



CONTENTS

| | |
|---|----|
| From the President's Desk | 1 |
| 100th Executive Council Meeting | 3 |
| Presentation by Newly Elected Fellows | 3 |
| Programmes Held | 3 |
| Annual General Body Meeting | 3 |
| Resolution on Commercialization of GM Mustard | 5 |
| Presidential Address | 6 |
| Foundation Day Lecture | 7 |
| Press Meet | 9 |
| Activities of Regional Chapter | 9 |
| Hyderabad Chapter | 9 |
| Brainstorming Session | 10 |
| Awards and Honours | 10 |
| Forthcoming Programmes | 10 |
| Article - Soil Health Card | 11 |
| Change of Addresses | 14 |
| Obituaries | 15 |

Editors

Dr K.K. Vass

Dr V.K. Bhatia

From the President's Desk

Agriculture Deserves it's Due



We progressed on food production front from 51 million tons (mt) in 1947 to 273 mt, in 2017, besides making similar gains in sugarcane and cotton as well. But simultaneously, our population also grew from 361 million in 1947 to 1302 million in 2017, thus negating the impact of higher production to certain extent. Analogous

increase in production is recorded in fruits, vegetables, milk, fisheries and poultry. All this has made us a proud nation with achieving self-reliance in food security and becoming a net exporter today, in comparison to the food-import-shipment-to-mouth, situation in 50's and early 60's. While applauding these achievements, we need to be reminded that the production is rather cyclical and there are severe ups and downs in the total agriculture production caused primarily due to monsoonal uncertainties, thus underpinning the need for appropriate technologies conducive to sustainable growth. On the socio-economic front, we feel saddened when we observe that we are at a lower rung of socio-economic development indicators, even among developing countries, in terms of undernourishment, hunger, and poverty prevailing among our population. Suffice to say that almost half of world's undernourished children are our own and also belonging to farm families as well.

We also notice that over the years the farming (production) has improved but not the condition of farmer. This is substantiated by the projections that 40% of farmers want to quit farming, given a better alternative. Worst, farmer suicide is on the rise, farmers' debt trap is increasing over years, rural-urban divide is widening. Market volatility rather than food scarcity is the cause for crisis in agriculture today. Market prices are dropping and inputs costs are increasing, rendering agriculture rather risky and unviable.

New strategy in agriculture is thus called for, which has to be led by structural reforms and infrastructural augmentation. We lose 8-10% of our non-perishable produce, (27 mt), and 20-30% of perishables, (50 to 60 mt), which together is estimated to cost us as much as Rs. 90,000 crore every

year or say up to Rs. 4 - 4.5 lakh crore during entire Plan period. Why can't we invest even one-fourth of this amount in generating suitable technologies and building necessary infrastructure to save this recurrent colossal loss and help to increase (or double) farmers' income, besides generating jobs for the rural youth? A large part of the produce of the farmer is sold at the farm gate without any processing and/or any value addition, as the production sites in the rural areas are devoid of such facilities, resulting in low returns to a farmer and also denying employment opportunities to the rural youth, if such facilities were in place. The farmer is thus totally out of the marketing-value-addition-consumption-chain and the profit sharing mechanism. Further, lack of adequate cold chain facilities promotes distress sale of produce and exposes the farmer to price volatility.

Improvement in production technologies requires investment in research which presently is merely 0.60% of A-GDP, against the desired figure of 1.5-2.0%, hampering the required growth in research and education development in the country. India's two-thirds of the population is in the age group of 19-35 years - a great national asset, but most are under- or un-employed. Obviously, a sizeable chunk of this force needs to be engaged in non-farm activities by creating enabling environment and infrastructure. Promoting agri-entrepreneurs is the answer for engaging this vibrant rural youth in their own settings. We need to make employment in agriculture comparable to other professions so as to maintain the enthusiasm and interests of youth in this profession, which must be intellectually stimulating and economically rewarding.

Therefore, future path of growth in agriculture must, ensure congruence among enhanced productivity, sustainability, profitability and equity. Strategy for reorientation of agricultural research, skill development, and effective out-reach network for technology spread and adoption must be in tune with developments taking place at the national and international levels. Accordingly, the investment in agriculture needs to be streamlined so as to make agriculture an attractive and profitable profession. If we really mean to improve farming and farmers' livelihood, we urgently need to rationalize our investment priorities and also the mechanism of marketing and profit sharing among producer, marketer, and consumer. Creating necessary infrastructure and efficient supply-chain-management system, including cold chain, storages, and transportation. It will be conducive for more job creation in rural settings, reducing

huge farm produce losses, increasing farmers' income, and checking rural migration to cities. Problem of plenty or surplus management has crept in recently and is a big challenge today than the deficit management of yesteryear. Decentralized investment by setting of small satellite towns for promoting agriculture raw material based industries for post-harvest processing and value addition of different produces can boost agricultural growth and create win-win situation for producer, agri-business professionals, and consumers.

Recognising that more than half of India's population is dependent on agriculture and the sector is the largest employer of workforce, return on investment in agriculture is higher than that in any other sector. Growth in agriculture reduces poverty and hunger almost twice as much as analogous growth in other sectors. India's economy will grow faster if agriculture attains a sustained growth, this needs sustained and adequately enhanced budgetary allocation to agriculture including R&D thus investment in agriculture can hardly be overemphasised. Fortunately, during the past couple of years, the Government has recognized this need and Union Agriculture Budget for 2017-18 was increased by 24% over the 2016-17 allocation, which in itself was significantly higher than the 2015-16 Budget. Major investments and reforms, including technological improvements are positioned in key sub-sectors, viz. PMKSY, PMFBY, Soil Health Card, Neem Coated Urea and INM, e-NAM, Gokul Mission, MGNREGA and others.

These initiatives, along with Jan Dhan Yojana, Make-in-India, Skill India, Digital India, and Doubling Farmers' Income by 2022, notwithstanding, Indian agriculture and farmers continue to be at crossroads. In order to realize the expected gains from the various initiatives, reforms, and enhanced budgetary allocations, outcome/impact assessment mapping should be institutionalized and effectively governed all along the developmental pathways to achieve the targeted outcomes.



Panjab Singh
President

100th Executive Council Meeting



Celebrating 100th EC Meeting

The meeting was held in the forenoon on June 4, 2017, in the Academy Secretariat and was attended by 19 EC members. Being 100th meeting, all the members expressed great satisfaction and happiness on this landmark achievement in the Academy's growth. The Executive Council approved the minutes of 99th meeting and action taken report was deliberated, the progress noted with satisfaction. The Executive Council was briefed by Dr C.D. Mayee, Vice-President about the details of *Mentoring Scheme and Science Communication Strategy*, all members welcomed the

concept but desired to have proper implementation in place. The EC also accorded approval to place the Annual Report 2016-17 of the Academy and the audited statement of accounts for the year 2016-17 before AGM. Based on the recommendation of a committee, the revised guidelines for Institution of Endowment Awards of the Academy were accepted and it was decided to raise the endowment amount to Rupees 20 lakhs from the existing 10 lakhs. It was also decided that the *XIV Agricultural Science Congress (ASC)* will be organised at Delhi in collaboration with IARI, New Delhi. As desired and expressed by Fellowship on many occasions that Academy may prepare actionable points from existing NAAS Policy / Strategy Papers, the EC decided to request Prof R.B. Singh, Past President, NAAS to formulate a roadmap out of relevant Policy Papers/Strategy Papers, that will be useful for initiating desired actions by NAAS/ICAR/Govt. of India/States/Others. The EC also approved to extend 25% discount on NAAS publications to private publishers as well. All other listed agenda items were deliberated and accorded approval wherever required.

Presentation by Newly Elected Fellows



Newly elected Fellow presenting his work in first Session

On June 04, 2017 in the afternoon, presentations were made in two sessions before the full house of Academy Fellowship. The Session-I was chaired by Prof Anupam Varma, Vice-President and co-chaired by Dr J.K. Jena, Secretary. In this session 13 Fellows belonging to disciplines of Crop, Horticulture, Animal, and Fisheries Sciences, made presentations on their work which generated very useful discussions among the Fellowship present in the house. The Session-II

was chaired by Dr C.D. Mayee, Vice-President and co-chaired by Dr K.V. Prabhu, Secretary, in which 11 Fellows under the discipline of NRM, Plant Protection, Agricultural Engineering & Technology, and Social Sciences, presented their work and one presentation was also made by Paravasi Fellow. All the presentations generated lot of discussions and many valuable inputs were given by the house to the presenters.



Newly elected Fellow presenting her work in Second Session

Programmes Held

Annual General Body Meeting

The 24th Annual General Body Meeting (AGM) of the Academy was held on June 05, 2017 at A.P. Shinde Symposium Hall, NASC Complex, New Delhi under the

Chairmanship of Prof Panjab Singh, the President of the Academy. It was attended by 195 esteemed Fellowship including two Past Presidents, Prof V.L. Chopra and Prof R.B. Singh, EC members, New Fellows and Associates.

Prior to start of deliberations, a 2-Minute silence was observed by the entire house as a mark of respect in the memory of 11 Fellowships, namely Dr Amrik Singh Sidhu, Dr Ravender Singh, Dr N.G.P. Rao, Dr Bharat Chattoo, Dr Swadesh Kumar Handa, Dr S. Nagarajan, Dr P.S. Ahuja, Dr K. Devadasan, Dr S. Robin, Dr N.A. Chaudhury, and Dr D.S. Athwal, who passed away since the last AGM.

The President welcomed the distinguished Fellowship assembled for AGM and shared felicitations of the World Environment Day and mentioned that he is looking forward for today's deliberations so that house apart from transecting the routine business also gives serious thought as to how NAAS can give re-orientation to its activities for contributing as a think tank to meet the new challenges being faced by our agricultural research, education, extension for development. The President also referred to successful conduct of XIII Agricultural Science Congress held at UAS, Bengaluru, between February 21-24, 2017. He observed that as per the decision of Government of India, recently NAAS has been reviewed by a high level committee of experts and very good report has been given by the team. He mentioned that NAAS will take appropriate follow-up actions, as per specific suggestions in the report.



Prof Panjab Singh welcoming the Fellowship assembled for AGM

Dr K.V. Prabhu, Secretary, NAAS presented a detailed report on various activities carried out by the Academy during the year 2016-17. He informed about the conduct of various EC meetings, their decisions, organizing technical programmes and regional chapter activities. Dr B.S. Dwivedi, Treasurer, presented the statement of accounts of the Academy including the audited report for the year 2016-17, that was duly approved by the house. Dr K.K. Vass, Editor, presented his report and informed the house the details of special publications brought out by the Academy since last AGM apart from quarterly NAAS-NEWS. He requested the Conveners of Regional Chapters and all Fellowship to contribute/send their material for inclusion in NAAS-NEWS. Dr P.K. Joshi, Foreign Secretary, presented his report and outlined various initiatives to improve the international linkages of NAAS. The Annual Report for 2016-17 of the



Dr K.V. Prabhu presenting report on NAAS activities

Academy was presented by Dr K.V. Prabhu, Secretary, and was approved by the house.

All agenda items listed for the business was deliberated upon, and accorded approval by the Fellowship. Some of the important decisions in the AGM include appointment of new auditors, revised guidelines for Institution of Endowment Awards and organisation of XIV Agricultural Science Congress at Delhi in 2019. Further, during the AGM, as a separate agenda item, a Resolution on Release of GM Mustard was moved and it was approved after an elaborate discussion in the house with an overwhelming support of the Fellowship (Page 5).

The esteemed Fellowship participated in general discussion and made suggestions pertaining to: (i)



NAAS Fellowship at AGM Meet

Seed being very important component of agricultural production and as such a "Brain Storming Session on Seed Sector" may be organised by NAAS; (ii) the Foreign Secretary, may conceptualise a Project on "Agri-Business in SAARC Countries" (iii) Nutritional component of food crops may be included in the syllabus of course curriculum of different courses in State Agricultural Universities. (iv) Guidelines may be prepared for the newly inducted Fellowship so that they only confine to their own achievements rather than of their institutions. (v) For enhancing the visibility of NAAS, Regional Chapters may organise quizzes/essay competitions among school and college students. (vi) Feed is a very important component for increasing the milk production in the country, so NAAS may organise a "Brain Storming Session on Feed for the Livestock Sector". (vii) Fellowship desired that only

the specific changes in new procedure for the Election of Office Bearers and Members of the Council may be highlighted to bring in more clarity. The President remarked that all points made above will be examined at NAAS Secretariat and appropriate action wherever required will be initiated (continued on page 6).

Resolution on Commercialization of GM Mustard

Whereas, The National Academy of Agricultural Sciences (NAAS), presently comprising nearly 625 Fellows, is the national think-tank for analyzing technological, socio-economic, and eco-environmental aspects of agricultural and food systems transformation and for suggesting holistic solutions for sustained, inclusive and accelerated agriculture-led development;

Whereas, The best bet for alleviating the stubbornly high incidences of hunger, under nutrition, and poverty in an agriculturally important country like India, and that efficacy of such an agriculture will be underpinned by the development of ever-improving technologies and technological innovations as well as their effective adoption to produce More from Less for More (MLM);

Whereas, despite ushering in the Green Revolution during the past 50 years and achieving food self-sufficiency and Right to Food based on home-grown food and becoming a formidable exporter of rice, cotton and other commodities, the situation of edible oilseeds remains gloomy;

Whereas, India meets 60% of its demand for edible oils through imports, costing nearly Rs. 80,000 crore annually, let alone the opportunity lost for the farmers to enhance their agricultural productivity and income, and national average yield of oilseed crops is low and sluggish;

Whereas, Brassica/rapeseed mustard is an important oilseed crop of India, occupying 6.6 million hectares of the 33 m ha global area, of which 8.5 m ha in Australia, Canada, and USA is under GE Mustard, and farmers in these countries have been reaping socio-economic and environmental benefits from GM canola since 1996, rendering Canada as the foremost exporter to India;

Whereas, In order to enable India also to benefit from GM mustard, our scientists have toiled hard during the past 20 years to develop promising biotech mustard varieties, such as mustard hybrid DMH-11, using barnase-barstar system to produce stable male sterile and fertility restorer lines for hybrid seed production;

Whereas, In field trials, DMH-11 has out-yielded the national and zonal checks by 20 to 30%, and future breeding using these two transgenic events will provide mustard hybrids with canola quality and better yield through mustering extensive diversity available in

mustard in the country for creating progressively higher yielding superior multi-trait hybrids;

Whereas, appreciating that regulatory approval is an essential requirement for commercialization of GE crops, India has developed a multi-tier regulatory system, which is one of the most robust regulatory systems in the world to address the biosafety and environmental concerns;

Whereas, The DMH-11 hybrid and its parental lines were rigorously tested for biosafety as per the guidelines and procedures, and all the biosafety studies conducted were submitted to GEAC in September 2015, and clearance from GEAC has been accorded on May 11, 2017, after thorough analyses by the expert committees;

Whereas we have apprised ourselves of all the conducted studies and unequivocally state that this technology is as safe as the non-GE mustard and will help the farmers and the country in improving its edible oils economy;

Whereas, The scientific and regulatory authorities around the world have consistently and repeatedly refuted the unfounded concerns of the activists, the Academy is deeply concerned about unscientific and ill-motivated attacks on the use of the GM mustard hybrid for improving the edible oil economy in India;

Therefore, towards greening the edible oil economy and connecting the people to nature on this World Environment Day, June 05, 2017, now, we the Fellowship (nearly 200 at this AGM) of the National Academy of Agricultural Science (NAAS), New Delhi, resolve that:

- The Central and State Governments should immediately endorse the recommendations of the GEAC so that the coming growing season can be fully utilised for the multiplication of parental lines and production of hybrid seed, which will hasten the environmental release of the two mustard parental transgenic events and hybrid DMH-11, thus allowing this technology to be available to farmers soon at a low-cost, and to breeders, to develop better and better hybrids in future;
- Having fully met the regulatory, biosafety, and performance requirements, a biotech product must not be denied to the farmers, who should have options to make informed choices, and empowered to become globally competitive in the fast changing world;
- All stakeholders must have full faith in the power of science & technology and the national regulatory & scientific agencies to improve our agricultural and food system productivity, profitability, and sustainability in perpetuity so that we not only help the farmers in improving their income and help

the country in reducing the burgeoning edible oil deficit, but also ensure that science is not denied the opportunity to serve the society; and

- Finally, the government should proactively support the agricultural scientists to pursue frontier sciences and to take new developments in science and technology to the farmers, as delays in decision making will only dishearten and de-motivate the scientific community, particularly young scientists.

Fellowship Admission

Dr K.V. Prabhu, Secretary, conducted the formal admission ceremony of the newly elected Fellowship during the year 2017. Respective Conveners of the Sectional Committees and in their absence, Secretary of the Academy, read out the citations of the Fellows. Thereafter, the President admitted following Fellowship to the Academy under different sections / categories:



Newly elected Pravasi Fellow receiving Fellowship certificate from the President

Crop Sciences

1. Dr Ryappa Ramappa Hanchinal
2. Dr Ajit Kumar Shasany
3. Dr Kuldeep Singh
4. Dr Narendra Pratap Singh
5. Dr Hari Deo Upadhyaya
6. Dr S. Robin (*admitted posthumously*)

Horticultural Sciences

1. Dr Ram Roshan Sharma
2. Dr Ramkrishna Pal
3. Dr Bijendra Singh

Animal sciences

1. Dr Vinayagamurthy Balamurugan
2. Dr Tarun Kumar Bhattacharya
3. Dr (Ms.) Sunita Grover
4. Dr (Mrs.) G. Taru Sharma

Fisheries Sciences

1. Dr A. Sait Sahul Hameed

2. Dr Sibnarayan Dam Roy

NRM Sciences

1. Dr Pratap Bhattacharyya
2. Dr Chandra Bhushan Pandey
3. Dr Yashbir Singh Shivay
4. Dr Arvind Kumar Shukla
5. Dr Gulshan Mahajan (*admitted in absentia*)

Plant Protection Sciences

1. Dr Pranjib Kumar Chakrabarty
2. Dr Supriyo Chakraborty
3. Dr (Ms.) Lata
4. Dr (Ms.) Irani Mukherjee

Agricultural Engineering & Technology

1. Dr Arjamadutta Sarangi

Social Sciences

1. Dr Hukum Chandra
2. Dr Narayan Bhaskar

Pravasi Fellows

1. Dr Kshirod Kumar Jena
2. Dr Vijay K. Juneja (*admitted in absentia*)

Foreign Fellows

1. Dr Albrecht E. Melchinger (*admitted in absentia*)
2. Dr Patrick Sorgeloos (*admitted in absentia*)

Following listed scientists were selected as NAAS-Associates for the year 2017 and given certificates by the President.

Associates

1. Dr Gajanan Behere
2. Dr Naveen Chandra Bisht
3. Dr (Ms.) Amritpal Kaur
4. Dr Amit Kumar
5. Dr Satendra Kumar Mangrauthia
6. Dr Manish Kumar Pandey
7. Dr Vijay Kumar Prajapati
8. Dr Yashpal Singh Saharawat (*admitted in absentia*).
9. Dr Nirbhay Kumar Singh (*admitted in absentia*).
10. Dr Sudhakar Srivastava

The President also presented NAAS-Institutional Membership certificates to following institutions.

1. Rajmata Vijayaraje Scindia Krishi Vishwa Vidhyalaya, Gwalior, Madhya Pradesh.
2. Acharya NG Ranga Agricultural University, Hyderabad, Andhra Pradesh.
3. Birsa Agricultural University, Kanke, Ranchi, Jharkhand.

Presidential Address

Prof Panjab Singh, President, NAAS delivered the Presidential address on **Reforms in Agricultural Research and Development**. He stated that the

achievements in the agricultural sector are attributed in large part to technology led improvements in productivity and investments in agricultural R&D and allied

sectors. He mentioned that our agriculture witnessed three distinct phases of growth, first, the sustenance agriculture till 60's later through the decades of 1970s to 1990's, in the second phase we saw the technology and input driven agriculture, which led to significant increase in production of important crops, especially of rice and wheat, that led to the 'Green Revolution' in the country. During the third phase, the emphasis was given towards diversification with inclusion of non-cereal crops including fruits and vegetables, livestock and fisheries. The efforts resulted in White Revolution in milk production and Blue revolution in fish production. This resulted in further acceleration in growth of agricultural output.



Prof Panjab Singh,
President NAAS
delivering Presidential
Address during AGM

It was emphasized by him that India is projected to be the most populous country in the world with about 1.5 billion people by 2030. Hence Food Security for all would be the most important challenge. The resource endowments of land, water etc. being unique to our country and their potential needs to be harnessed to the advantage of agriculture sector.

Referring to Climate change, now globally accepted threat and a serious concern for all the countries, he advocated for a collective approach cutting across disciplines, to effectively counter the threat of climate change. In this connection he mentioned that application of biotechnology for sustainable agricultural production is well established and could be used for evolving coping strategy for climate change issues as well. He cited that Indian farmers have benefited immensely from transgenic Bt cotton in which production has taken a quantum jump from 13.7 million bales in 2003-04 to an estimated 32.0 million bales in 2016-17. In this connection he expressed the concern of Academy in delays occurring at various levels in grant of permission in the testing / release of GM technology specifically of Mustard. He was of the view that Fellowship should also firm up their opinion on this important issue.

He expressed concern that of late, there is a general impression that higher agricultural education in the country is facing dilution in its quality. Emphasizing that to ensure academic excellence, universities may be accorded enhanced level of autonomy coupled with accountability. He stressed the need for periodic review and revision of curriculum consistent with national and global scenario, with a focus on market trends, self-employment avenues and industry requirements.

He also pointed out that over the years a huge expansion of the existing institutions and establishment of newer institutions under ICAR system has occurred, which was not appropriately supported by any matching increase in the budget and manpower. The move led to thin spread of resources with a larger share going towards meeting the establishment costs and leaving meager funds for the research programmes. In this connection he mentioned that our Academy should have a critical assessment of the resource use and suggest to the authorities to control expansion and focus on integration of intra and inter-institutional multidisciplinary research efforts.

He talked about how Academy could get involved in government initiative of "Doubling Farmers Income by 2022". At the same time he mentioned that strategy for future growth should not be a "Food First" or a "Food Self Sufficiency" that quests to increase food production alone at all cost, at the exclusion of other ecological concerns. That approach he cautioned may result in serious resource degradation and/or misuse of resources.

While concluding, he emphasized that we have reached a stage where we must address 'second generation problems' relating to organizational rigidities, inefficiencies, and difficulties in sustaining funding. In the rapidly evolving scenario of agricultural research for development, NAAS must carve a niche for itself and play a more proactive advocacy role, in matters of voicing concerns for policy issues and providing advisories relating to Government programmes/initiatives in agriculture. He hoped that our Fellowship spread across the country will be forthcoming to make NAAS an important partner in the national development.

At the end a formal vote of thanks was proposed by Dr J.K. Jena, Secretary, NAAS.

Foundation Day Lecture

Dr Arvind Subramanian, Chief Economic Adviser, Ministry of Finance, Govt. of India delivered the Foundation Day Lecture entitled "**Transforming Indian Agriculture: Some Reflections**". In his lecture, he mentioned that the Government has made doubling farm incomes as one of its top policy priorities. To this end, it has taken a

number of policy actions to boost agriculture: instituting soil health cards, emphasizing efficient irrigation, strengthening of procurement of pulses, introduction of neem-coated urea, building more assets under MGNREGA, expanding crop insurance for farmers, and building a common agricultural e-market via e-NAM.



Dr Arvind Subramanian, Chief Economic Adviser, MoF, Govt, delivering Foundation Day Lecture



NAAS Fellowship and other dignitaries at the Foundation Day Lecture

He mentioned that while these developments are taking place in agriculture sector, but still farmer is projected as pure, unsullied, hard-working, in harmony with nature yet poor, vulnerable and the victim, first of imperial masters during pre-independence and then of indigenous landlords and middlemen in post-independence era. It looks that to support and protect the farmer is also a preferred ideology and mantra of political class. He questioned that whether this kind of approach, in the present day, is really helping the farmer's cause for betterment? In his lecture he dealt on following critical issues.

Agriculture Matters: He enumerated the well-known reasons of importance of agriculture, like sustenance to many, food to all, and employment to many etc. Emphasizing that in addition to these intrinsic positive reasons to invest in agriculture, there are other instrumental reasons like poor agricultural performance, political and social disaffection and restiveness, all of which can hold back the economy. Thus there are intrinsic as well as instrumental reasons for prioritising agriculture. He argued that, Sir Arthur Lewis, Nobel Laureate, has shown that economic development was always and everywhere about getting people out of agriculture. But this must happen along with rapid productivity growth, ensuring rising farm incomes and adequate food supplies for the people. He suggested that we must care deeply about farmers and agriculture today because we want there to be fewer but more productive and prosperous farms and farmers tomorrow.

The Success: He highlighted that Indian Agriculture has come a long way since 1947, achieved food security in major crops, rural poverty rates have declined substantially, agricultural incomes have risen, and nutrition levels have risen. He mentioned about contributory factors for wheat and rice based green revolution especially in Northern and Southern States that was supplemented by white revolution which transformed the Indian dairy sector and coupled with regional achievements like Cotton in Gujarat, Maize in Bihar, Sugarcane in Uttar Pradesh, Wheat in Madhya Pradesh and Potatoes in West Bengal, are satisfying

successes of our agriculture growth. But despite these successes, the honest story is that overall agricultural labour productivity is less than a third of that in China and about one percent of that in advanced countries like USA. He mentioned that median household net farm income was about Rs. 19,250 in 2012-13, which is not very far above the poverty line. Indicating that while there is enormous variation across states in these incomes but opined that it does not pay to be a farmer in India. He further stressed that emerging challenge of Climate change is reported to reduce agricultural productivity and increase variability; all the models indicate disproportionate impact on our agriculture.

Cereal-Centricity: It was pointed out by him that we support cereal and especially rice production through numerous ways, government helps farmers through policies that affect the prices of outputs and inputs. We provide MSP to farmers for marketable output that too mostly in cereals and wheat, which in turns is confined largely to a few states. Adding on to it, subsidies are provided for power, water, fertilizer, seed, credit, exemption from income tax and occasionally loan waivers. It results in higher agricultural incomes for States producing more cereals and wheat – reflecting a biased smothering with love for cereals.

Smothering with love-Big not small Farmers: Dr Subramanian pointed out that this approach not only benefits the cereal farmers, it also tends to favour larger farmers and does not adequately reach the smaller farmer. He also cited that exemption of agricultural income from tax favours those with larger incomes, only one-third of subsidy on fertilizer went to small and marginal farmers. Further, he stated that data now indicates that not all of agricultural credit goes to farmers and loan wavier mostly helps bigger farmers. He cited examples from Punjab, that this smothering approach in the long-run can be counter-productive, as agricultural growth in Punjab used to be 5.7% between 1971-72 and 1985-86 while for All India, it was only 2.3%. Since 2005-06, it recorded declining trend to an average of 1.6% in comparison to Indian average of 3.5%.

Policy adjustment: He mentioned that while supporting cereals more is understandable but we should also pay adequate attention to pulses, dairy, livestock, fruits, vegetables and oilseeds. He cited commendable efforts made in pulses to increase procurement at MSP resulting in increase to 2 million tons (out of a total output of 8.7 million) in Kharif season but at the same time it was reported that about 60% of the record *Tur* output was sold at less than MSP, resulting in depressed income. This leads to a response that creates policy volatility and pro-cyclicality, which increases price uncertainty for farmers. So we must take long-term perspective in making policy adjustments. In case of fruits and vegetable he mentioned that restrictions on selling imposed via APMCs are not helpful. The government has created an electronic common market and we must wait to see the results. On dairy and livestock we must be fully aware of the economic costs of social policies. If social policies impede the working of the livestock market, the impact on economics of livestock farming could be considerable. So these must be accounted for appropriate choices to be made. It is possible that social policies could affect social returns even more adversely.

Conclusion: Dr Subramanian pointed out that the benefits of technology are very important for pulses, oilseeds and dairy. If we want farmers to benefit from new technology we must allow them these benefits regardless of the provenance of the technologies just as we do in other sectors. Expropriating property rights retroactively and undermining sanctity of contracts as sought by voices on opposing ends of the ideological spectrum could impede the flow of technology and thus end up hurting not helping farmers. To be sure, we must absolutely ensure that there is no abuse of patent rights or other monopolistic practices but the right instruments must be chosen, moreover, there must always be an underlying cost-benefit analysis but an analysis as farmers themselves would do it rather than as how the analysis might be done for them. He mentioned that ways must be found of reducing the addiction of intensive agriculture to have free power, water, cheap credit and fertilizer. He also urged that CACP in its MSP calculations to quantify not only the private costs and returns of various crops but also their true social costs. At the end, he stressed that time has come to do hard-nosed realism to transform Indian agriculture.

Press Meet

In order to put forward the view points of NAAS Fellowship effectively and for their wider dissemination, a Press Conference on GM Mustard was held in the afternoon of 5th June, 2017 in NAAS Secretariat. It was chaired by Prof Panjab Singh, President, and attended by Prof R.B. Singh, Former President, NAAS, Dr T. Mohapatra, Secretary DARE & Director General, ICAR,



NAAS Fellowship interacting with members of press on GM Mustard

Prof Deepak Pental, Former Vice Chancellor, Delhi University, Prof Sudhir Sopory, Former Vice Chancellor, JNU, Dr Swapan Kumar Datta, Former DDG (Crops), ICAR, Dr C.D. Mayee, Former Chairman, ASRB & Vice-President, NAAS, Prof Anupam Varma, Vice-President, NAAS, Dr K.V. Prabhu, Jt. Director (Research), IARI & Secretary NAAS and other internationally known experts in the field of GM technology were also present. These experts and President NAAS interacted with members of press on various issues raised by them on GM technology. There were more than twenty journalists representing Press and Electronic Media. For the information to press, the resolution adopted by NAAS Fellowship in their AGM strongly recommending the release of GM Mustard was circulated. It was informed that a letter has been written to the Hon'ble Prime Minister of India from NAAS, requesting his indulgence in the matter and asking the Ministry of Environment, Forest & Climate Change (GoI) to give early approval on the recommendation of GEAC on GM Mustard.

Activities of Regional Chapter

Hyderabad Chapter

The Chapter organized Quiz, Elocution and Painting competitions for VIII to IX standard students from different

schools on 6th April 2017 at CRIDA, Hyderabad. The main purpose of this programme was to create awareness and consciousness about agricultural sciences among the school children. The topic for elocution was "How



Winning students with Dr David Bergvinson and Dr Ch. Srinivasa Rao

to make farming a lucrative profession” and theme selected for painting was *Swatchh Bharat*. Students from four Kendriya Vidyalaya Schools and Ekalavya High School, Jillelaguda, Hyderabad participated in these events.

The winners of the competitions received certificates and mementos on 12th April, 2017 the CRIDA Foundation Day, from the Chief Guest Dr David Bergvinson, DG, ICRISAT, Hyderabad. This important event was effectively organized by Dr Ch. Srinivasa Rao, Director, CRIDA & Convener of Hyderabad Chapter.

Brainstorming Session

A Brainstorming Session (BSS) on *Mitigating Land Degradation Due to Water Erosion* was held under the Convener'ship of Dr V.N. Sharda, Chairman, ASRB and Fellow of the Academy, at NAAS Secretariat on 20th June, 2017. The session was chaired by Prof Panjab Singh, President of the Academy and attended by 17 senior level scientists from different disciplines representing nodal ministries, development departments, ICAR,



Brainstorming Session on Mitigating Land Degradation Due to Water Erosion, in progress

SAUs, IWMI, and NAAS. The purpose of this BSS was to discuss in detail various issues and concepts of water erosion in mitigating land degradation. The theme of the topic was comprehensively presented by the Convener, Dr V.N. Sharda, he dealt on all issues related to soil erosion, land degradation, climate and ecological aspects of soil erosion, indicators for identification of hot spots and bright spots and mitigating strategies for minimising production and economic losses. This was followed by two more presentations on *Sedimentation in Reservoirs and Sediment Yield from River Basins* and *Erosion Risk Areas and Production Losses due to Water Erosion*, by the scientists of IISWC, Dehradun. There was a detailed discussion among the participants and very useful recommendations emerged, viz, effective implementation of national programmes like PMKSY, MGNREGA, and watershed development; watershed approach to control the threats of climate change; best management practices to bring the erosion within permissible limits, scientifically developed soil maps may be made available to concerned departments for their conservation planning.

Awards and Honours

Dr K.C. Bansal, NAAS Fellow and former Director, ICAR-NBPGR, New Delhi received Haryana Vigyan Ratan Award for 2012-13 from Shri Kaptan Singh Solanki, Hon'ble Governor of Haryana, at Raj Bhavan

in Chandigarh on May 11, 2017. He received this award for his valuable contributions in the field of Plant Biotechnology that has helped directly and indirectly in crop improvement programme.

Forthcoming Programmes

- Strategy Workshop on Vegetable Oil Economy and Production Problems in India (Convener: Dr C.D. Mayee)
- Strategy Workshop on Conservation Policies for Hilsa and Mahseer (Convener: Dr K.K. Vass)
- Strategy Workshop on Accelerating Seed Delivery Systems (Convener: Dr K.V. Prabhu)
- Status Paper on Saving the Harvest (Convener: Prof Anupam Varma)
- Policy Brief on Crop Residue Burning in North-West India (Convener: Dr Yadvinder Singh)

Article - Soil Health Card

C.L. Acharya¹ and Sanjay Srivastava²

¹FNAAS and Former Director, ICAR-IISS, Bhopal

²Principal Scientist, ICAR-IISS, Bhopal

Soil health emphasizes the integration of biological with chemical and physical measures of soil quality that affect farmers' profits, risks, and the environment. A healthy soil has many attributes. The United Nations declared 2015 as the international year of soils. It was a happy coincidence that on February 19, 2015, the Central Government also initiated a country-wide programme of assessing the soil health and distributing the Soil Health Card (SHC) to every farmer of the country.

Attributes of Soil Health Card

A Soil Health Card (SHC) contains information on the current status of soil health and, when used over time, can be used to determine changes in soil health that are affected by land management. Soil health can be depicted in the form of physical, chemical, and biological indicators. Soil health indicators can be assessed qualitatively (in field assessment) and quantitatively (in laboratory assessment). There are tools and techniques

to qualitatively assess the soil colour (indicative of organic carbon/humus), earthworms count (indicative of soil fertility), organic matter, roots/residue, compaction, soil till, water retention capacity, drainage/infiltration and soil texture (feel method) in the field itself. However, this requires quite a bit of experience.

Soil Health Card Scheme

Government of India in February, 2015 launched a country-wide Soil Health Card (SHC) Scheme to prepare and distribute the soil health card to every farmer in the country. A typical soil health card according to SHC scheme is shown in Figure 1. It is proposed that this important activity would continue in perpetuity so that the Soil Health Card (SHC) is distributed to farmers continually over a period of three years.

The soil health card presently depicts the status of 12 essential parameters. These are pH, EC, Organic

| SOIL HEALTH CARD | | | Name of Laboratory | | | | |
|----------------------------|-----------|------------|--------------------------|--------------------------|------------|------|--------|
| Farmer's Details | | | SOIL TEST RESULTS | | | | |
| Name | | | S. No. | Parameter | Test Value | Unit | Rating |
| Address | | | 1 | pH | | | |
| Village | | | 2 | EC | | | |
| Sub-District | | | 3 | Organic Carbon (OC) | | | |
| District | | | 4 | Available Nitrogen (N) | | | |
| PIN | | | 5 | Available Phosphorus (P) | | | |
| Aadhaar Number | | | 6 | Available Potassium (K) | | | |
| Mobile Number | | | 7 | Available Sulphur (S) | | | |
| Soil Sample Details | | | 8 | Available Zinc (Zn) | | | |
| Soil Sample Number | | | 9 | Available Boron (B) | | | |
| Sample Collected on | | | 10 | Available Iron (Fe) | | | |
| Survey No. | | | 11 | Available Manganese (Mn) | | | |
| Khasra No. / Dag No. | | | 12 | Available Copper (Cu) | | | |
| Farm Size | | | | | | | |
| Geo Position (GPS) | Latitude: | Longitude: | | | | | |
| Irrigated / Rainfed | | | | | | | |

| Secondary & Micro Nutrients Recommendations | | | Fertilizer Recommendations for Reference Yield (with Organic Manure) | | | | |
|---|----------------|---------------------------------------|--|----------------|-----------------|------------------------------------|------------------------------------|
| Sl. No. | Parameter | Recommendations for Soil Applications | Sl. No. | Crop & Variety | Reference Yield | Fertilizer Combination-1 for N P K | Fertilizer Combination-2 for N P K |
| 1 | Sulphur (S) | | 1 | Paddy (Dhaan) | | | |
| 2 | Zinc (Zn) | | 2 | | | | |
| 3 | Boron (B) | | 3 | | | | |
| 4 | Iron (Fe) | | 4 | | | | |
| 5 | Manganese (Mn) | | 5 | | | | |
| 6 | Copper (Cu) | | 6 | | | | |
| General Recommendations | | | | | | | |
| 1 | Organic Manure | | | | | | |
| 2 | Biofertiliser | | | | | | |
| 3 | Lime / Gypsum | | | | | | |
| International Year of Soils 2015 | | | Healthy Soils for a Healthy Life | | | | |

Figure 1. A typical soil health card as per the scheme. Twelve essential parameters are shown on top right (www.soilhealth.dac.gov.in/).

C, available nitrogen (N), phosphorus (P), potassium (K), sulphur (S), iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), and boron (B). In the first phase of the scheme 2.53 crore soil samples would be analysed and 14 crore soil health cards would be distributed.

Relevance of SHC to a Farmer

- The SHC contains an advisory based on the soil nutrient status of a farmer's holding.
- It shows recommendations of dosage of different nutrients needed.
- It also advises the farmer on the fertilizers and their quantities he should apply, and also the soil amendments to be undertaken, so as to realize optimum yield.

Government SHC scheme mainly aims on the assessment of soil fertility (chemical) parameters, and rightly so. Scientific fertilizer nutrient management based on soil fertility parameters is the need of the day as a huge amount of foreign exchange is spent every year on import of fertilizers. This imposes further burden on Government as fertilizers being a costly input need to be subsidized because farmers cannot afford to bear the actual cost. Use of fertilizer nutrients on scientific basis is expected to economize on fertilizer use, reducing the consumption in the areas where soil fertility is build up and increasing its use in the areas where it is required. This would also ensure an increased productivity on sustainable basis.

Implementation process

The nodal agency to implement the SHC scheme is the Department of Agricultural Cooperation & Farmers Welfare (DAC&FW), Ministry of Agriculture & Farmers Welfare, Government of India. The Integrated Nutrient Management (INM) Division, DAC&FW has to provide guidance to Department of Agriculture of all the States and Union Territory Governments. The Department of Agriculture in different states are the main executive bodies to implement the scheme in their respective states. However, to accomplish the task, the Government identified departments, private organizations, and students who are working in a mission mode for collection and analysis of soil samples.

Accomplishments and Limitations

The scheme essentially provides for the collection and analysis of one soil sample from a grid of 2.5 hectare in irrigated areas and one soil sample from a grid of 10 hectares in rain-fed area. The scheme has been quite successful in accomplishing a target of collecting 2.53 crore soil samples during the period. Out of these 2.44 crore samples have been analysed and soil health

cards have been distributed to 8.72 crore farmers (www.soilhealth.dac.gov.in/).

No doubt the scheme is a praiseworthy step on the part of Government but it has some limitations as well. If a soil health card is distributed to each farmer at an interval of 3 years, then about 4.67 crore soil samples need to be analyzed each year (assuming that one representative soil sample is collected from each of the 14 crore farmers' holdings over a period of three years) which is a daunting task considering the available infrastructure of soil testing laboratories in the country. In India, presently, 1574 soil testing laboratories are available (Figure 2). This, however, includes 135 laboratories which are under developmental phase. Out of 1574 laboratories, 1454 are static and 120 are mobile laboratories. However, most of these laboratories do not have micronutrient (Zn, Fe, Mn, Cu) analyzing capacity. Out of 1574, only 596 laboratories have facility to analyze these micronutrients. Similarly, only 154 and 456 laboratories are equipped for the analysis of boron (another micronutrient) and sulphur, respectively. The spread of soil testing laboratories under various organizations in the country indicate that maximum are with state government (616) followed by laboratories under *Krishi Vigyan Kendras* supported by ICAR (388) and private companies (234). There are additional 336 laboratories operated by other organizations viz., Agricultural Produce Market Committee, Public Sector Undertaking, State Agricultural University and others. As per available data the existing capacity of analyzing soil samples varies significantly among different states in the country. The lowest range around 5000 samples per annum is reported for Andhra Pradesh, Maharashtra, and Bihar. Large number of states analyzes samples in the range of 7000-10000 but maximum samples of 22541 are analyzed by Tamil Nadu followed by 21606 and 15292 samples respectively by Uttar Pradesh and Kerala. However, the all India average being 10642

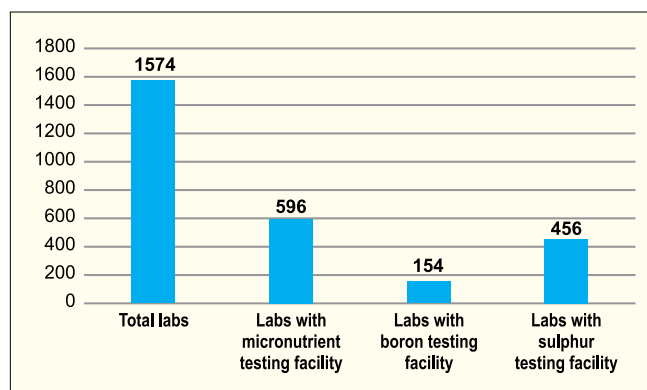


Figure 2. Number of soil testing laboratories and their capacity to analyze soil fertility parameters. All the labs have the facility to analyze pH, EC, Organic C, available P and K. (Adapted from farmer.gov.in/stlrpt.aspx)

samples per annum (Adapted from Methods Manual: Soil Testing in India, 2011). Keeping this in view, the analysis of 4.67 crore soil samples would require 4450 laboratories. Limitation of soil testing laboratories infrastructure imposes a risk of collection and analysis of fewer soil samples than scientifically required.

Suggested Alternatives

The SHC scheme has created a renewed interest in the area of soil health assessment and fertilizer nutrients applications based on the soil test values. As a corollary, several agencies are engaged in R&D in finding the new rapid methods of analyzing the soil samples in a resource limited environment. Some of these initiatives include using infrared spectra and sensors to estimate soil health parameters, and development of rapid soil test kits/mini labs. In future, we may get a technology suited to Indian conditions/scenario, but at present, the void may be filled by soil test kits/mini laboratories, now available in Indian market. Two examples that are worth mentioning here are ICAR-IARI, Pusa, STFR (Soil Test and Fertilizer Recommendation) meter and *Mridaparikshak* mini lab developed by ICAR-Indian Institute of Soil Science, Bhopal. They give soil test results which are linked with the soil test based fertilizer recommendations and have the facility/provision of generating soil health cards.

Suggestions and Way Forward

The first phase of the SHC is successfully completed, however, during the journey, several lessons are learnt. However, some suggestions are listed below to make the scheme more effective and impact oriented.

1. A good representative soil sample is most important in any soil testing programme. About 14 crore farm holdings exist in India. This does not necessarily mean that we have to collect and analyse 14 crore soil samples. The soil samples should be representative of each farm land which is distinguishable with adjoining land in terms of morphology (colour, drainage, slope) and past management practices (cropping history etc.). Bigger farms sometimes may require more than one representative soil sample. The total number of soil samples may go up to 20 crore (if each distinct farm land is to be analysed) that need to be collected and analysed over a period of three years amounting to 6.7 crore soil samples per annum. However, the existing analysing capacity is far less than this. Hence, we have to adopt a multipronged approach involving increasing the existing laboratory infrastructure; enriching the existing laboratories with micronutrient analyzing facilities; and using soil test kits/mini labs.

2. Collection of such a huge number of representative soil samples poses another challenge. While the samples can be analysed throughout the year, there is actually very little time to collect the soil samples since the samples cannot be collected in the standing crop. A concerted effort is required involving the state governments, private functionaries, NGOs etc. An important activity could be the involvement of farmers themselves in the process of sample collection. Sample collection requires some expertise and it is generally believed that farmers are not well equipped to collect the soil samples. However, in most cases, the sample collection process does not require sophisticated implements or technique. If the farmers are made to believe about the importance of soil testing and the possible practical benefits of soil test based nutrient applications, they will be motivated to collect a good representative soil sample. This may solve the problem to a great extent as each farmer would have to collect only one (or a little more in some cases) soil sample of his/her field (s). This can be possible if there is strong political will and whole hearted efforts are made to inform the farmers about the benefits of soil testing and method/technique of soil sample collection through mass media (TV and print), mobile phones, demonstrations and trainings. Village level workers can also be galvanized, incentivized and trained to monitor the sample collection process by the farmers.
3. A look at the latest coordinator's report reveals that less than 10% soil samples were found deficient in Fe in the states of Madhya Pradesh, Odisha, Karnataka, Chhatisgarh, Uttarakhand, Kerala, Himachal Pradesh, J& K, Jharkhand, West Bengal and North East states (Shukla and Tiwari, 2016). Micronutrients like Fe and Mn, are not likely to be deficient in soil having pH less than 5.5. Under such cases all those samples having pH less than 5.5 belonging to above mentioned states may be skipped for these micronutrients analysis and a general statement "Sufficient" may be written on SHC against these micronutrients. Based on existing knowledge similar scientific relationships exist for other nutrients also. A careful look at already generated wisdom is required and possibilities may be explored to skip the analysis where it is not needed.
4. It is now amply clear that it is not possible to provide SHC to each farmer with the existing traditional laboratory infrastructure. The use of rapid soil test kits/mini lab is imperative. These kits/mini labs employ, at least for some parameters, different procedures than the ones used in traditional soil testing. Generally, some calibration models are

used to project/display the results comparable to the results obtained with conventional methods. However, these calibration models are empirical in nature and conversion factor may differ from one soil type to another. Hence, special care is required to calibrate kit/mini lab methods with the standard laboratory methods under different soil types.

5. Quality of analytical results is very important. Since lakhs of soil samples are analysed, there is a tendency to outsource the work to private/other parties. Provision is generally made to compare the results of some samples (say 1%) obtained by soil health card generation laboratory with standard/referral lab. However, the results of such comparisons should be made public so that the public at large is more confident about the accuracy of results.
6. Special care is required for the estimation of micronutrients (Fe, Mn, Zn and Cu) (Lindsay and Norvell, 1978; Soltanpour et al., 1976) since DTPA extraction of micronutrients is a non-equilibrium extraction. The factors like temperature while shaking, shaking speed, and type of shaker (reciprocating or rotary) individually may affect the results of extractable Fe and Mn by 20-50%. Hence, the protocol of estimations should be strictly followed (Lindsay and Norvell, 1978).
7. In the SHC scheme, there was a provision of farmers' field demonstrations of impact of soil test based fertilizer recommendation as obtained from Soil Health Card vis-à-vis farmers' practice. Hence, special target oriented demonstrations plots/fields should be put-up/earmarked and huge publicity should be given at the *Kisan melas* during the harvest time so that the farmers themselves see and believe the visible impact/benefits of soil test based fertilizer applications.
8. Training the concerned persons in the areas of soil sampling, preservation of collected samples, analytical methods, and interpretation of soil test results is equally important. This was, in fact, an integral part of the SHC scheme. However, it

requires still more efforts in terms of availability of trainers and budgetary provisions. Training on the use of sophisticated equipment like Atomic Absorption Spectrophotometers is especially required in handling such equipment.

9. In the first phase of SHC scheme, the emphasis was given on the assessment of soil fertility parameters because they are directly linked with the management of fertilizer nutrients. However, there are some important physical and biological parameters which are essential to depict the real soil health and can be incorporated in the soil health card. Physical parameters generally do not change so frequently and they may be determined on one-time basis. Some of the more important parameters that can be integrated with soil health card are infiltration capacity, bulk density, water holding capacity and aggregate stability. Similarly, an important biological parameter that can be practicably integrated is dehydrogenase activity which indicates overall biological activity in the soil. Initially, we may implement this in one or two agriculturally important states and take up the work in other states subsequently.

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Change of Addresses

- Dr T.R. Sharma, Executive Director, National Agri-Food Biotechnology Institute (NABI), (An autonomous Institute of DBT, Govt. of India), Mohali 160071; Tel.: Off. (0172) 4990101, 4011916; Cell: 9818386057; Email: trsharma@nabi.res.in; edoffice@nabi.res.in; trsharma1965@gmail.com
- Dr V.K. Singh, Head, Division of Agronomy, Indian Agricultural Research Institute, New Delhi 110012; Tel.: Off. (011) 25841488; Cell: 9821349639, 9412578525; Email: vkumarsingh_01@yahoo.com
- Dr A.K. Parida, Director, Institute of Life Sciences, (An autonomous Institution under DBT, GOI), Nalco

Square, Bhubaneswar 751023; Tel.: Off. (0674) 2301900; Cell: 9444024019; Email: director@ils.res.in; drajayparida@gmail.com

- Dr A.K. Srivastava, Member, Agricultural Scientists Recruitment Board, Room No. 203, KAB-I, Pusa, New Delhi 110012; Tel.: Off. (011)25842536; Cell: 09466592661; Email: memberasrb.as@gmail.com
- Dr V.K. Dadhwal, Director, Indian Institute of Space Science and Technology, (Dept. of Space, Govt. of India), Valiamala, Thiruvananthapuram 695547; Tel.: Off. (0471) 2568452, 2568600; Email: dadhwalvk@hotmail.com
- Dr D.K. Sharma, Emeritus Scientist & Ex. Director, ICAR- Central Soil Salinity Research Institute, Regional Res. Station, Near Manywar Kasiram Smarak, P.O. Dilkusha, Lucknow 226002; Tel.: Off. (0522) 2464664, Cell: 9996245195; Email: ds5550@gmail.com; dk.sharma@icar.gov.in
- Dr D.D. Patra, Vice Chancellor, Bidhan Chandra Krishi Viswavidhyalaya, P.O. Krishi Viswavidyalaya, Mohanpur, Nadia 741252; Tel.: Off. (03473) 222666, (033) 25879772; Res. (0522) 4077088, Cell: 9450096944; Email: ddpatra@rediffmail.com; bckvvc@gmail.com
- Dr P. Bhattacharyya, Principal Scientist, Crop Production Division, ICAR-National Rice Research Institute (NRI), Cuttack 753006; Tel.: Cell: 09438213108; Email: pratap162001@gmail.com
- Dr J.S. Chauhan, Former ADG (Seed), C/102 NASC Complex, DPS Marg, New Delhi 110012; Tel.: Res. (011) 25843858; Cell: 09414025636; Email: adgseedicar@gmail.com; js_chau@yahoo.com; js_chau09@rediffmail.com
- Dr K.R. Kranthi, Head, Technical Information Section, International Cotton Advisory Committee, 1629 - K Street, NW Suite 702, Washington DC 20006, USA; Tel.: Off. +1-202-292-1687 (Director), +1-202-463-6660 ext 122; Cell: +1-202-577-6050; Email: krkranthi@gmail.com
- Dr Jitendra Kumar, Director, Institute of Pesticide Formulation Technology, Sector-20, Udyog Vihar, Gurugram 122016; Tel.: Off. (0124) 2348488, 2342758, 2347788; Res. (011) 25089998; Email: jitendrakumar7@yahoo.com, jitendra.24@gmail.com
- Dr A.K. Singh, Deputy Director General (Hort. Sciences), Indian Council of Agricultural Research, KAB-II, Pusa, New Delhi 110012; Tel.: Off. (011) 25842068; Res. (011) 25843137; Cell, 9899558691; Email: aksingh36@yahoo.com; ddghort@gmail.com
- Dr J.S. Samra, Former DDG, ICAR, H.No. 17, Sector 16A, Chandigarh 160015; Tel.: Res. (0172) 2660226, Cell: 9650620999; Email: jssamra2001@yahoo.com
- Prof Ashok Kumar, Principal, College of Agriculture, CCS HAU, Bawal 123501 Haryana; Cell: 9416674542; Email: akumarphysiology@gmail.com

Obituaries



Dr Narayan Aditya Chaudhury was born in Satagachi, Dumdum Kolkata (West Bengal), India on 25th May, 1934. He did his M.Sc in 1955 and Ph.D. in 1961 from the University College of Science & Technology, Calcutta. He did his Post-doctorate Research Associateship at Department

of Chemistry, University of Georgia, Athens, GA., USA, 1962-64; and was Post doctorate-Fellow, at School of Chemistry, University of Minnesota, Minneapolis, Minn., USA, 1964-65.

Dr Chaudhury started his career as Lecturer in the Department of Chemistry, University of Kalyani and rose to the position of Professor and Head at Department of Agricultural Chemistry & Soil Science. He also served as Dean, Post Graduate Studies at the Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, W. Bengal. He was a very popular teacher among students.

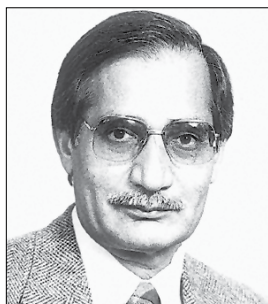
During his long scientific career, he pursued researches

in the field of Agricultural Chemicals (Pesticides) especially Chemistry & Bioactivity of Natural Products in Agriculture, and was one of the pioneer researcher in this area. He led AICRP on Pesticides Residues (ICAR Net Work Project) at BCKV center. Prof Chaudhury was invited as speaker in International Conferences on Natural Products Chemistry, held at Kenary Island, in Spain and at Strasburg, in Germany. Prof Chaudhury was one of the founder members of the Society of Pesticide Science & also Fellow of the Society. He was elected as the Fellow of National Academy of Agricultural Sciences, New Delhi in 1995 and was a Fellow of the West Bengal Academy of Science & Technology, and of Indian Society of Agricultural Chemists, Allahabad, as well.

Prof Chaudhury, served as member of Editorial Board of Journal of Indian Chemical Society, Indian Journal of Chemistry, CSIR, Journal of Agriculture & Food Chemistry (ACS), and Journal Chemistry & Industry (London).

Prof Chaudhury, guided a large number of students for Ph.D. programme and published more than 200 papers in reputed journals. Prof. Chaudhury passed away on 26th

April, 2017 at Kolkata. In his passing away, the country has lost an eminent academician, teacher, researcher and agricultural scientist of repute. The entire Fellowship mourns the sad demise of one of the distinguished fellows and pays its homage to the departed soul.



Dr Dilbagh Singh Athwal was born in Lyallpur, India (now Pakistan) on 12th October, 1928. He did B.Sc. in 1948 from Punjab University and in 1975 obtained Master's degree in "Public Administration" from Harvard University, USA. In 1954, Dr Athwal, earned his Ph.D. in "Genetics and Plant

Breeding" at the University of Sydney, Australia. He returned back to India and became the first Head of the Department of Plant Breeding at Punjab Agricultural University and did pioneering work that led to the development of the hybrid pearl millet variety, *Bajra*, in 1963. He went on to produce the iconic wheat variety, *Kalyan*, in collaboration with his colleague and friend Norman Borlaug. His work in wheat was instrumental in bringing the Green Revolution to Punjab, India.

A renowned Indian Plant Breeder, Dr Athwal, joined International Rice Research Institute (IRRI) in 1967 as its Assistant Director. In 1972, he was promoted to Associate Director and then, in 1976, he was appointed as the Institute's very first Deputy Director General. At IRRI, he administered the fledgling training program, supervised the research studies of postdoctoral fellows, and shared various administrative duties with IRRI's first Director General, Robert F. Chandler. While still at IRRI in 1975, in recognition of his outstanding work as an agricultural scientist, Dr Athwal was conferred the "Padma Bhushan" the third-highest civilian award of the Government of India. He was elected as Foreign Fellow of NAAS in the year 1992.

In 1977, Dr Athwal left IRRI to become program officer for Asia at the Rockefeller Foundation's International Agricultural Development Service (IADS) in New York. His career also took him to Washington, D.C., and Winrock International in Little Rock, Arkansas, from where he retired as a Senior Vice President in 1991.

Dr Athwal passed away on May 14, 2017 at his residence in New Jersey in USA and in his sad demise the

Academy lost one of its distinguished Foreign Fellow and internationally renowned agriculture scientist. The entire Fellowship mourns his sad demise and pays homage to the departed soul.



Dr S Robin was born in Thoothoor, Kanyakumari District, Tamil Nadu on 14th May, 1964. He graduated from Agricultural College and Research Institute, Tamil Nadu Agricultural University, Madurai: B.Sc. (Ag.), 1985; M.Sc. (Ag.), 1988; Ph.D., 1997. He was awarded Rockefeller IRBP- fellowship,

1998-2000; Colombo Plan - Overseas fellowship. He was Post Doctoral Fellow at Texas Tech University, Lubbock, TX, USA, 1998; and Project Scientist at IRRI, 1998-2000; followed by Visiting Fellow, CIRAD, Montpellier, 2006. During his significant career he occupied many positions starting as Assistant Professor at Agricultural Research Station, Paramakudi, TNAU, 1989-1994; and became Associate Professor at Agricultural College & Research Institute, Trichy, 2002-2003; Professor, Department of Rice, TNAU, Coimbatore 2003-2007; Professor and Head, Department of Rice, 2011-2015. He rose to the position of Project Director, Centre of Excellence in Molecular Breeding and Dean, School of Post Graduate Studies, Tamil Nadu Agricultural University, Coimbatore, in 2016 and occupied the position till his very sad demise in 2017.

His research areas were Rice - Genetics, Genomics and Breeding and was one of the main developers of the CO51 high yielding short duration crop, notified for most of the states. The CO50 and CO51 are both pest and disease resistant and drought tolerant varieties. He received Tamil Nadu State Award 2012. In recognition of his scientific achievements NAAS elected him for Fellowship for the year 2017 and was to be inducted to Academy on June 05, 2017 but Nature willed it otherwise and was inducted to the Academy posthumously.

Dr Robin died in harness while delivering a scientific lecture at Assam Agricultural University on April 14, 2017 due to massive cardiac arrest. In the sudden demise of Dr Robin, the Academy and the country has lost a very young and dynamic Rice Breeder. The entire Fellowship mourns the sudden sad demise of a promising Fellow of the Academy and pays homage to the departed soul.

Editors: Dr K.K. Vass and Dr V.K. Bhatia

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