their valuable services rendered to the academy. Six publications of the Academy were released during this meeting. At the conclusion of the function, the incumbent Secretary, Prof. M.P. Yadav proposed vote of thanks.

Programmes planned for 2014

Brainstorming Sessions

1. Hydroponic Fodder Production in India (Convener: Dr. H.S. Gupta & Prof. M.P. Yadav).
2. Monitoring and Evaluation on AREE4D (Convener: Dr. P.G. Chengappa).
3. Climate Resilient Livestock Production (Convener: Dr. Khub Singh)
4. Breaking low-productivity syndrome of soybean in India (Convener: Dr. S.M. Virmani)
5. Reservoir Fisheries Development in India: Policy & Management Options (Convener: Dr. W.S. Lakra)
6. Practical and affordable approaches in implement precision (Convener: Dr. S.R. Verma)
7. Linking Farmers with Market (Convener: Dr. Anjani Kumar)
8. Bovine Breeding Policy in India (Convener: Dr. M.L. Madan and Prof. M.P. Yadav)
9. Good Aquaculture Practice (GAP) Certification of Aquaculture in India – Criteria and Implementation Plan (Convener: Dr. I. Karunasagar)

XII Agricultural Science Congress

The XII ASC will be organized from **3-6 February 2015** at National Dairy Research Institute, Karnal. The theme of the Congress is **“Sustainable Livelihood Security of Small Holder Farmers”**. Various sub-themes under which all scientific programmes will be organized are as follows:

Sub-Themes

1. Livelihood security for small holder farmer
2. Skill and human resource development for diversification, employment and income opportunity
3. Empowerment of women in agriculture
4. Intensification of livestock production for small holder and land less farmers
5. Attracting youth in agriculture
6. Group dynamics of small holder farmers, SHGs, Producers Companies, Cooperatives and contract farming

7. Linking small holder farmers with the market
8. Credit flow and insurance support to small holder farmers
9. Mechanization & Post Harvest technologies for small farmers
10. Natural resource management & climate change: International perspective
11. Policy matter issues for the protection of small holder farmers

Dr. A.K. Srivastava, Director, NDRI, Karnal will be the Convener of the Congress (website: <http://agricongress2015.in>, Email : info@agricongress.in).

NAAS Silver Jubilee Celebrations

- ❖ Following Activities/Scientific Programmes will be organized during June 2014 – April 2015 to mark Silver Jubilee of the Academy:
- ❖ National Level Silver Jubilee Symposium highlighting 25 Years of achievements in each section/discipline of the Academy and output in respective areas alongwith way forward till 2030 will be organised between June 2014 and April 2015. For this purpose the following Fellows will act as Conveners with venues in major cities indicated against each:

Names of the Conveners along with the places of the activity are listed below.

Section/discipline	Conveners
Crop Sciences	Dr. Ajay Parida at Chennai
Horticultural Sciences	Dr. H.P. Singh at Bangalore
Animal Sciences	Dr. K.M. Bujarbaruah at Guwahati
Fisheries Sciences	Dr. W.S. Lakra at Mumbai
NRM	Dr. B. Mandal at Kolkata
Plant Protection	Dr. K.R. Kranthi at Nagpur
Agricultural Engineering	Prof. Anwar Alam at Bhopal
Social Sciences	Dr. Mahtab S. Bamji at Hyderabad

- ❖ Half a day commemorative Seminars highlighting the major achievements in the last 25 years.
- ❖ Discipline-wise Panel Discussions for half a day with 20-25 participants will be organized
- ❖ Special Lectures to be delivered by Eminent Agricultural Scientists (Half a day programme)
- ❖ Inter-Academy Meeting on the theme 'Food and Nutritional Security in India' wherein Presidents of the INSA, NASI, NAVS, NADS and IASc may be invited.
- ❖ A day long Youth Convention on the theme 'Youth in Agriculture'
- ❖ Debate competition among the students to be organized on one of the following topics:
 - (a) Alternate Vocations to Agriculture for Rural Youth
 - (b) GM Crops for Long Term Food and Nutritional Security
- ❖ NAAS Silver Jubilee Awards are proposed – one each for Eminent Scientist, Industrialist and Farmer category.

SECURING AND MANAGING FUNDS AND ENDOWMENTS

Finance and Audit

The main source of funds for the Academy is the grant of Rs. 200 lakh received from the Indian Council of Agricultural Research (ICAR) in the year 2013-14. The Accounts of the Academy are audited by Chartered Accountants appointed with the approval of the General Body. Utilization Certificates up to the year 2013-14 have been submitted to the ICAR.

A brief Audited Statement of Accounts and Auditor's Report for 2013-14 is annexed with the report (Annexure I & II).

Acknowledgment

The Academy gratefully acknowledges the Indian Council of Agricultural Research for its generous and continuing support for its programmes, and for extending generous financial support since its inception. The Academy also places on record the cooperation and support in terms of logistics and grants received from other organizations.

Auditor's Report



Ashok Aggarwal & Co.
Chartered Accountants

Chamber No. 207-211, R.K. House,
WP-504, Shiv Market,
Ashok Vihar, Delhi-110052
Tel. : 27224924, 47068900
Telefax : 27466167,
E-mail: info@caashokaggarwal.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, 2014 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 account 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 document 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 2014,
 - (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.

For Ashok Aggarwal & Co.
Chartered Accountants
Regn. No. 005422N


Sachin Aggarwal
Partner
M. NO:-500156
Place : New Delhi
Dated : May 1, 2014



NATIONAL ACADEMY OF AGRICULTURAL SCIENCES
BALANCE SHEET AS ON 31.03.2014

Liabilities	Amount (Rs.)	Assets	Amount (Rs.)
CAPITAL FUND		FIXED ASSETS	
Opening Balance	11,56,03,999.43	Opening Balance	3,11,75,208.49
Add: Transferred from Accumulated Fund	1,53,74,154.00	Addition during the year	50,29,536.00
Add: Excess of Income over Expenditure during the year	98,58,898.74	Sale during the year	—
Less: Funds transferred to Specific Reserve Fund	1,59,30,253.74	Depreciation w/off	(35,02,606.16)
		Deposits in Approved Securities	13,83,33,729.81
SPECIFIC RESERVE FUND		CURRENT ASSETS	
Opening Balance	5,02,81,806.84	Bank Balances	26,51,471.66
Add: Addition during the year	1,59,30,253.74	Cash Balances	10,294.00
Less: Utilized during the year	1,53,74,154.00	ADVANCES	
		Tax Deducted at Source	20,47,071.21
Total		Total	17,57,44,705.01

As per our report of even date attached

Ashok Aggarwal & Co.

Chartered Accountants

- Sd -

Sachin Aggarwal

Partner

M.NO. - 500156

Place : New Delhi

Dated : May 1, 2014

National Academy of Agricultural Sciences

- Sd -
Treasurer

- Sd -
Secretary

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED ON 31st MARCH, 2014

Expenditure	Amount (Rs.)	Income	Amount (Rs.)
To Expenditure/contribution on Project Programmes	1,51,26,915.11	By Grant in Aid from ICAR	2,00,00,000.00
To Depreciation	35,02,606.16	By Interest on Investments	49,99,859.71
To Excess of Income over Expenditure transferred	98,58,898.74	By Contribution from Publications, Subscriptions and other receipts	34,88,560.30
Total	2,84,88,420.01	Total	2,84,88,420.01

As per our report of even date attached

Ashok Aggarwal & Co.
Chartered Accountants

- *Sd* -

Sachin Aggarwal
Partner

M.NO. - 500156

Place : New Delhi

Dated : May 1, 2014

National Academy of Agricultural Sciences

- *Sd* -

Treasurer

- *Sd* -

Secretary

LIST OF ACRONYMS

ADG	Assistant Director General
AREE4D	Agricultural Research, Education and Extension Integration for Development
BRAI	Biotechnology Regulatory Authority of India
CAZRI	Central Arid Zone Research Institute
CNBRCD	Centre for Natural Biological Resources and Community Development
CRIDA	Central Research Institute for Dry land Agriculture
COL	Commonwealth of Learning
CSA	Climate Smart Agriculture
CSIR	Council of Scientific & Industrial Research
DAHD&F	Department of Animal Husbandry, Dairying and Fisheries
DARE	Department of Agricultural Research and Education
EC	Executive Council
FAO	Food and Agriculture Organization
FRS	Fellow of the Royal Society
GEAC	Genetic Engineering Appraisal Committee
GER	gross enrolment ratio
GM	Genetically Modified
GMOs	Genetically Modified Organisms
IBSC	Institutional Biosafety Committee
ICAR	Indian Council of Agricultural Research
IIPR	Indian Institute of Pulses Research
IISS	Indian Institute of Soil Science
INSA	Indian National Science Academy
KVKs	Krishi Vigyan Kendras
MOOC	Massive Open Online Courses
NAAS	National Academy of Agricultural Sciences
NADS	National Academy of dairy Sciences
NASC	National Agricultural Science Centre
NASI	National Academy of Sciences, India
NAVS	National Academy of Veterinary Sciences
NBAIM	National Bureau of Agriculturally Important Microorganisms
NDRI	National Dairy Research Institute
NICRA	National Initiative on Climate Resilient Agriculture
NIFA	National Institute of Food and Agriculture
RCGM	Review Committee on Genetic Manipulation
SAC to PM	Scientific Advisory Council to Prime Minister
SAUs	State Agricultural Universities
SHG	Self Help Group
TEC	Technical Expert Committee
UGC	University Grants Commission
USDA	United States Department of Agriculture



NATIONAL ACADEMY OF AGRICULTURAL SCIENCES

Map indicating Regional Chapters



NAAS Documents on Policy Issues*

1. Agricultural Scientist's Perceptions on National Water Policy	- 1995
2. Fertilizer Policy Issues (2000-2025)	- 1997
3. Harnessing and Management of Water Resources for Enhancing Agricultural Production in the Eastern Region	- 1998
4. Conservation, Management and use of Agro-biodiversity	- 1998
5. Sustainable Agricultural Export	- 1999
6. Reorienting Land Grant System of Agricultural Education in India	- 1999
7. Diversification of Agriculture for Human Nutrition	- 2001
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