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*Wish you a  
Happy New Year  
2012*

### From the President's Desk

## Agricultural Transformation – The RoadMap on the Eve of the XII Five Year Plan



During the Green Revolution era, from mid-1960s to mid 1990s, an unprecedented agrarian transformation occurred. The food and agricultural production and productivity had more than doubled and the intensity of hunger and poverty had halved. The White Revolution during the last 30 years had also

more than doubled the country's milk production, currently producing over 100 million tonnes of milk – the largest in the world, greatly contributing to the nutritional adequacy. These revolutions are largely attributed to the synergy of technology, policies, services, farmers' enthusiasm and strong political will.

The Green Revolution, however, waned in the subsequent decade. Since the mid- and late- 1990s, while the overall GDP growth rate of 7 to 9 percent was recorded, the agricultural growth had hovered around 2.2 percent per annum, although during the last five years an average annual growth rate of 3.3 percent was recorded. This recovery must not only be sustained during the XII Five Year Plan but be further accelerated to attain the targeted growth rate of 4.0 percent and above to alleviate the stubbornly high food insecurity, under-nutrition and poverty, India being home to one fourth of the world's hungry and poor.

The agrarian crisis is ascribed to several factors. Continuous decline in investment in agriculture, neglect of the interest of farmers, deterioration in terms of trade for agriculture which has improved only lately, predominance of marginal and sub-marginal farmers, debt crisis, and stagnating farmers' income, which meets hardly 80% of their needs and requirements, are some of the major underlying factors. Moreover, ineffective and negligible input-output price interventions to increase net income of farmers have generally failed to stimulate increased productivity and production. Further, in face of the increasing climate volatilities, the input : output imbalance has accentuated.

Agriculture, the life thread of the nation, touching the daily life of about 600 million people comprising nearly 120 million farming families – the men and women feeding the over one-sixth of the humanity must occupy the centerstage of the development. It accounts for about 15 per cent of the national GDP and over 50 per cent of the employment, against the corresponding figures of about 55 and 70 per cent in the early 1950s. Despite the decreasing share of agricultural GDP in the total national GDP, keeping in mind the high dependence of majority of our people on agriculture for the livelihood security, agriculture-led economic growth

is central to inclusive and accelerated growth in the country. Thus, **if agriculture fails, everything else will fail.**

With the above backdrop, during the XI Five Year Plan, the National Development Council (NDC) organized a special meeting on agriculture and had identified that besides addressing the issues of managing the stressed natural resources, especially in face of the climate change, and inadequate rural infrastructure, technology fatigue, poor supply and credit support systems, poor extension and marketing services and poor planning at district or lower level should also be adequately addressed. To address some of these issues, several new schemes such as RKVY and NFSM were introduced and mechanisms for States to seek Central funds for the agriculture sector taking into account agro-climatic conditions, natural resource issues and technology, and integrating livestock, poultry and fisheries.

The XII Plan aims to achieve the overall agricultural output growth of 4.0 to 4.5 percent by targeting growth rates of 2 per cent in foodgrains and 4.5 to 6 percent in horticulture, livestock and fisheries. The Plan will also continue the emphasis on inclusive and gender-sensitive growth. In doing so, the following aspects are expected to be impacted: enhanced productivity and farmers' income, diversification towards high-value farming, strengthening of off-farm and non-farm rural employment and livelihood emphasis, prevention of post-harvest losses and promotion of value addition along the value chain, and promotion of agri-business and small and medium entrepreneurship. Further, it will not only be food security, but comprehensive food and nutritional security. Food, nutrition, health, education, and overall livelihood security should be converged. Effective policies, strategies and actions, institutions, capacity development and needed linkages and partnerships should be elaborated.

Appreciating the centrality of the agricultural sector in alleviating hunger and poverty, the past Five Year Plans had planned for an agricultural growth rate of at least 4.0 percent, but failed. Can this trend be broken in the XII Plan and beyond? Can there be a roadmap to reach the target? The National Academy of Agricultural Sciences (NAAS) sees a distinct possibility to achieve this target and is developing the necessary roadmap which focuses on business unusual rooted in the principles of ecology, environment, economics and equity to ensure sustained and enhanced livelihood security of the people. Among other things, the roadmap is discussing the following aspects:

- Alleviation of the stubbornly high incidence of hunger and poverty with greater focus on nutritional adequacy and household and individual level food security through achieving full food self-sufficiency by accelerated and sustainable production by bridging huge yield gaps and by raising yield levels. Agro-ecologically differentiated approaches are being highlighted.
- Specific pathways are being suggested for protection and enhancement of soil, plant, livestock and fish health, climate change management, risk obviation, anticipatory and participatory research to develop resilient agriculture, minimizing the environmental footprint of agriculture, carbon sequestration, accent

on integrated farming systems and resource management, eco-technologies, green agriculture, conservation and judicious use of land, water and biodiversity, conservation agriculture, biomass utilization and waste management.

- Specific measures are being detailed out for enhancing productivity, profitability and income of the overwhelmingly large proportion of small, marginal, sub-marginal and landless farmers through developing, transferring and providing appropriate technologies, inputs and services and improving input use efficiency, particularly in vast rainfed and other risk prone non-congenial agro-ecological regimes; and revamping agricultural extension system.
- New models and strategies, activities and measures are being put forward for linking farmers with markets, managing trade distortions in the globalized world and effecting necessary market, trade and distribution reforms, strengthening post-harvest management, agro-processing, value addition; augmenting safety-nets, including management of trans-boundary pests and diseases, creation of multiple livelihood opportunities and enhancement of integrated on-farm – non-farm employment and income; and market research for positioning production systems, entering futures markets and transforming technology transfer systems and creating market-led extension.
- Best practices and successful experiences are being highlighted to strengthen science-based and informed policy advocacy, balanced food-fuel-bioenergy development towards accelerated, sustained and equitable income growth and comprehensive livelihood security, investment in agricultural research and capital formation and incentives in agriculture, social safety nets, human resources and skill development, and public-private partnership.
- Detailed outline for institutional transformation and for creating new institutions towards meeting the new and emerging challenges and opportunities are being suggested. Particularly, the roadmap would show the way as to how best could we use biotechnology, biodiversity conservation and genetic resources, allele mining, bio-risk management, bioremediation; informatics, bioinformatics, ICT, awareness raising, monitoring, and early warning GIS/GPS/remote sensing, risk management; and nanotechnology;
- Keeping in mind the current trends of food prices, the document is examining whether the challenges of the food price hike and inflation could be converted into an opportunity for stimulating agricultural production and enhancing farmers' income and assessing the prospects of agricultural diversification with special reference to the opportunities and challenges of biofuel production for food security and prosperity.



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# Attitudinal and Behavioural Attributes of High Achievers Attaining Excellence in Science

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It is well-known that professional attainments are influenced to a great degree by among other factors, by work place environment and socio-psychological attributes of the person concerned.

In an impressionistic study, attitudinal and behavioural attributes relating to the attainment of excellence in science were identified. The

inferences were drawn from the questionnaire-based feedback received from high achievers and those who have excelled in their field of work. Their respondents identified their personal qualities and work place environment which helped them in attaining excellence. The parameters identified were related to attitudinal and behavioural aspects, personal qualities, work place environment, non-academic and social milieu and interpersonal relationship.

Listing attributes essential for excelling in science alone is not of much help. However, it is possible to work towards excellence by bringing positive changes in the attitude of scientific work force through the intervention of training methods extensively used in corporate sector. Some measures for improving work place and home environment have been also suggested.

## Objectives

The present exercise was undertaken to get perception of high achievers and those attaining excellence on following aspects.

- Attitudinal and Behavioural aspects
- Personal qualities
- Work place environment
- Non-academic and social factors
- Interpersonal relationship

## Methodology

The participants who deemed to have attained excellence were selected on the basis of following criteria:

- **Peer recognition:** Election/nomination to high offices of professional societies, policy making bodies, review and award committees.
- **Rapid upward mobility :** Those getting “Green channel” promotions.

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- **Recognition by professional Societies:** Awards, conferment of Fellowships etc.
- **Scientists with “the camphor effect”:** recognition by non-professionals for their output impacting welfare of society.

A questionnaire-based opinion survey was conducted among 117 scientists who participated in the study. The participants were both from India and abroad cutting across various disciplines. Neither the respondents nor their affiliations were identified individually. The respondents can be identified under the following three groups:

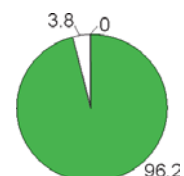
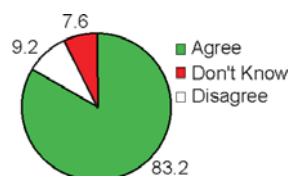
- The ‘home grown’: they had their higher studies in India and continued to do research here.
- The ‘brain drain’: they had their higher studies in India but pursued research career abroad.
- The ‘home sick’: they went abroad for higher studies but returned to work here.

## Results

The responses received were categorized into three groups: **Agree**, **Do not agree** and **Don't know**. Percentile scores for each group were calculated and presented as “pie chart” that follows.

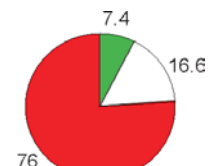
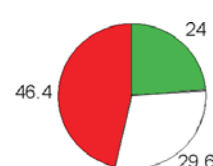
### Attitudinal and behavioural aspects

It is the positive attitude that takes the scientists to top positions Excellence has genetic and hereditary contributions. It is in the genes.



Attitudinal factors have played significant role in my success in science.

Good behavior and conduct has nothing to do with a scientist's performance and success

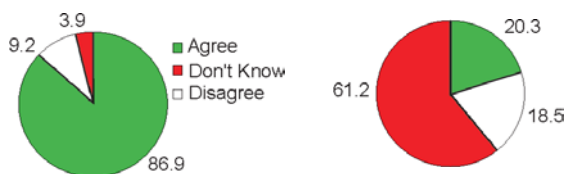


- Majority of the respondents (**83.2 %**) agreed that their positive attitude drove them to reach the top. Only **7.4 %** disagreed.
- This issue of hereditary trait was debatable among the respondents; **46.4 %** felt that qualities leading to excellence are not inherited but surprisingly **24.0 %** felt that you must have it in your genes to excel.
- Seventy six per cent of the respondents agreed that good behavior and conduct is linked to their performance and success. It had positive influence on the organization.
- An overwhelming majority (**96.2 %**) felt that attitudinal factors played significant role in attaining excellence.

### Personal attributes

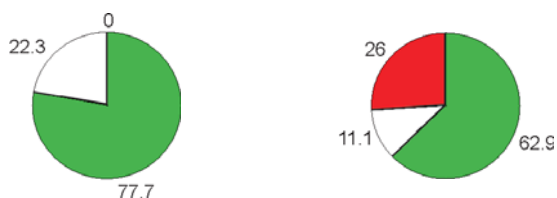
I have always competed against my past standards of excellence and goals set by me

I consider articulation as an important attribute for recognition but “talk while you walk” types scientists are generally over-rated



A scientist' physical fitness has no relationship with his excellence. Science is more “brain than brawn”

My success is primarily due to my personal motivation, a desire to excel rather than any role model

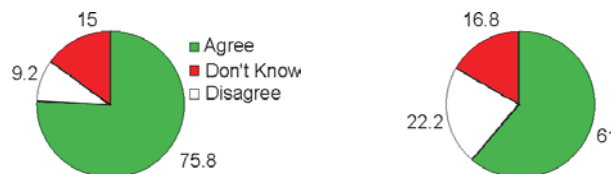


- Most of the respondents (**86.9 %**) revealed that they competed against their past standards and goals set by them which helped in attaining excellence.
- As many as **77.7 %** respondents considered articulation as an important quality for attaining recognition but at the same time “talk while you walk” type scientists are grossly over-rated.
- It was felt by **61.2 %** respondents that physical fitness helped them in attaining their goals.
- A substantial number of respondents (**62.9 %**) attributed success to their personal motivation and not to any role model but **26%** felt that having a role model helped them attain excellence.

### Work place environment

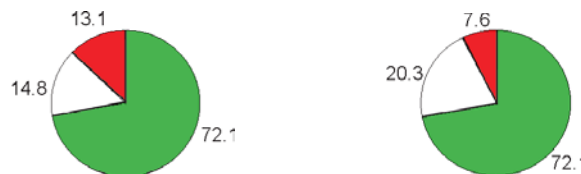
Infrastructure, equipments and tools have significantly contributed to my success and attaining excellence

My extraordinary achievements are due to institutional resource support and strong peers I have



Scientists in India have low social esteem as compared to other professions

A leadership that motivates has contributed significantly to my success and attaining excellence



- Infrastructure, equipments and tools lead to excellence is the belief held by **75.8 %** but **15 %** felt that man behind the machine to be more important.
- As many as (**72.1 %**) respondents attributed their extraordinary success to institute's resource and a strong peer group around at the work place.
- According to **61.0 %** respondents, science in India has a low social esteem which prevents attracting more talent to science as compared to other professions like politics, medicine, management etc.
- About three-fourth (**72.1 %**) respondents were of the view that a leadership that motivated contributed to their success.

### Non-academic social factors

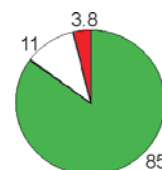
Unhappy family life will drive a scientist to laboratory resulting in better performance

My happy family life has been one of the factors for my attaining excellence



I attribute my success amongst other things to my spouse who being an efficient homemaker enabled me to solely focus on my professional work

- An overwhelming (**90.6 %**) attributed happy family life as one of the significant factors in attaining excellence.





- Most of the respondents (**85.1 %**) gave credit to the spouse confirming the adage that behind every successful man is a woman.
- But on the contrary 9.2 % respondents stated that their unhappy family life drove them to laboratory resulting better output. However, **77.9 %** respondents were in disagreement.

### Interpersonal relationship qualities

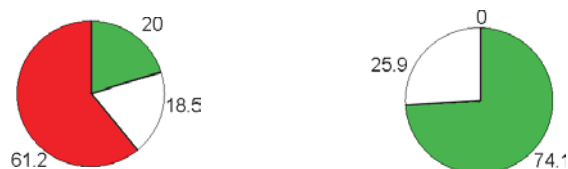
Those who have excelled posse very good public and social networking skills

Creative and successful scientists have someone or few as role models in their career



I attribute my success as a scientist to peer pressure and a strong desire to excel over others

My negative emotions like, resentment due to unjust criticism have also contributed to my attaining excellence



- About half the respondents **57 %** were in agreement that those possessing very good public /social skills and networked well were more upwardly mobile with only 2 % disagreeing
- As many as (**74 %**) respondents agreed that creative and successful scientists had someone as their role model not necessarily a Godfather.

- As many as **74 %** scientists attributed their success to peer pressure and a very strong desire to excel over others.

## Conclusions and Recommendations

- Infrastructure and institutional support, strong peers at work place and leadership that motivates are the three most important organizational factors for attaining excellence.

**Action:** Select science managers for their leadership qualities but not solely on the basis of scientific achievements

- Craving for recognition, intense desire to excel and capacity for hard work arising from healthy life style are the personal traits essential for attaining excellence.

**Action:** Have healthy work force. Why not have a gym at work place and well managed sports complexes at campuses?

- Attitudinal and behavioural factors contribute significantly and can be tuned by intervention of trainers which is an established practice in corporate world.

**Action:** Invest in training and de -toxing like the corporates do. Organise motivational / leadership training workshops

## Acknowledgments

Thanks are due to Prof. Nagendra Singh, formerly faculty at IIM, Ahemdabad, MDI, Gurgaon and Director IIM, Lucknow for his help in organizing this study. I also thank all the respondents to this survey without whose cooperation it would not have been possible to carry out this work.

## Programmes Held

### Brainstorming Sessions

The following five Brainstorming Sessions were organised by the Academy in this quarter:

- ❖ **Sustaining Agricultural Productivity through Integrated Soil Management**  
(Convener: Dr. A. Subba Rao)

The Brainstorming Session on this theme was organized on 10<sup>th</sup> October, 2011 at NAAS premises, New Delhi and was attended by 21 invited participants from research and academic institutions. Dr. A. Subba Rao, the Convener of the Brainstorming Session welcomed the participants. Prof. Anwar Alam, Secretary, NAAS while chairing the session underlined the crop

yield plateauing and decline in soil organic matter status. He also highlighted the need for efficient organic waste recycling, avoiding burning of organic residues at the cost of valuable manure for soil. Dr. A.K. Singh, DDG (NRM) and the Chief Guest emphasised the importance of soil, seed, tillage and nutrients in sustaining the crop productivity and the need for maintaining good soil health through balanced and integrated nutrient supply, site-specific nutrient management and precision agriculture. He reiterated the need for nutrient use efficiency, use of organic residues in conservation agriculture and the government's initiatives in improving the soil health. Dr. A. Subba Rao, the Convener made an overview

presentation based on the draft paper. This was followed by eleven presentations on different aspects of soil and water management in different climatic zones and representative soils. Each presentation was followed by thorough discussion on the topic.

### **The highlights**

Meeting the food demand mostly depends upon the supply of plant nutrients and water as well as the functional capacity of soil in relation to nutrient cycling and rhizospheric environment. Supply of plant nutrients through fertilizers is getting squeezed with rise in the cost and various national and international policies. Availability of water always remained uncertain due to its dependence on rainfall and groundwater recharge and the situation is getting tough due to competition from other sectors. Currently, the major constraints are decline in soil productivity and groundwater quality as well as loss in soil biodiversity. Hence, a pressing need has arisen for managing our precious soil resources efficiently to meet the growing demand for food and to safeguard the quality of the environment.

**Integrated soil management (ISM)** involves a combined strategy of effective crop, nutrient, water, soil and land management for sustainable agricultural production and other forms of land use. ISM can be tailored to the characteristics of site and soil and more importantly, to environmental, economic and social constraints faced by the farmers. ISM technologies should enhance soil structure, improve nutrient and water use efficiency, conserve valuable soil and water resources, and wherever possible, increased cropping intensity.

The integrated soil management also involves the technologies for arresting soil degradation; reclamation of degraded lands; water harvesting, conservation and management; organic resource management; balanced nutrition to crops; manipulation of soil biota and remediation of problematic and contaminated soils.

### **Policy needs**

#### **1. Strengthening of soil testing programme**

The existing soil testing laboratories need to be upgraded with state of art facilities and qualified and trained personnel for efficient, rapid and reliable soil analysis including some physical and microbiological parameters and for providing soil test based site-specific recommendations to the farmers. The laboratories may also periodically monitor the soil health in their respective agro-climatic zone. ICT may be exploited for faster dissemination of soil test based recommendations and soil health cards to farming community.

#### **2. Establishment of framework for monitoring the soil quality**

A national database center linked to research



institutions and various soil testing laboratories may be created to enable access to soil health data by farmers, administrators and planners. Data mining tools must be fast and reliable. The soils in different agro-climatic zones need to be mapped for their health based on well accepted minimum data set for each zone.

#### **3. Efficient recycling of organic wastes**

Organic materials help to build good soil structure and maintain healthy microbial activity in addition to supplying plant nutrients. Management of crop/farm residues (both off-site and in-situ), safe and acceptable agro-industrial and municipal organic wastes through composting, and mulching in conservation agriculture may to be promoted. Efficient composting techniques may be popularized through subsidies and large-scale burning of crop residues must strictly be banned.

#### **4. Need for effective land use policy**

An effective land use policy framework may be formulated for each State for demarcated areas not suitable for farming due to their fragile nature. These can alternatively be used for agroforestry/forestry/ range lands. Diversion of fertile lands for industry and other developmental purposes should be restricted.

#### **5. Encouraging carbon sequestration in soil under Kyoto Protocol Agreement**

In recent agreements under the Kyoto Protocol, C sequestered in soil qualifies for the inclusion in Carbon footprint (Article 3.4) with subsequent benefit of C credit. Inclusion of soil C sequestration for accounting purpose requires authentic database for an independent assessment and verification. Thus, there is need to generate verifiable soil C baseline data for SOC under agroforestry, grass land and arable agriculture.

#### **6. Measures to protect fertile soil from chemical, biological and physical pressures**

A soil protection policy needs to be formulated and implemented at national level. This policy should

regulate the entry of pollutants to soil from gas-dust releases from power plants, metal smelting, the burning of raw materials for cement; heavy metals from fertilizers (e.g. Cd through phosphatic fertilizer), pesticides (e.g., Zn, Cu, Sn, Hg, organic pollutants) and industrial effluents; salts and heavy metals from contaminated surface water and groundwater. Both the private and public organizations such as corporations, municipalities, Town and Country Planning Departments, Ministry of Industries, Mining, Urban Developments etc. and entrepreneurs/ industries with likeliness of causing soil pollution should be brought under Environment Protection Act.

### **7. Remediation of degraded, problematic and polluted soils**

Physically and chemically degraded soils pose risks to all strata of organisms including humans, livestock and crops and hence, must not be left untreated. Economic feasibility in particular makes it difficult to carry out remediation of eroded soils and those affected with salinity, sodicity, acidity, and contaminated with pollutants. A Land Reclamation Board may be set-up to facilitate monitoring of programmes related to soil reclamation and remediation with adequate resources. The Board may also work on preventing risks from pollution, enabling a minimum of agricultural activity on the reclaimed land.

### **8. Promoting balanced nutrition of crops**

Fertilizer policy needs to be oriented towards ensuring balanced nutrition to major crops through nutrient based subsidy, micro-nutrient fortified major fertilizers and soil test based site-specific nutrient management. The Government may also provide subsidy to soil amendments including mineral and byproduct sources for reclaiming sodic and acidic soils.

### **9. Creation of public awareness about the crucial role of soil in the ecosystem and its vulnerability**

Institutions that provide training and education for people in soil-related occupations such as farmers and gardeners must be linked to a nodal institution at national level which can provide requisite logistics and resource materials for public awareness including design of course curricula for school education.

### **Research needs**

1. Basic research on water, carbon and nitrogen footprints and their role in soil-crop management with special reference to climate change
2. Developing efficient techniques of water and nutrient management for their economic use in different agro-ecosystems

3. Efficient technologies for utilization of biomass from different sources (agricultural, agro-industrial, municipal etc.) for improving soil productivity under integrated nutrient management and organic farming
4. Role of resource conservation agriculture in abiotic and biotic stress management with special reference to climate change
5. Identifying and characterizing microbes as both individuals and as consortia in soil and water and their roles in regulating different soil functions and their interaction with plants
6. Soil quality assessment and monitoring through identification of minimum data sets under different agroecosystems.
7. Research on soil-plant-animal / human continuum in different agroclimatic zones with reference to micronutrient dynamics and pollution levels of heavy metals must be scaled up for safeguarding the animal and human health.
8. Research is required to unlock the interrelations between climate change and soil quality and to develop models for predicting the impact on soil quality under different climate change scenarios.
9. Technology for reclamation of waterlogged sodic soils.

### **❖ Livestock Infertility and Its Management** (Convener: Dr. B.S. Prakash)

Livestock sub-sector is one of the main pillars of India's agrarian economy, food and nutritional security and livelihood. Its ownership is highly egalitarian and the growth in this sub-sector is highly pro-poor. India possesses the highest cattle population of around 199 million (15% of the total world's cattle population). Buffaloes numbering around 105 million in the country contribute to more than 53% of the total milk production. The sheep and goat are also important livestock species of India which contribute greatly to the agrarian economy, especially in the arid/semi-arid and mountainous terrains where crop and/or dairy farming





are not economical. Good reproductive performance is essential for efficient livestock production. However infertility is a serious bottleneck in our quest for making livestock rearing a profitable venture. Various issues related to amelioration of livestock infertility are highlighted:

- **Anestrous and repeat breeding** in buffaloes and bovines are two of the most serious reproductive problems affecting 30-40% of the total cattle and buffalo population. On a conservative estimate, the country is losing 20-30 million tonnes of milk annually and in economical terms, about ' 40,000-50,000 crores on these accounts.

#### Issues related to artificial insemination

- The average productivity of cows and buffaloes is still very low because the bulls used for semens do not possess high genetic superiority and the AI though has been in existence for over 60 years has only benefited 20% of our breedable livestock. Conception rate due to A.I. is also low. A.I. facilities are not available at the farmers' doorsteps. Semen available for A.I. is not of required quality. There is shortage of qualified para-veterinarians.
- Application of artificial insemination has made crossbreeding between *Bos taurus* and *Bos indicus* populations very widely possible for substantial increase in milk yield. However, the male crossbred offsprings are often inferior to purebreds in semen production. The proportion of males reserved for breeding and reaching successful freezing stage is the lowest in crossbred bulls.
- **Feed resources:** Our country is ill-equipped with respect to feed resources to fulfil the nutritional requirements of dairy animals. In conditions when sufficient nutrients, particularly energy are not available to the cows, buffaloes, sheep or goats, a loss in body condition results causing decrease in milk production, and reproductive activity is compromised.
- **Advances in embryo biotechnological research** with tremendous progress in basic embryo transfer techniques, *in vitro* maturation of oocytes and *in vitro* fertilization and production of buffalo calves by IVF technology have been made but their extensive use is still elusive.
- **Infectious agents** that have a deleterious effect on the animals are also known to interfere with reproduction. Bacterial infections of the uterus, vagina and vestibulae can lead to anestrous and repeat breeding, delayed return to oestrus after mating, early embryonic death and sometimes, abortion. However, nearly half of the cows are still capable of breeding, indicating that pathological conditions do not necessarily render cows

permanently sterile. Their seriousness depends on the location of the infection. Many diseases can therefore be substantially reduced by vaccinations.

- **Fertility Therapy:** Considering the exorbitant cost of fertility-enhancing drugs and hormones for treating the livestock, alternate therapeutic methods have been identified. Our country is also rich in terms of expertise in recombinant technology and peptide synthesis. These options must be exploited on priority.
- The overall incidence of mastitis, retention of fetal membranes (RFM), metritis, endometritis and pyometra in crossbred cattle are more in comparison to native cattle. Suppressed immune status due to harsh Indian climatic condition is one of the major hurdles limiting their reproductive performance and hence productivity. Periparturient period is the most critical period for a dairy cow as the future productive and reproductive capability is related to a smooth transition from pregnancy to lactation. Reduction in the use of antibiotics treatment is the need of the hour. The beneficial effects of herbal preparations are similar to synthetic preparations and they can be easily prepared. Time has come to exploit indigenous natural resources possess valuable therapeutic properties for the betterment of livestock population through improved immunity and fertility.

Livestock fertility improvement and management assumes great importance for finding solutions to bridge the gap between available knowledge and its application at the farmers' door-steps. Accordingly, a Brainstorming Session was convened by Dr. B.S Prakash, Head, Division of Dairy Cattle Physiology, NDRI, Karnal, on October, 15, 2011 at NAAS premises, New Delhi. Dr. A.K. Srivastava, Director NDRI moderated the Technical Session of the programme which was inaugurated by Padma Bhushan Prof. R.B. Singh. In addition to valuable presentations by experts in their relevant areas related to various aspects of infertility viz. endocrinology, nutrition, infections, biotechnologies, etc. there was an active participation of the experts from the industry and Central and State animal husbandry departments.

#### ❖ Value-added Fertilisers for Site-specific Nutrient Management (SSNM) (Convener: Dr. Rajendra Prasad)

The brainstorming Session (BSS) on Value-added Fertilizers and SSNM was held on 17<sup>th</sup> October 2011 in the premises of NAAS under the convenership of Dr Rajendra Prasad, Ex ICAR National Professor. It was attended by 22 participants, who came from ICAR institutes, Ministry of Agriculture (INM), Fertilizer Association of India and the fertilizer industry. There were four sessions, which were respectively chaired



by Professor R.B. Singh, President, NAAS, Prof. H. S. Gupta, Director, IARI, Dr. Virendra Kumar, ex Director Marketing, IFFCO and Prof. Anwar Alam, Secretary, NAAS.

While introducing the topic, Dr. Rajendra Prasad pointed out that the value addition is not limited to the fortification of fertilizers with secondary and micronutrients as per soil test recommendations (SSNM) resulting in customized fertilizers. It includes issues such as increasing the efficiency of applied plant nutrients, development of water-soluble fertilizers containing primary, secondary and micro-nutrients and even matters related to improvement of storage and handling of fertilizers.

Prof. R.B. Singh in his opening remarks stated that the fertilizer is the key input in not only augmenting the food production but also in overcoming the malnutrition due to deficiency in micro-nutrients, such as iron, whose deficiency leads to anaemia, which is quite common in pregnant women in Asian and African countries. Similarly, zinc deficiency in food can lead to child diarrhoea, endemic in several Asian and African countries. These problems can be easily overcome with the use of customised fortified fertilizers for different crops and regions. In view of this, BSS on Value Added Fertilizers resulting in a policy paper is quite timely.

Prof. H.S. Gupta pointed out that in view of low fertilizer nitrogen use efficiency, use of low-cost and indigenous nitrification inhibitors can play an important role. He observed that the Indian Agricultural Research Institute (IARI), New Delhi has played a lead role in this direction by developing neem-coated urea. He informed the participants that some new nitrification inhibitors are being developed at IARI. Dr. Virendra Kumar congratulated NAAS for organising the BSS on this very important topic. He observed that IFFCO has been always a front runner in this direction and it had a long back organised field trials with Urea Super Granules (USG) and ammonium polyphosphate (APP). He appealed to ICAR and Govt of India to find out the areas and crops where they can be suitably employed. He also informed that recently IFFCO has come out with boronated NPK fertilizers for the eastern India in

consultation with the soil scientists and agronomists and the product is in the market.

Dr. Alam pointed out that with the continued increase in area under micro-irrigation (drip and sprinkler) there is an urgent need to develop water-soluble fertilizers having primary, secondary and micro-nutrients as per the crop and soil needs and suitable equipment for application of liquid fertilizers. Also there is a need to develop suitable applicators for the placement of USG. He observed that there is sufficient technical manpower in the country to develop these equipments and what is needed is a serious attempt to do this fast. He hoped that the policy paper emanating from this Brain Storming Session will be able to accentuate the process of developing new value-added fertilizers and suitable equipment for their application.

The following are the major recommendations:

### **Policy**

- The process of approval, pricing and incorporation of Value Added Fertilizers (VAFs) in the Fertilizer Control Order must be faster.
- An advanced centre on Value-added Fertilisers may be established without any further delay. This centre should provide leadership and guide R&D units of the fertilizer industry in developing VAF.
- Agronomic evaluation of newly developed VAFs should be restricted to the crop and region for which these are developed, doing away an All-India evaluation.
- Pilot-scale production of urea super granules (USG) may be approved for a few manufacturers. USG is already in use in Bangladesh and Philippines.
- Strict quality assurance on VAFs including water-soluble and liquid fertilizers should be enforced.

### **Research**

- In the development of crop / region-specific customized fertilizers, precautions are necessary in the dosing of boron, copper, manganese and molybdenum in N/NP/NPK fertilizers, because there is a narrow margin between deficiency and toxicity limits for plants for these nutrients.
- Development of low-cost indigenous nitrification inhibitors.
- Coating of N/NP/NPK fertilizers with bio-degradable polymers, nano-clay, gypsum and other low cost indigenous materials.
- Use of nano-technology in development of VAFs.
- Development of bio-impregnated phosphatic fertilizers.
- Development of suitable equipments for the application of USG and liquid fertilizers.

### ❖ Fighting child malnutrition

(Convener: *Dr. V. Prakash*)

The BSS was convened by Dr. V. Prakash, Distinguished Scientist of CSIR at National Institute of Nutrition (NIN), Hyderabad on 13<sup>th</sup> November, 2011 to address various issues in “*Fighting Child Malnutrition*”.

The session was inaugurated By Prof. Dr. Sheela Ramachandran, Vice-chancellor of Avinasingam Deemed University, Coimbatore and the key note address was delivered by Dr. RB Singh, President, NAAS, New Delhi. The session included presentations by Dr. V. Prakash, Dr. Sasikeran, Director, NIN, Hyderabad,; Dr. Ms. Mahtab Bamji, Hon INSA Scientist, Hyderabad, Dr. Ramesh Bhat, Consultant FAO, Hyderabad and Dr. Shivkumar, former Director of NIN. This was followed by a panel discussion in which a number of participants from around the country representing universities, research institutions, representatives from industry and the State Government and NGO organizations.

The key message was that today's need for fighting malnutrition in children must recompass a life cycle approach covering the first 1000 days of a child clearly and must necessarily include the maternal nutrition from day one of the conception to the 3<sup>rd</sup> or 4<sup>th</sup> year of the child all the way to adolescent age. The concerns being low birth weight and exposure to many nutritionally related diseases, micronutrient enrichment especially in the supplementary and complementary foods, as well as the ever-needed protein, calorie make up in the diet are essential. The diet must include plenty of vegetables and fruits during the growing years. Mineral nutrition



especially that of iron+ folic acid, calcium, zinc etc. was emphasized. The vehicles for such supplementation and complementary foods were also discussed. The role of PUFA and MUFA as well as iodine and beta carotene was underlined. Illustrating with the successful State models, the State policy matter regarding the nutrition food reaching the malnutritive children was raised. The proposed Policy Paper is expected to provide a roadmap with many layers of concentric rings upto the village level for reaching the nutrition power to the unreached.

### ❖ Agriculture Education in India

(Convener: *Dr. S.M. Virmani*)

A Brainstorming on Agricultural Education in India was held on 23<sup>rd</sup> December 2011 under convenership of Dr. S.M. Virmani and chaired by Prof. R.B. Singh, President, NAAS. It was well attended and lot of good ideas emerged. The detailed proceedings of the Brainstorming will be covered in the next issue.

## NAAS-ICAR Interface Meeting

For the first time, an interface meeting between ICAR and NAAS was held at the Academy on November 21, 2011. It was intended to address food and nutritional security, livelihood to the rural people and associated issues of research, education and extension education, issues which are so vital that stakeholders, major or minor, articulate on the subject and give voice to their perceptions. Many a times their perceptions are inaccurate damaging the cause and image of both the organizations, possibly due to the lack of effective linkages and communication channels.

Academy prepared a background note to facilitate focussed discussion which covered the following 7 topics.

1. NAAS - contact with public
2. NAAS Fellows on Mission
3. Mentoring of Young Scientists
4. Genetically Modified Crops in NARS
5. Hybrid Seeds: Harbinger of Food and Nutritional Security
6. SWOT Analysis of Higher Agricultural Education in India

### 7. Krishi Vigyan Kendras

**Dr. S. Ayyappan, Secretary, DARE & Director General, ICAR** expressed his satisfaction for such a meeting being held between ICAR and NAAS for the first time. He opined that NAAS could play a very important role in the National Agricultural Research System (NARS). He thanked Prof. R.B. Singh, President, NAAS for his steering role in the XII Plan formulation and as an articulate spokesman of NARS





issues. He also appreciated the background note and ideas floated for the interface.

On the subject of the contributions of NARS, he highlighted the importance of quality education in the knowledge-driven economy. He was in favour of having more number of SAUs in proportion to the growing number of traditional universities. India has today about 500 universities and this number is likely to rise to 800 - 1200 by the year 2020. Agriculture should also have due share of SAUs looking to the challenges ahead, but should not lose the intergrated, multidisciplinary and holistic approach. We need to have innovative ways for the channelized growth in agricultural education. There are avenues for non-formal education and skill development of the large proportion of rural population. There is dire need of attracting bright youth to the agricultural education as the GER is set to grow to 15-18%.

The society and the youth need to be sensitised about agriculture which is key to food and nutritional security of the country and livelihood security to the rural people. Concerns are raised at times about the employability of agricultural graduates, inadequacy of skills among them but the skill development possibilities in agricultural sector are enormous.

Mentoring the scientists and grooming them to be potential leaders are necessary and NAARM has just begun such a programme. He also appreciated the contact the public concept of NAAS and the regional chapters of NAAS should be more active to reach the school and college students educating youth about agriculture, opportunities it offers and motivating them towards agricultural education and educational opportunities that exist in the country. One could think of a good course in agriculture suited to the region at 10 + 2 level. Non-formal course with components of hands-on experience could be thought of. NAAS Fellows particularly those retired can be of immense help.

The next concept of NAAS Fellows on Mission is a good idea in establishing mentoring process and creating active linkages. One day meeting in State capitals involving ICAR staff could be organised. District and State level road maps could be formulated.

Academy would do well in sensitising the stakeholders about the positive role of KVKs. In the developed world, the scientists are left to pursue basic and strategic research but in India, a scientist has to blend his resources for research, teaching and extension. We seem to be expecting too many things from our scientists which can impede creativity. The role of ICAR must be clearly understood. There can be some flexibility in the plan scheme so as to meet unforeseen contingencies.

In research, reporting failure is also important. Hardly any RPF-III shows project failed or failed to deliver targeted results. We must remember that RPF-I is a concept document; RPF-II should reveal the process and constraints, if any and RPF-III must depict lessons learnt.

How to maintain continued interest in core research? He desired NAAS to provide inputs in some of these issues.

**Prof. R.B. Singh, President, NAAS**, stated that although NAAS is a creation of ICAR, it enjoys full autonomy and independence. Regarding the XII Plan preparation, he observed that Dr. Patil's Report on Agricultural Research and Education is an excellent report. It is addressing most of the major points. We need to carefully calibrate each and every point including GM crops. The role of KVKs is critical in providing linkage between farmers and researchers and at this time there is no other effective mechanism. In USA, Land Grant Colleges have gone through tremendous changes but we in India seem to be almost stagnant. The Academy can play an independent role and is preparing a roadmap. This is right time, XII Plan is still under formulation. Food and nutritional security and livelihood stability must be addressed. Innovations and creativity must find due place in the document and due importance must be given to agricultural research and education for development at all levels.

**Dr. H.P. Singh, DDG (Hort.), ICAR** observed that education is rightly recognized being the foremost but quality has to be ensured. ICAR in the matter of agricultural education needs to have statutory powers. He shared Bihar's experience on agricultural stream at High School / Higher Secondary level in 1955. But later it was closed for want of demand. A 10 year cycle of UG, PG curricula revision is good. There are UG and PG programmes in several traditional universities in agricultural discipline but graduates are not well-groomed. A policy guideline is very much essential. He observed that language is very important, agricultural graduates and post-graduates have language and communication problems. We need to bring youth to agriculture, he said.

Dr. Singh raised a point; we have marginal, small medium and larger farmers. For which farmers we are working in NARS? NAAS may define it. Farming should also have economy of scale. Strategic, basic, applied and adaptive researches are interrelated. Home Science in NARS is virtually killed; introducing one year field experience is not desirable. Compartmentalization in disciplines should be curbed, he said. A four year degree programme should have technology degree and a three year a science degree, he suggested.

**Dr. Bangali Baboo, National Director, NAIP, ICAR** observed that there is a general lack of awareness at different levels about the services of NARS and its constituents at ground level etc. Validated information appropriately worded and presented in rightly chosen medium of communication is necessary. NAAS can play the role of independent evaluator, he said. ICAR should highlight its achievements periodically. For creation of employment in rural sector which is dominated by small and marginal farmers, a value chain approach is a possibility. He informed that NAIP has 51 value chains of which 50 are working.

**Dr. M.M. Pandey , DDG (Ag. Engg.), ICAR** observed that Academy is very well-positioned and well-mandated to address agricultural research and education. He made two basic points.

1. Can Academy explore what is ailing?
2. Systemic improvement to correct situation.

He further added that IITs have excelled because they have holistic infrastructure and programmes including basic sciences, humanities, management, etc besides engineering and technology. Soft skills are very important and hence should be duly addressed. A point has been raised about Dr. Patil's report on XII Plan, can Academy underpin the critical issues that if ignored would do irreparable harm to the country, if those recommendations are not agreed to. Academy should limit at macro-level and not involve with micro-level issues.

**Dr. Meenakumari, DDG (Fisheries), ICAR** observed that dedicated and qualified teachers are lacking. Tendency of the son-of-the-soil syndrome has crept in. Infusion of basic sciences will strengthen agricultural research and education, she added.

**Dr. Swapan K. Datta, DDG (CS), ICAR** cautioned that critical planning is needed as how to double the number of SAUs. What is lacking in our communication? Pusa Basmati 1121 covers such a large area but it is not talked about. People talk of - Sub 1 and Golden Rice which are yet to make a mark. Pre-breeding work needs to be strengthened. NBPGR has 4 lakh germplasm accessions. It requires about 4000 scientists to explore this vast potential. We do not have flexibility in the system. Increased demand cannot be met if the germplasm available are not being used. There are 4500 scientists in biotechnology and 1500 are additionally recruited in Bioinformatics in China. This is more than the entire strength of ICAR. We should have commensurate scientific strength in order to match with others like China.

**Prof. R.B. Singh** intervened to inform that this issue was discussed in the Planning Commission. Time has come for certain degree of visibility. We must know as to what is the fate of Golden Rice, Amar Potato, other such products. We need to have both, number of SAUs as well as high quality in SAUs. National Farmers' Commission has also recommended IIT like institutions in agriculture. Agricultural science is no lesser science. Multidisciplinary communication skills are very important. NARS-driven international collaboration should be strengthened. Plant genetic resources have been talked; same holds true of animal and fish genetic resources. Element of flexibility to ICAR to cope up with emergent situation is absolutely essential, Dr. Alam concurred. Dr. Ayyappan informed that GOI is considering provisions to cope up with emergent requirement.

**Dr. Arvind Kumar, DDG (Edn), ICAR** stated that the ICAR-NAAS interface is a very good platform. We may have such meetings at regular intervals. Quality of



higher education cannot be compromised. If super speciality hospitals have come up why not super speciality SAUs, at least one to begin with. National Agricultural Education Project has been submitted. Reform is targeted to focus on capacity building of both the teacher and the taught. Mobility is facilitated but progress is rather slow. He informed that 4<sup>th</sup> year of UG is proposed to be devoted to "Rural Entrepreneurship and Awareness Development Yojana (READY)"; one full year, no course work. Profit earned will be shared among students.

Higher Agricultural Education Policy is being developed. We will apprise NAAS from time to time. He observed that agricultural extension may focus on the trinity of technology development, delivery mechanism and policy. Slow growth in agriculture is not due to technology fatigue but fatigue of this trinity. He would prefer increasing the capacity utilization of SAUs, instead of their proliferation.

**Prof. R.B. Singh** added that educational quality is on the anvil at NAAS. XI Agricultural Science Congress scheduled to be held in the year 2013 at OUAT, Bhubaneswar, has higher education in agriculture as theme of the Congress. NAAS Chapter can be in a city with 10-20 Fellows who can galvanize themselves and interact with authorities. Funding to SAUs is at the last on the agenda of most of the State Governments. It is also true that sometimes, the Vice-Chancellors are not rightly selected. A suggestion emerged that NAAS Fellows could be 'National Lecturers'. They could be brought to SAUs camping for a week or so. All DDGs may deliver a dozen lectures in the SAUs.

**Dr. K. D. Kokate, DDG (Ag. Extn.), ICAR** agreed that we are weak in effective communication at certain levels. We are not able to showcase our achievements. Dr. Kokate said in agriculture, management of agricultural technology that produces result as evident from the recent record production of pulses. The Indian Parliament note describes KVK as "bullwork system of the country". African countries now want to adopt KVKs.

**Dr. Kokate** suggested changes in nomenclature of "Programme Coordinator" to Coordinator, KVK and ICAR may consider providing scientist - positions for subject matter specialists at KVKs instead of technical positions.



He also desired that subject matter specialists positions be increased from six to ten (four additional). KVKs are closely monitored, more than 10 evaluation committees have evaluated KVKs and 41 professional peers are helping. KVKs have been given star rating depending upon performance. Farmer innovators schemes at district levels are envisaged. He underlined HRD training and accreditation as important. Improvement of skills of farmers and other stakeholders is an imperative. Farmers could also be given star-rating. He felt 4% growth in agriculture is too low, to attract people.

**Prof. R.B. Singh** desired the scope of KVKs to be expanded to Krishi Vigyan-cum-Udyog Kendra as recommended by NCF. Strong synthesis of KVK - ATMA is desirable. DG, ICAR is now Chairman, APAARI and he is closely associated with GFAR and BRICS, India is going to organise an international event of BRICS in 2012. The scope of KVKs can be expanded in these platforms, he opined.

**Dr. A.K. Singh, DDG (NRM), ICAR** was worried that inbreeding and 'son-of-the soil' syndrome is damaging the NARS. Atleast 25% of scientific staff should be from outside the State. He found that some departments in SAUs have only professors, no Asstt. Professors. No additional positions created even in newly established SAUs. Academy may take up this issue. There was need to have good district-wise plan of action on what can be economically produced with existing resources. Food security is not very stable. Even one bad year can upset the table. We need to have soil fertility maps with the help of SAUs. Absent landlordism is adversely affecting production and productivity. Fertilizer is becoming critical; prices of P and K fertilizers have almost doubled. No new fertilizer product has come up in recent past. Fertilizer production processes have become obsolete. We do not have fertilizer application strategy. Land use policy needs to be effectively implemented. Climate forecast could be done by KVKs, he suggested.

**Dr. Raj K. Gupta, CYMMIT, CGIAR** observed that this interface is about what Academy can do for ICAR? In coming years we have issues of water, climate change, energy and labour. Through 'Contacting public' taking agricultural sciences to public, the Academy can counteract the negative voices unfounded, not based on scientific facts as they are. We are not educating public about Bt technologies. The wells are drying out and documentaries need to be filmed for public exposure. Farm mechanization is the need of the hour. Useful mechanization is lacking; field channels continue to be made manually, mechanical option must be put in place; projects on skill development should be taken on high priority. Natural resources are not being duly addressed. For decades we have only 141 M. ha. net cultivated land, no revisions. No good database on net

cultivated area. Academy can flag such issues, raise alarm bells. It is a policy failure. He was critical of SRI. If conservation agriculture is not good for certain areas we should document it for the benefit of farmers. KVKs are at interface with research and delivery system. 'KVKs have become one of the departments of district collectors', KVKs are being used for demonstrations. There is undue pressure on KVKs by the system. Ratio of scientific manpower in research (4500) and extension KVK (about 6000) is getting lop sided. There is need to have more scientists for research. Inbreds used in hybrid programmes do not have proper maintenance in breeding programmes.

**Dr. Devakumar, ADG (EPD)** and Editor, NAAS informed that recently he was in Viswabharati where he suggested that lectures by eminent agricultural scientists be organised. Creative agriculture courses may be developed. NAAS can take up task of Third Party Evaluation. Academy may also like to take up sponsored studies. NRCs have resource constraint. Bioprospective of new molecules and gene mining are not possible with weak resources. He endorsed the idea of lectures by DDGs and NAAS Fellowship. He prompted the idea of Education Olympiad.

**Dr. Ramesh Chand, Director, NCAP** stated that agricultural advancement depends upon action at State level. There are States where technology worked but policy failed and vice versa. Un-intended consequence may happen in a large system, undesirable tendencies also crop up. NAAS must have a strong science policy. Academy can influence public opinion through media. There are good people in Academy but lack of good mechanism. There is need to inform public about what has been done; system will respond. African countries have great interest in EMBRAPA and China for science but not India. China has strong science policy. The contribution from Chinese scientists is on the high. Reforms that are needed may be identified. Academy can do things which others are not doing. NAAS can develop analytical capacity of NARS. Strong hierarchical system with delegated powers need to be developed. World over, Bt cotton has been through pure variety but not hybrids through which seed companies make big money. He also mentioned that NAAS Journal Rating is too rigid.

**Dr. Gaya Prasad, ADG (AS)** said that for nutritional security, priority has to be put on livestock and animal husbandry. Veterinary and animal sciences universities are being created possibly due to neglect of these departments in SAUs. There are already 12 Animal Science Universities and two are in pipeline. It is not a good trend. NAAS may like to curb this trend. The component of research and education is weak in this sector, he opined.



**Dr. Himanshu Pathak** suggested that young scientists need to be heard. Dr. Mauria observed that inbreds do have problems. Innovation management is absolutely essential. IPR-led research should be done. **Dr. Venkatasubramanian** suggested that views of Awardees need to be documented. KVK impact study will be useful in HRD. NAAS Fellows should be utilised as visiting faculty.

### Concluding Remarks

**Dr. S. Ayyappan**, Director General cautioned that farmer suicides earlier confined to cotton have appeared in turmeric farming. SAUs' functions are not well understood by State authorities. He informed that during XII Plan, one more ADG to Agric. Extension Division is being provided to look after skills development and another in the Education Division for international cooperation. We lack good communication skills; our communications are either too technical or too popular. We need to acquire professional help. KVKs have room for volunteers, KVK-Mitras. Independent evaluation by NAAS can be very helpful. There is duplication in research. Can NAAS help in curbing redundant duplication. NARS-driven international cooperation is good. We are required to be 'Student-Ready and Farmers First'. Soil fertility maps are urgently needed. Residue monitoring is also very important. Fertilizer is a difficult question. Farm made manures are advocated. Keeping arable lands fallow is a crime. Dept of Agricultural Research and Education in State Governments is likely to come up. Practical suggestions about delegating powers to the Directors is welcome. ICAR institutes are required to organise four events every year offering opportunity to interact with public.

**Prof. R.B. Singh** wanted central stage for ICAR and India but not EMBRAPA and China. Credible evaluation, internal or external, using scientific methodology is needed. Academy can come up with Agricultural Policy in cooperation with ICAR. Dr. Singh agreed that decentralised planning and working, delegation of powers are needed. NAAS Journal Rating exercise is going on and the interests of economics and social sciences should be given due attention.

### Action Points

1. ICAR-NAAS interface meetings be held at periodic interval to collectively address the issues of agriculture, agricultural research, education & extension.
2. Regional Chapters of NAAS be activated creating

active linkages with regional / State authorities in matters of agricultural research, education and extension education.

3. Mentoring of students and young faculty be institutionalised in a healthy manner.
4. NAAS Fellows be put on specific task relevant to the region/State in the interest of agricultural education, research and agriculture in general.
5. For strengthening agricultural education, capacity utilization of SAUs be enhanced and avenues of new universities be examined with reference to quality and the needs.
6. KVKs be owned and nurtured by NARS, as they are the only mechanism of active linkage between SAUs and their stakeholders.
7. Public awareness be created about GM crops developed in the country. Bt- based varieties be developed so that dependence on corporate-bred seeds can be minimised.
8. NAAS Fellows may be facilitated as National Lecturers visiting SAU Campus or ICAR Institute for a week delivering lectures to students and staff on relevant topics.
9. NAAS could be utilized for independent evaluation of R & D and educational programmes.
10. Negative voices, that are unjustified, be counteracted by NARS and NAAS through proactive mechanisms.
11. Proactive role be played in creating awareness about ICAR, SAUs, KVKs functions, highlights of achievements, success stories.
12. For better public contact, NARS and NAAS should prepare documentaries and bulletins on relevant topics and current issues.
13. Mechanization is the need of the hour, skills of the operators and extension workers be enhanced.
14. Academy should flag issues, raise alarm bells, and voice on critical issues.
15. There is need to increase scientific manpower. Excessive vacancies and restrictions on recruitment are impeding work at SAUs.
16. NARS and NAAS should strengthen their science base and formulate agricultural science policy.
17. Innovative research results need to be highlighted for public consumption through print and electronic media.

## Awards and Honours

- **Dr. Ch. Srinivasa Rao**, Principal Scientist and **Dr. B. Venkateswarlu**, Director, CRIDA received FAI-

Golden Jubilee Award for the best work done in the field of nutrient management in rainfed agriculture for the year 2011.



- **Prof. P.N. Takkar** has been conferred with Platinum Jubilee Commemoration Award of the Indian Society of Soil Science.
- **Dr. K.V. Devaraj**, former Vice-chancellor, University of Agricultural Sciences, Bengaluru was awarded Honorary D.Sc. Degree at the 10<sup>th</sup> Convocation of CIFE, Mumbai.
- **Dr. J.C. Dagar**, ADG (AA), ICAR was conferred with Dr. K.G. Tejwani Award for Excellence in Agroforestry Research & Development by the

Agroforestry Society of India.

- **Dr. B.S. Dwivedi**, Head, Division of Soil Science and Agricultural Chemistry, IARI was awarded with ISSS-Dr. J.S.P. Yadav Memorial Award for Excellence in Soil Science (2011) by the Indian Society Soil Science.

### Book published by the Fellows

Venugopal, V. (2011) *Marine Polysaccharides: Food Applications*, CRC Press, Boca Raton, Florida; 396 p. ISBN: 9781439815267

## Salient Decisions of 77<sup>th</sup> & 78<sup>th</sup> Meetings of the Executive Council

### Election of Office Bearers & Members of the Executive Council

The suggestions received from the Fellowship to fill up one-third vacancies in the positions of office bearers and members of the Executive Council that occur every year were considered by the Committee of Office-bearers. Following the past tradition, the said committee shortlisted a panel which was finalised with due modifications by the Council in its 77<sup>th</sup> meeting. The panel of names were circulated for election by postal ballots and the Council in its 78<sup>th</sup> meeting approved the election results and ratified the election of the following new Office Bearers & Members of Executive Council for the year 2012:

Dr. Lalji Singh	Vice-President
Dr. N.K. Singh	Secretary
Dr. P.K. Chhonkar	Editor
Dr. B.S. Dhillon	Member
Dr. K. Gopakumar	Member
Dr. (Ms.) Gita Kulshrestha	Member
Dr. Biswapati Mandal	Member

### Election of Fellowship and Selection of Associates for 2012

The prospective candidates forwarded by each Sectional Committee were adapted by the Executive Council in its 77<sup>th</sup> meeting for inclusion in the panel for election through postal ballots for Academy's Fellowship for 2012. The Council in its 78<sup>th</sup> meeting approved the election results and ratified the same for induction in the Fellowship of the Academy.

The list of Fellowship for 2012 can be seen at <http://www.naasindia.org/Announcements/Fellows2012.pdf>

#### Fellows

1. Dr. V.K. Batish
2. Dr. J.S. Chauhan

3. Dr. Karabi Datta
4. Dr. A. Gopalakrishnan
5. Dr. S.N. Jha
6. Dr. G. Kar
7. Dr. M.R. Khan
8. Dr. Ashwani Kumar
9. Dr. Arvind Kumar
10. Dr. S.S. Mehetre
11. Dr. S.M.K. Naqvi
12. Dr. S.R. Niranjana
13. Dr. Prajneshu
14. Dr. L.C. Rai
15. Dr. M.V. Rajam
16. Dr. S.K. Rao
17. Dr. D.P. Ray
18. Dr. U.C. Sharma
19. Dr. K.N. Tiwari

#### Foreign Fellows

1. Dr. Ram J. Singh
2. Dr. G.S. Vijaya Raghavan

Similarly, the candidates recommended by the Sectional Committees for NAAS Associates were duly approved by the Council in its 77<sup>th</sup> meeting and the final list of **NAAS Associates** for the year 2012 is given below:

1. Dr. Sumanta Nandi
2. Dr. S. Bandyopadhyay
3. Dr. E.S. Rao
4. Dr. Deepu Mathew
5. Dr. S. Rajkhowa
6. Dr. Anirban Roy

### Revised guidelines and proforma for Academy's Awards

The Academy confers Memorial Awards, Recognition



Awards, Young Scientist Awards and Endowment Awards on biennium basis.

The revised criteria and proforma for nomination / election of Fellowship by Prof. S.S. Acharya Committee were approved by the Council on 17

September 2011. The proforma and criteria for Academy's Awards have been accordingly revised and approved by the Council on 28 November 2011 and the same can be also seen at [www.naasindia.org/AA2012.html](http://www.naasindia.org/AA2012.html)

## OBITUARY



**Professor Dr. S. Kannaiyan** was born on Aug. 4, 1944 in Rajagopalapuram, near Mannargudi, Thanjavur District, Tamil Nadu. He graduated from Annamalai University in 1968; completed his postgraduate (1972) and doctoral (1977) programmes from the same University. He served Tamil Nadu Agricultural University (TNAU) in different capacities such as Associate Professor (1980-86) and Professor (Agricultural Microbiology) (1987-93), and as Dean (Agriculture) (1994-1999).

Dr. Kannaiyan was the seventh Vice-Chancellor of TNAU (1999-2002). He was a great visionary and was instrumental for several significant developments in education, research and extension in TNAU. He was a renowned agricultural microbiologist and biotechnologist. His contributions in the field of biofertilizers, particularly Azolla and Blue Green Algae, in identification and development of new strains and cultures are noteworthy. He was a visiting Scientist to C.F. Kettering Research Laboratory, Ohio, USA; University of California, Davis, USA; National Azolla Research Centre, Fuzhou, China; University of

Nottingham, UK; Biology and Biotechnology Laboratory, University of London, UK. He was the Fellow of the Association of Microbiologists of India, Indian Society of Biochemistry, Institute of Biology, London, UK, and was Founder President, National Academy of Biological Sciences. He was recipient of the Chief Minister Award (1995), Tamil Nadu State Council for Science & Technology-Best Research Scientist Award (1996), Hari Om Ashram National Award (1997), Harikrishna Shastri National Award (2003), etc. He trained a battery of M.Sc. and Ph.D. students. He is remembered for his organisation skills and team spirit. He published more than 400 research papers in national and international journals, and authored more than 25 books. He held positions like Chairman, National Biodiversity Authority, Ministry of Environment & Forests, Govt. of India (2005-08); Member, Zoo Authority of India and Senior Advisor and Chairman, PRIST University, Thanjavur. During his last years of his life, he promoted wellness and wellbeing as an active member of Research Advisory Board, World Noni Research Foundation, Chennai.

Dr. Kannaiyan passed away on Oct. 20, 2011. He is survived by his wife, his son and his daughter. The Fellowship of the National Academy of Agricultural Sciences pays their homage and tribute, and prays for the peace of the departed soul.

## ANNOUNCEMENT

Nominations are invited for the following upto March 31, 2012

- Fellowship of the Academy for the year 2013
- Associateship of the Academy for the year 2013
- Academy Awards for the Biennium 2011-2012

Nomination forms are available on Academy's website : <http://www.naasindia.org>

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