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From the President's Desk

Indian Agriculture – Dilemma of Research vis-a-vis Development

The Agriculture and allied sector continues to be pivotal to the sustainable growth and development of Indian economy. Not only does it meet the food and nutritional requirements of our 1.3 billion people, it contributes significantly to production, employment and demand generation through various backward and forward linkages. It also helps in alleviating poverty and ensuring the growth to overall economy. The sector, however, currently is facing a dilemma. While it has made large strides in achieving the designated development goals of food security, availability, and accessibility, it is still being challenged by formidable crisis and invariably research is made to be a weak-link in this crisis.

Let us examine this dilemma in perspective. India embarked its economic development model through adoption of five yearly plan mechanisms in 1951. Analyzing the actual growth rates achieved in each plan, it is noticed that we achieved 3.6% in 1st plan, which rose to 4.2% in 2nd and then declined to 2.8% in 3rd plan. From 4th plan onwards it started picking up and growth rate ranged from 3.3% (1973-74) to 5.8% (1996-97) during 8th plan. However, in subsequent three plans it significantly increased to between 7.8 and 8.0% (2016-17). Agriculture had a major role in registering these growth rates in spite of the fact that during these periods country faced four wars, compelling us to resort to plan holiday, annual plan, rolling plan mechanism in between. Apart from these manmade hazards, the natural disasters viz., floods, drought, cyclones and outbreak of pests and diseases also took heavy toll of agriculture productivity intermittently. In the context of these situations more than satisfactory performance in agriculture was achieved despite the priority changes made during respective plans. This argument is supported by the fact that during 1st plan (1951-56) the main thrust was agricultural development in the country in the perspective of food-crisis in the country, coupled with shortage of industrial raw material viz raw jute and cotton. So emphasis was given on agriculture with 31% of plan outlay and against a target of 62 million tons (mt) food grain production a high of 66 mt was achieved. But in the 2nd plan emphasis shifted from agriculture to industry on the premise that agriculture was recording smooth performance, foreign aid will be available to agriculture and larger investment were needed for heavy industry for growth. Therefore, plan outlay dropped to 20% of total outlay during 2nd and 3rd plans. But record food grain production of 89 mt was achieved with application of new strategy

viz., high yielding varieties/hybrids, multiple cropping, short duration crop varieties, water management, and adoption of technology and price guarantee as policy support. During 4th plan (1969-74) new orientation was imparted to agriculture policy, support to weaker section, with technology as major input and building buffer food stock. The food grain production reached all time high of 108 mt in 1970-71 despite the fact that the outlay remained at 21% of total plan and continued at same level during 5th and 6th plans as well with main thrust on bridging the gap between potential and actual farm yields. However, the outlay was increased to 22% in 7th and 8th plans with theme on growth and diversification to achieve self-sufficiency in food and generate surpluses for export. Accordingly focus was given on improving production of rice, pulses and oilseeds and the production reached to 199.3 mt. Subsequently the focus during 9th plan (1997-2002) was agriculture-led growth resulting in food grain production of 218 mt with a plan outlay of 19.4% but growth rates fell marginally and similar trend was noticed during 10th plan (2002-2007) as well. The main reasons for this lackluster growth manifest during the period was ascribed to structural weakness in agriculture, low level of public investment, exhaustion of the yield potential of new high yielding varieties of wheat and rice, low seed replacement rate, inadequate incentive system, inadequate storages and post-harvest value addition. The 11th (2002-07) and 12th (2007-12) plans aimed at faster and more inclusive growth and sustainable growth with a focus on second green revolution. During (2016-17) the food production is estimated to reach an all time record of 272 mt. If one looks at food grain production data during last decade and half it is noticed that while there has been marked improvement in food production but investment in the sector have not matched accordingly indicating that technologies played a major role for this progressive growth in agriculture. Unfortunately, agriculture scientists are frequently criticized and are denied their due support for R&D and ICAR as a system is put under frequent reviews, perhaps more than any other scientific establishment. There is dire need to enhance R&D support in agriculture for research in frontier areas and quality education so as to keep pace with growing food and nutritional security requirements of the future.

In response to changing dietary patterns, the composition of agricultural production has diversified over the years. As a result, the horticulture, livestock and fisheries sectors have emerged as major drivers of growth in the agriculture and allied sector. On the production and productivity front, the horticulture sector outperformed the conventional food crops. Between 2004 and 2015, horticultural output achieved an annual growth of about 7 percent as compared to around 3 percent growth in food grains. This increase in production has come from an increase in acreage and even larger increase in productivity through application of technology. While the area under horticultural crops grew by about 2.7 percent per annum, productivity increased by 37 percent. As a result, India has maintained its second rank in the global production of fruits and vegetables, next only to China. In case of milk production we touched 155.5 mt in 2015-16 from the level of only 17 mt in 1950-51. Per capita availability of milk has reached 322 g per day which is more than the world average of 294 g per day. In case of fish the production grew to 10.072 mt in 2014-15 from just 0.752 mt in 1950-51and poultry increased from 1.8 billion eggs in 1950-51 to 82.9 billion in 2015-16. Regarding export/ import scenario it is highlighted that from a net importer of food items, today the share of agriculture in national exports in around 13% which is more than double of our agricultural imports. Therefore, this holistic performance of agriculture sector has been significant in spite of modest investment in the sector with major share going to rural development activities. In this performance contributory role played by harnessing the benefits of technologies generated by the agricultural scientists of the country cannot be overlooked. In fact this has been technology driven growth. While technology up-scaling and out-scaling is an ongoing process and are being regularly fine tuned to meet emerging challenges but to ascribe the current ills faced by the farm sector to the technology / scientist alone is not justified. We need to relook at our development pathway for agriculture a fresh. Agricultural Research has shown the way to overflow the food basket of the country through application of technology which has been internationally recognized. But to spread its benefits both horizontally and vertically among farming community and society at large in the country we need appropriate net- working of all stakeholders at village, panchayat, district, state and national level to produce more from less and double the income of primary producer in the stipulated time-frame. This in-fact will be major initiative to achieve second-green revolution.

While lauding these world class science achievements we need to look at the state of health of our disadvantaged section of society where the health care benefits have not trickled down in-spite of having best of medical science institutions and brains in the country. This situation is somewhat similar that exists in farming sector especially with small and marginal farmers who are more vulnerable to agricultural crisis in comparison to big farmer. Therefore, it is a big challenge to reach the benefit of science and technology to the unreached. This dilemma of Research and Development has to be resolved with full commitment and all resources of knowledge, governance, policy and finance at our disposal. In our pursuit of doubling farmer's income and increasing job opportunities in rural settings for reducing poverty, spending on education and agricultural R&D must receive high priority. This is also important for the reason that investment in agriculture produced the highest marginal returns for promoting agriculture income while investment in rural infrastructure development and health provisions are most effective in reducing rural poverty. To attend to the needs of millions of small and marginal farmers and village youth constituting to more than 60% of the total population, higher investment in agriculture education and agriculture R&D must receive much higher allocation than what it is given today.

Panjab Singh
President

101st Executive Council Meeting

The 101st meeting of the Executive Council was held on September 16, 2017 and chaired by Prof Panjab Singh, President NAAS. It was attended by 16 EC members and after a brief welcome by the President, agenda items were discussed in detail and approval accorded wherever necessary. Some of the important decisions include; approving the guidelines for the mentoring scheme, expediting process of revising the guidelines for scoring of journals, and reducing the contents of the NAAS Year Book 2018 in print version while details will be put on website. The approval of date and theme was accorded for XIV ASC 2019 to be held at New Delhi in collaboration with IARI during February 20-22, 2019 on the theme 'Science and Technology Innovations for Agricultural Transformation'. Prof Anupam Varma, Vice-President of the Academy and Chairman, Conveners' Group presented the recommendations of the Conveners' Group meeting under various disciplines for the year 2018. The recommendations were endorsed by EC after detailed deliberations. Similarly the recommendations on Pravasi and Foreign Fellowship for the year 2018 were also accepted by EC. The Executive Council also approved the selection of six scientists as Associates of the Academy with effect from 1 January 2018. The Executive Council highly appreciated the efforts and time put in by the Sectional Committees and the Conveners' Group in evaluating and recommending the nominees to election of Fellowship and selection of Associateship. With an aim to enhance the visibility of NAAS and to associate Fellowship in the agricultural development programmes of Central/ State Government Departments, a brochure need to be prepared indicating how the expertise of Academy could be utilized. Dr R.K. Singh, Director, IVRI and member EC was requested to prepare the brochure as soon as possible. After examination of suggestions received from Fellowships for various vacant positions in EC w.e.f. 1.1.2018, a detailed discussion was held and EC accorded consent to shortlisted names and for seeking votes from the entire Fellowship of the Academy for the proposed names as per NAAS guidelines.

Programmes Held

Strategic Workshop on "Vegetable Oil Economy and Production Problems in India" (Convener: Dr C.D. Mayee)

Strategic Workshop on 'Vegetable Oil Economy and Production Problems in India' was organized on July 3, 2017 at NAAS, New Delhi. Prof R.B. Singh, Past President, NAAS chaired the workshop, and participants represented NAAS, SAUs, ICAR Institutes, Vegetable Oil Industry and other officials. The workshop aimed to discuss stagnating productivity of oilseed crops, widening gap between demand and supply and continued reliance on import of edible oils, thus mounting burden on foreign exchange of the country. Dr C.D. Mayee made a comprehensive presentation on the current vegetable oil economy, future requirement and production problems. He also presented the alternate sources of vegetable oil and what could be done to reduce the imports by increasing the domestic supply of oil. Special mention of current stalemate of GM-Mustard was mentioned by him as a strategic policy decision taken by NAAS to release the GM-Mustard to benefit growers, consumers and the nation. The other experts who presented their views on related issues include Prof R.B. Singh, Mr Vijay Sardhana, Dr S.T. Radhakrishnan, Dr V.S. Bhatia, Dr A.V. Reddy, Dr R.K. Mathur, Dr K.S. Vara Prasad, and Shri Ram Kaudinya.

Main emerging highlights of the discussions were:

1. Nearly two third of the current demand of 21 million tonnes (mt) of edible oil is met through imports of soya oil, canola oil, sunflower oil and mainly palm oil. The entire soya and canola oil used are derived from GM-Seed and hence the domestic supply of mustard oil from the present level of 2.2 mt can be increased to 3.0 mt by adopting the GM - Mustard technology. With the adoption of Bt cotton in the country in the last 15 years the cotton seed oil availability has increased to 1.5 mt annually. Thus of the total 21 mt oil consumption, the public is already consuming nearly 22.5% of GM oil from Bt Cotton, Soya and Canola. Therefore, a clear policy on GM mustard cultivation will go a long way in reducing the reliance on import.
2. It is estimated that by 2050, nearly 25.91 mt of edible oil and 10.61 mt of vegetable oil for non edible uses will be required and hence it is necessary to enhance productivity of the nine oilseed crops and also to brighten the prospects of supplementary sources. Rice bran appears to be a potential source untapped as yet.
3. In each of nine oilseed crops, immediate interventions such as, use of high yielding cultivars, SRR improvement, enhancing irrigated area, IPM and INM practices and simultaneously better returns over cost are necessary to increase domestic availability of oilseeds. Increasing area under oilseed crops by extending the cultivation to the rice fallows will be helpful in this regard.
4. Some immediate policy interventions such as; creating 'Oilseeds Development Fund', reducing 20% gap in custom duty between crude and refined oil and focusing on high oil bearing crops like mustard will go a long way to stabilize the availability of edible oil in India.
5. Minimum Support Price (MSP) with special bonus for some oil bearing crops will also attract farmers to invest in such crop cultivation.

Expert's Consultation to finalize "Policy Brief on Crop Residue Burning" (Convener: Dr Yadvinder Singh)

An expert consultation to finalize "Policy Brief on Crop Residue Burning" was organized on July 12, 2017

at NAAS, New Delhi. Prof Panjab Singh, President, NAAS chaired the session and participants were from different ICAR institutes, SAUs, NAAS and other national and international organizations. The main objectives of this session were to discuss different issues relating to impacts, management and tackling the problems faced by rice crop residue burning. During the course of discussion, the problem of crop residue burning, its impact on environment, soil health and human health was highlighted. The current practices employed for rice residue management were deliberated alongwith their problems. In order to explore the viable solutions to these problems, innovative methods involving use of super Straw Management System (SMS)-fitted combines and Turbo Happy Seeder were advocated. This innovative method was illustrated through a success story on wheat crop sowing on 120 ha at the Borlaug Institute for South Asia (BISA) at Ladhowal and in over 100 ha in the climate smart villages under CIMMYT-CCAFS program on climate smart agriculture (CSA). This combination facilitated easy operation of the Turbo Happy Seeder with about 20-25% increase in its capacity and less wear and tear of cutting flails. The various components of cost involved in its manufacturing and usage were also discussed. Finally the advantages of concurrent use of SMS-fitted combines and turbo happy seeder were highlighted.

Some of the major advantages of this innovative system are: increase in average yield, economical cost of production, increase in nutrient use efficiency, production with SMS with more crop per drop of water, reduced risk of biotic and abiotic stresses, improvement in soil health, improvement in environment, improvement in the health of on-farm and off-farm workers, saving in depletion of N, P, K

and S in soil and increase in the income from adoption of turbo happy seeder technology package.

Finally the business models for fast adoption of the technology along with the policy needs were the focus of the discussion. The session concluded with recommendations to encourage adoption of the proposed technology as a practical and viable alternative to farmer's practice of crop residue burning.

Expert's Meeting on "Policy Brief on Soils" (Convener: Dr C.L. Acharya)

An expert consultation convened by Dr C. L. Acharya on "Policy Brief on Soils" was held at NAAS on August 09, 2017. The meeting was chaired by Prof Panjab Singh, President NAAS, who in his opening remarks mentioned that soil health, has become very serious issue and NAAS need to frame policy brief for the authorities so that they take knowledge-based decisions to restore the soil health in the country. In the meeting an overview on the topic was presented by Dr Acharya and paper was circulated among the participants. All the participants took active part in the discussion and gave many valuable suggestions to improve the draft policy brief developed by Dr Acharya in consultation with other experts. It was decided in the meeting that this policy brief after incorporating the suggestions will be finalized by core group of experts and final document will be processed by the Academy. The major recommendations decided in the meeting were, ensuring the authenticity and monitoring of data generated for the soil health card; urgent need to improve the inputs of organics and BNF in Indian agriculture; incentive to farmers for adoption of conservation agriculture practices; reforms in Nutrient Based Subsidy (NBS) to correct some aberrations; the fertilizer subsidy to be audited for NUE and long-term impact on environment; a transparent regulatory authority for supply of soil specific fertilizer to farmers; safe disposal of municipal waste; national level soil protection policy; availability of heavy machinery for soil shaping to farmers on cooperative basis; and use of alternate source of energy for farming.

Activities of Regional Chapters

Karnal Chapter

A meeting of Karnal Chapter was held on 6th May 2017 at NDRI, Karnal and was attended by regional fellowship and associates including scientists from NDRI and IIWBR. Dr M. L. Madan, Convener & Former VC, DUVASU, Mathura, U.P. in his opening remarks mentioned that NAAS has a major role of fulfilling the societal responsibilities on number of concurrent issues for overall awareness on agriculture as a whole among various stake holders including common men, farmers, students and teachers of educational institutes in Haryana and Chandigarh region. He emphasized to sensitize the civil society about NAAS achievements. It was decided that farmer's representatives from the region would be invited to NAAS meetings to seek suggestions from them on field oriented research issues. The NAAS Karnal Chapter would make efforts to attract / sustain the youth in Agriculture Research especially fresh ARS scientists.

During the discussion following action points emerged

Fellowship of Karnal Chapter would visit selected institutes and schools of Haryana and Chandigarh region to sensitize the students and teachers on the prospect of Science education as a whole including Agricultural Science, and contribution of agriculture to country and to the state of Haryana. Eminent scientists, educationists and distinguished personalities associated with agriculture, who visit Karnal would be invited for special talk on public platform on behalf of the Chapter. To make best use of NAAS policy papers the recommendations from

specific papers relevant to the state of Haryana and Chandigarh would be compiled. It was decided that Dr S. K. Karma, Fellow, NAAS would prepare 1-2 page note on implementable areas. After completion of the report the same would be communicated to higher authorities of State of Haryana (Chief Minister, Chief Secretary, Governor etc.) for their attention and consideration.

Some of the recommendations on Prospects and Challenges on Milk Production in Haryana; Feed and Fodder for Gausalas; Decline in R&D investment in Agriculture and its effect on Agriculture Research; Privatization in Agricultural Research; How to attract youth into Agriculture etc. may be prepared on priority after due brain-storming for onward transmission to NAAS and State Government. A press note on 'Surgical strike on plant and animal diseases' may be prepared by the Chapter for publication in local newspapers.

Dr Madan urged the NAAS Fellows and members of Karnal Chapter for active cooperation from everyone to make the activities of the Chapter visible in the region.

Dr M.L. Madan
Convener, Karnal Chapter

Kolkata Chapter

A two-day National Seminar entitled "Nutrients and pollutants in soil-plant-animal-human continuum for sustaining soil, food and nutritional security-way forward" was organized by BCKV in collaboration with the National Academy of Agricultural Sciences, New Delhi during June 9-10, 2017 at Kalyani. Prof Panjab Singh, President, National Academy of Agricultural Sciences, New Delhi graced the occasion as the Chief Guest and Dr D.D. Patra, Vice-Chancellor, BCKV presided over the inaugural function. Renowned soil scientist Prof L.N. Mandal, Former Vice-Chancellor of BCKV was felicitated. Micronutrient maps for 14 districts of West Bengal and several other publications were released on this occasion. More than 200 researchers, students, and industry-personnel from all over India and Bangladesh participated in the seminar.

In the seminar 40 invited lectures were presented by different experts under six technical sessions i) improving micronutrients availability in soils for nutrition of crops, ii) mitigating toxicity of heavy metals and organic pollutants in soil, water and plant systems, iii) value addition to crops, iv) up-keeping soils for posterity, v) rehabilitation of degraded soils – progress, pitfalls and promises, and vi) translating science of soil into practice and policy. All presentations evinced keen discussion among the participants and many important recommendations emerged during the discussion.

Dr Biswapati Mandal
Convener, Kolkata Chapter

Ludhiana Chapter

Dr Pramod Aggarwal, NAAS Fellow and Regional Program Leader (CCAFS), IWMI, India, New Delhi, delivered special lecture on 'Managing Climatic Risks in Agriculture: Big Data Provide New Opportunities', organized by Ludhiana Chapter at Punjab Agricultural University (PAU), Ludhiana on 9th August, 2017. The event was presided over by Dr B.S. Dhillon, Vice-Chancellor, PAU. Dr A.S. Nanda, Vice Chancellor of GADVASU, also graced the event apart from NAAS Fellows, Deans, Directors, Heads of the Departments, faculty and students of the University who attended the lecture.

Dr Aggarwal in his lecture spoke that globally climate related risks have increased, such as flood being the major weather-related disaster affecting 56 per cent population (2.3 billion) followed by drought affecting 26 per cent people (1.1 billion), storms affecting 16 per cent people (660 million), extreme temperature affecting around 2 per cent (94 million) and the landslides and wildfires affecting 8 million people. India, he said is in medium range of vulnerability to food insecurity; however, in 2050, it will move towards higher ranges of vulnerability with respect to food insecurity. Dr Aggarwal in his talk introduced a newly developing term 'Big Data' that includes information from diverse sources, including increased usage of mobile phones with camera, digital images by farmers, microsatellite images, high resolution satellite data, data from more than one million crop cutting experiments, 30 million soil samples, large multi-location trials, genomics and social media such as 'WhatsApp'. He suggested that the 'Big Data' can be used for agriculture related activities such as crop insurance, ICT based agro-advisories, precision agronomy, early warning systems and for research on crop-weather relations and crop breeding. Informing that in CIMMYT, 'Big Data' is being used for assessing the global seed distribution network of wheat and maize. In conclusion he advocated that the goal to use Big Data should be to 'harness the capabilities of Big Data to accelerate and enhance the impact of international agricultural research and solve development problems both faster and better and at greater scale'. Dr A.S. Nanda, Vice Chancellor, GADVASU in his remarks, appreciated the thought-provoking lecture of Dr Aggarwal when in today's world the agriculture and livestock are becoming highly vulnerable to the climatic risks. The lecture ended with the vote of thanks by Dr V.K. Arora, NAAS Fellow & Treasurer of the Chapter.

Dr B.S. Dhillon
Convener, Ludhiana Chapter

Bhubaneswar Chapter

The NAAS Bhubaneswer Chapter organized a National Seminar on "Climate Change: Impact on Aquatic Environment and Fish Health" on 06 September 2017, in collaboration with ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA) and Association of Aquaculturists (AoA), Bhubaneswar. The programme was chaired by Dr K. Pradhan, Former VC, OUAT, Bhubaneswar and was attended by Dr D. P. Ray, Convener and Former VC, OUAT, Bhubaneswar; Dr S.P. Adhikari, Former VC, FM University, Balasore; Dr J.K. Sundaray, Director, ICAR-CIFA apart from 12 NAAS Fellows from the region and the scientists of ICAR-CIFA, Bhubaneswar. Dr K. Pradhan, in his remarks raised the concern of greenhouse gases, effect of climate change on fisheries, impact on fish and its availability and reproduction and other important behavioural changes.

In this Seminar, five lead papers were presented by eminent speakers. Dr H. Pathak, NAAS Fellow & Director, ICAR-NRRI, Cuttack presented impacts on agriculture due to climate change, greenhouse gas emission rate in global and Indian context. He listed five major strategies/steps to reduce the climate change effects viz., mitigation, adaptation, loss and damage, technology and funding.

Dr A.K. Pal, NAAS Fellow & Former JD, ICAR-CIFE, Mumbai in his presentation concluded that stressor like temperature and hypoxic conditions have various roles in modulating the fish physiological responses, hormonal imbalances or disorders, and association of genes or expression of heat shock protein (HSP) gene. Dr S. Adhikari, Principal Scientist, ICAR-CIFA highlighted the issue of water stress and future of freshwater aquaculture especially with enclosed culture systems. Dr M.K. Das, Former Head, FREM Division, ICAR-CIFRI, Kolkata presented the research carried out with regard to fish habitat modifications in the Ganges river system, impact of extreme events on fish physiology and reproduction. Dr K. V. Rajendran, Head, AEH Division, ICAR-CIFE, Mumbai narrated the effect of temperature on the pathogen development, life cycle and other aspects of some of the common fish and molluscan parasites.

Based on the detailed deliberations, the house made following recommendations/ suggestions.

- More investment required on developing climate-smart technologies and climate resilient aquaculture species;
- Develop integrated land use and crop planning policy to integrate farming, as adaptation and mitigation strategy;
- Study on picoplankton and cyanobacteria in relation to climate vulnerability to be encouraged;
- Detailed database compilation on different culture systems under different climatic conditions is essentially needed to develop base-line bench mark;
- More studies on fish physiology, hypoxia, temperature, stress/tolerance limit and introduction of neutraceuticals as mitigation measures to be taken up;
- Study on emerging pathogens in the present context of climate change is emphasized;
- Capacity building and climate change education must be taken up at different levels; and
- Climate change should be differentiated with local phenomenon/pollution to give more clarity on the long and short term trends.

Dr D.P. Ray
Convener, Bhubaneswar Chapter

Lucknow Chapter

NAAS Lucknow Chapter organized a one day training program on “Development of soft skills for attaining excellence in science” at ICAR-IISR, Lucknow on September 12, 2017. More than 50 Scientists from different ICAR institutes in the region participated. Dr P.K. Chhonkar, Adjunct Faculty, IARI and Ex-Head and Prof, IARI delivered the interactive talk spread in three sessions. The programme was convened by Dr P.S. Pathak, Convener of Lucknow Chapter, he welcomed all distinguished participants, introduced the speaker and highlighted the activities of NAAS and its role in developing science base policy on agriculture in the country. The programme was graced by Dr A.D. Pathak, Director ICAR-IISR, Lucknow, Dr K.K. Lal, Director, ICAR-NBFGR, Lucknow and Dr D.K. Sharma, Former Director ICAR-CSSRI, Karnal.

Dr P.K. Chhonkar, in his lecture cum exercise based on questionnaires provoked the scientists and other staff to improve their soft skills to benefit the organizations in terms of meaningful output and outcome. The interactive lectures highlighted the importance of soft skills in improving work culture, interpersonal relationship, communication skills, importance of EQ and physical and mental fitness in research and development.

At the end Dr Amaresh Chandra, NAAS Fellow and Organizing Secretary thanked the speaker for a thought provoking lecture and all the distinguished participants.

Dr P.S. Pathak
Convener, Lucknow Chapter

Nagpur Chapter

NAAS Nagpur Chapter organized a guest lecture on ‘What prevents public sector organizations

from successfully commercializing their GM crop developments?' on 18 September 2017 at ICAR-Central Institute for Cotton Research, Nagpur. Dr Derek Russell, Hon. Prof, Faculty of Veterinary and Agricultural Sciences, University of Melbourne, Australia delivered the lecture. The lecture was attended by nearly 80 Scientists and Researchers belonging to the ICAR Institutes, SAUs and the Private Sector. The session was chaired by Dr K.P. Viswanatha, Vice Chancellor, MPKV, Rahuri. Dr V.N. Waghmare, Director (Acting), ICAR-CICR, Nagpur welcomed the guests. Dr C.D. Mayee, Convener, NAAS Nagpur Chapter shared details about the NAAS activities. Dr K. R. Kranthi, Head, Technical Information, ICAC, Washington DC, USA introduced the speaker to the audience.

In his lecture, Dr Russell deliberated about the various factors which are hindering the success of full commercialization of GM crop developments. He explained in detail how various technical, commercial, organizational and social uncertainties associated with the GM inventions of public sector organizations affected the commercialization around the globe. He also suggested how to overcome these problems for successful commercialization. There was an active discussion after the talk in which several participants interacted with the speaker, prominent among them were the Former Vice Chancellor of PDKV Akola, Dr Sharad Nimbalkar; Former Directors of the CICR – Dr A. K. Basu, Dr K.D. Kornanne, Dr N.D. Mannikar. The speaker responded to all the points raised by the present scientists.

Dr K.P. Viswanatha, Vice Chancellor, MPKV, Rahuri in his concluding remarks informed that some groups mislead the farming community as well as bureaucrats about GM technology without being fully aware of its potential benefits. They need to be convinced about the GM crops for successful commercialization. He also felt that farmers are the best judges and the Bt cotton is an example.

A vote of thanks was proposed by Dr Blaise, Treasurer, NAAS Nagpur Chapter.

Dr C.D. Mayee
Convener, Nagpur Chapter

Assurance of Minimum Prices to Farmers: Need for Crop Price Forecasts for Effective Pre-Emptive Market Interventions

Dr S.S. Acharya, FNAAS & Former Chairman, CACP, Udaipur
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The objectives of this article presented by Acharya (2017) in the Expert Meeting on Agricultural Market Price Visualization and Early Warning System, organized by FAO at New Delhi, September 11-12, 2017, are to look at the urgent need for crop price forecasts for farmers as well as for policy makers, to review the current status and suggest a way forward. The article is divided into six sections. The importance of price forecasts in general is briefly discussed in the first section. In the next three sections, we look at the relevance of availability of credible price forecasts for assurance of minimum support prices to farmers, effective utilization of market intervention scheme and for timely trade policy decisions. A brief review of two important initiatives within National Agricultural Research System (NARS) and the capacity that has been built in the country is presented in the fifth section. Some concluding observations and the way forward are given in the last section.

I. Relevance and importance of price forecasts

The farmers face several kinds of risks like weather risks, risks in production process (inputs availability and quality, insect pests, diseases etc.), and

marketing risks. The risks associated with marketing process are of three types viz.: physical risks (loss in quantity and quality), institutional risks, and price risks. Risks and uncertainties, by definition, cannot be eliminated. At best, these can be minimized. The physical risks in marketing can be minimized by adopting suitable measures during handling, storage and transportation. In the case of price risks, the individual farmer finds himself almost helpless. For reducing the price risks of farmers, at least two major schemes viz.: Minimum Support Price Scheme (MSP) and Market Intervention Scheme (MIS) are in operation for crop products since long (Acharya and Agarwal, 2016). But there are several questions related to their effective implementation. My assessment is that farmers' discontent, arising from this, is getting increasingly aggressive in most of the Indian states. Bumper production of horticultural crops, especially vegetables, in several years and of pulses during the last year resulted in crash in prices when farmers sold their produce in distress as institutional arrangements were either absent or did not work adequately. Farmers' resentment against the system, therefore, is obvious. Assurance of at least a minimum price to the farmers for their produce is also closely linked to the present government's ambitious plan of doubling the farmers' incomes by 2022.

It may be mentioned here that price uncertainties are faced by all the stakeholders in agricultural marketing. Apart from farmers, these include assembling traders, bulk buyers, processors, wholesalers and importers/exporters. Other than farmers, all stakeholders, individually or collectively, make their own predictions based on their experience and information accessed from various sources and plan their actions or responses to maximize their gains or profits. It is only the farmers who are at a relative disadvantage to foresee the ensuing price situation.

II. Effective implementation of minimum support prices

There are 24 commodities for which MSPs are announced by the Government of India. For the purpose of analyzing the effective implementation, it is pertinent to divide these into two groups of crops. Wheat and paddy (rice) need to be discussed separately from rest of the crops.

Wheat and Paddy (Rice)

Assurance of MSP is critical for this group because 70 percent of the population is covered under PDS which assures rice and wheat at a rate of Rs 2 or 3 per kg to the consumers, impacting the market price level for these grains. Further, every year around 50 to 60 million tonnes is purchased at MSP giving an impression that MSP is very effective for these grains. But effectiveness is questionable in these crops also. There are two clear instances to prove this point. One, when decentralized procurement scheme was launched in the country, the quantity of price support purchases in states like MP, Chhatisgarh, Jharkhand and Odisha went up considerably showing that prior to this scheme, the paddy or wheat growers in these states were not getting even the MSPs. Two, in the current rabi marketing season, when New UP government made extra efforts, the MSP purchases of wheat aggregated to more than three million tonnes showing that in the absence of these efforts many wheat growers of UP would not have received the MSP for their wheat produce.

This is mainly because of a mix-up in terms of distinction between MSP purchase operations and public procurement. The origin of this mix-up can be traced to a regime of two sets of prices for wheat and paddy viz. MSP and separate procurement price, with altogether different objectives for six years from 1965 to 1971. This was followed by a period of 20 years from 1971 to 1991 when procurement price was treated as MSP for these crops. During this period of procurement price (20 years), farmers suffered because as soon as the so called procurement targets were fulfilled, the agencies shut the operations even when market prices continued to rule below MSP. Realizing this misuse of procurement word, in 1991, the CACP recommended (and government accepted) that since kharif crops of 1991, there shall be no procurement prices (and no associated procurement targets) and instead there shall be minimum support prices also for paddy and wheat (for all other crops, there were only MSPs) (Acharya and Agarwal, 1994). As MSP is a price guarantee, MSP operations are required to be carried out (a) in all the markets where prices dip below MSP; and (b) throughout the marketing season till farmers continue to offer their produce at MSP to the purchase agencies. It is inherent in MSP operations that in some years, we

end up with purchases much higher than that needed for meeting PDS and buffer stocking requirements while in others, MSP purchases may be far lower than these requirements (OMSS and imports are the instruments to complement MSP operations). The purchase targets fixed in MSP operations are only to help agencies to plan and prepare in advance for logistics (purchase centres, gunny bags, money for disbursement to farmers etc.). The designated price support agencies and their functionaries at lower levels are not able to distinguish between targets of procurement and intention of price guarantee. As a consequence the farmers suffer who are not so aware of this distinction. A clear case of this confusion was observed during the support operations for pulses in the current season. While purchase agencies shut their shops as soon as purchase targets were achieved, the farmers continued to suffer and had to sell their produce below MSPs. Farmers resentment and anguish is obvious. Every year, almost all reports of CACP have expressed concerns and cited several cases of ineffective MSP operations in many states, for example see (CACP, 2015a, 2015b). The main reason is the slackness on the part of state governments. It is not uncommon to hear some Agricultural Ministers of state governments saying that this is the purview of the central government and the nodal agency (FCI).

Other Crops

For raw cotton, raw jute and copra, owing to the pro-active role of concerned states, nodal agencies, related industry, trade organizations and also farmers collectives, the situation is relatively better. For sugarcane, there is no commitment of government purchases. Hence the issue is different.

For coarse cereals, pulses and oilseeds, MSP purchase operations were/are traditionally not needed every year. That is one of the reasons that when ever, there is bumper production in some areas, the MSP purchase system is neither in place nor active. Further, oilseeds and pulses are not a part of PDS. Even in the case of coarse cereals, usually the responsibility of disposal of purchased quantities has to be taken by the concerned state. As a consequence, the state governments are not pro-active in undertaking the MSP purchase operations of these commodities. This year, when GOI decided to build the buffer stock of pulses, the purchase operations were undertaken but the mix-up of procurement targets and price support operation was clearly visible.

By and large, in both these cases, where the state governments are pro-active in advance, the situation is better. However, much more needs to be done to solve the problem of denial of even MSP to the farmers, for which the farmers have now awakened and protesting. This kind of failure on the part of state government was conveyed to State Governments during farmers' agitation in parts of MP and southern Rajasthan.

III. Market intervention scheme (MIS/PSF)

MIS is in operation for the last more than three decades. The purpose is to provide price support for those commodities that are not covered in MSP policy. This is meant for those commodities where price support operations are not needed every year and support operations are required only in some areas/regions. The scheme got a little boost when special funds were provided to SFAC under the title Price Stabilization Fund.

MIS is more flexible than MSP regime. Under MIS, support can be provided in some years, for a limited but defined period, in specified critical markets and by purchasing specified quantities. The initiative has to emerge from the concerned state. The support price, markets and quantities to be purchased are decided mutually by the state and the centre. The losses, if any, are shared equally by the centre and state (75:25 for NE states) (Acharya and Agarwal, 2016).

In the past, the scheme was used very rarely mainly due to slackness on the part of states, not coming forward in time. There are several commodities where wide fluctuations in prices are very frequent. There is lot of resentment from the consumers due to very high prices at one time and from the farmers due to very low prices only after a few months. The commodities in this group include onion, potato, chilly, tomato, apple, coriander, and cumin. The new state government in UP announced to purchase around one lakh tonnes of potato from farmers at a price of Rs 487 per quintal is an example of the need for up-scaling MIS. Another case is the

reported announcement of Maharashtra government sanctioning payment of Rs 100 per quintal to onion growers who sold their produce at distressing prices during July-August 2016. Such ad-hoc measures do help but do not show the prudent use of a scheme like MIS (PSF) that is in place since long. We need a well-articulated institutional mechanism both at the central and state levels to reach the benefits of this scheme to the farmers and incentivize them.

(a) There is a need for an exclusive and dedicated institutional framework at the state level, consisting of a Nodal Officer and mandated cell, to foresee the demand, supply and price situation well in advance, move a proposal to the Centre, and prepare a plan of action (the focus of state level departments of agriculture and horticulture remains on production related activities in most of the states).

(b) Also, there is a need to specify the mandated commodities at the centre, with scope for state- and year-specific additional commodities.

(c) At the Central level, the guidelines in the form of Price Stabilization Fund Scheme are available but going by the past experience, a pro-active stance at the central level is necessary to guide the states' Nodal Agencies to come up with timely proposals and to process these proposals speedily for timely interventions.

A very critical aspect in implementing the MIS well in time is the need for a credible outlook information generating system (including price forecasts) in the country.

IV. Trade policy decisions

Apart from the effective implementation of MSP policy and MIS, quite often trade policy decisions are not well-timed. This happens because predicted prices are not available from our own credible sources. As a result, our farmers as well as consumers suffer. Several cases can be cited to explain this.

(i) In 2006-08, when India needed to import 6 to 7 million tonnes of wheat, we lost around Rs 50 billion due to unavailability of our own global outlook information on wheat prices.

(ii) Recently when prices of pulses sky rocketed, we went for large imports. The imports took time and by the time imports arrived, next harvest season was on and farmers suffered due to lower prices. Earlier the consumers suffered and later the farmers suffered due to lack of advance trade decisions.

(iii) Similarly, when the onion prices increased sharply in the market, the government's decision to restrict the exports and to impose stocking restrictions are only ad-hoc measures taken too late.

(iv) Conversely, when there is a bumper production of a crop (say onion) and prices crash, the belated decision to allow liberal exports by fixing MEP at lower levels hardly help the farmers because by the time these measures materialize, most farmers have already sold their produce at almost throwaway prices.

If crop price forecasts are available in advance, the policy decisions and interventions can be well-timed to achieve the intended outcomes and help the farmers as well as consumers.

V. Market intelligence and outlook generation system : Status and concerns

A very critical aspect for reaching the benefits of all these three instruments of agricultural price policy (MSP, MIS and Trade policy decisions) to farmers, and ultimately also to the consumers, is the timely pro-active stance by the state governments as also the centre. An essential pre-requisite for this to happen is the availability of credible 'likely price situation' well in advance of the harvest season. Realizing this need, two important initiatives were taken by the ICAR in the National Agricultural Research System (NARS) in 2008-09, as a part of The World Bank-assisted National Agricultural Innovation Project (NAIP). It is very relevant to note some salient features of these for this discussion.

(1) Establishment and Networking of Agricultural Market Intelligence Centres in India

This operational research project during the period 2009 to 2014. was led by Tamil Nadu Agricultural University (TNAU), with Consortium partners of 10 State Agricultural Universities viz.: HAU Hissar, GB Pantnagar, PAU Ludhiana, MPUAT Udaipur, PDKV Akola, APAU Hyderabad, UAS Bangalore, UAS Dharwad, GAU Junagarh and KAU Trissur.

The team reviewed globally available price forecasting models (ARMA, ARIMA, ARFIMA, LARCH, GARCH and ANN) and sharpened its methodology. Measures of forecasting accuracy were also used. The team regularly brought out pre-sowing and pre-harvest forecasts for 34 crop products (including cereals, pulses, oilseeds, cotton, vegetables and spices/ condiments) with 90 to 100 percent accuracy.

The price forecasts were widely disseminated through print media, visual media, mobile applications, radio broadcasts and also through tie-ups with organizations having networks with farmers. Regular feedbacks were received and analyzed. The impact assessments were also done that revealed positive impact of the forecasts on farmers' incomes. The project created adequate technical and human resource capacity at state and regional levels within NARS. The project also created demand for price forecasts amongst all the stakeholders (National Coordinator, 2011).

After the project period it was quite satisfying that the ICAR carried forward the work through a Network Project under the leadership of NIAP (NCAP) and further strengthened the technical and human resource capacity for price forecasts with in NARS at the state level (Saxena and Pavithra, 2016). But later the work was wound up as cannot continue as a regular activity.

(2) Developing a Decision Support System (DSS) for Agricultural Commodity Market Outlook

This project was operated from 2009 to 2012. The NIAP (NCAP) was the consortium leader. The consortium partners initially were IARI (Division of Agricultural Economics) and IASRI (Kumar, 2011).

The team reviewed at least nine existing global models and their features. These included USDA/ ERS, IFPRI IMPACT, OECD AGRILINK, FAO World Food, EU Simulation (EUSIM), World Bank Outlook, ADB Outlook, Irish Agriculture and Arkansas Global Rice. Based on the review and its own iterations, the team came out with some evolving models for India for further refinements.

(i) Grain Outlook Model – multi-commodity model that included rice, wheat and maize, with 2007 as the base year;

(ii) Oilseeds Outlook Model – multi-commodity model that included rapeseed/mustard, groundnut, soybean, oils and oil meals, with 2010 as the base year;

(iii) Commodity Market Outlook Statistics (CMOS); and

(iv) Wheat Outlook Model.

General features of grain and oilseed model include the following:

(i) Developed under partial equilibrium framework, with a system of equations being simultaneously solved, using a non-linear programming approach;

(ii) It is a multi-commodity model;

(iii) The model is dynamic;

(iv) The model is spatial with regional dimension on the supply side;

(v) The demand side equations are modeled for the country as a whole;

(vi) The forecasting capability is up to 2025.

The Model Structure consists of (a) Producer Core System (area, yield, production and supply); (b) Consumer or Demand Core System (HH food demand, feed demand and total demand); (c) Trade Core System (exports, imports and trade balance); (d) Price Linkage Equation; and (e) Model Closure.

Subsequently, it was intended to (a) calibrate the model using new and better estimates of elasticities; (b) incorporate linkages with more related crops; (c) validate the model based on past data; (d) compare the forecast results with similar international commodity outlook models; (e) develop a user-friendly interface using software solutions; and (f) establish a Commodity Outlook Cell for regularizing outlook generation exercise. The team also conceptualized the human resource needs for such a cell. The project was co-terminus with NAIP. The work has not been carried forward.

VI. Concluding observations and the way forward

(1) The AMIC project has successfully demonstrated the benefits derived by farmers by getting

advance information on future prices in the form of price forecasts. This has reduced the price information asymmetry faced by the farmers.

(2) Such price forecasts are also helpful to other stakeholders in the marketing system. More specifically, these can be used by state governments and related agencies for advance planning and preparation of action plan for timely and effective implementation of MSP policy and MIS to solve the problems for which farmers are agitating all over the country.

(3) These price forecasts, along with the regular output made available from market Outlook DSS can be very useful and serve as timely inputs for trade related policy decisions and other interventions.

(4) The technical and human resource capacity has already been created. However, despite these initial efforts, a credible nation-wide system for regularly generating and making available market intelligence/price forecasts and outlook information for key agricultural commodities is yet to take shape and become operational. It must be recognized that project- mode has its inherent limitations. The continuity of trained and experienced scientists becomes difficult. Owing to the need for validation and moderation of results before final release, the continuation of associated core scientists is quite critical in such endeavours. Hence, such cells should necessarily operate in a program mode.

(5) The institutional framework ought to remain with agricultural science based National Agricultural Research System (NARS) and must operate in a hub and spoke model. My assessment is that ICAR-National Institute of Agricultural Economics and Policy Research (NIAEPR) should work as hub and around 20 SAUs should be designated as spokes so that all key agricultural commodities are covered. Each selected SAU should be mandated to cover important crops of the region for price forecasts. Agricultural market Outlook DSS should also be housed in NIAEPR.

It is quite satisfying that some state governments (like MP, UP and Karnataka) are also now showing increasing interest. The Karnataka government is reported to have signed MoU with Microsoft, a software giant, for developing a farm price forecasting model. Obviously, a national initiative, in a program mode, somewhat on the pattern of IMDs weather forecasts, is urgently called for.

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Awards and Honours

Prof (Dr) Khageswar Pradhan, esteemed fellow of NAAS and former Vice-Chancellor, OUAT, Bhubaneswar and Rajasthan Agriculture University, Bikaner was presented with "ODISHA BIGYAN ACADEMY AWARD" by the Chief Minister of Odisha, Sri Naveen Patnaik at a felicitation ceremony held at Bhubaneswar. He has been named as a "Senior Scientist of Odisha". This honour has been conferred to Dr Pradhan in recognition of his life time contribution in research, education and development in Agriculture sector and society, particularly in running a public and charitable educational trust for orphan and poor.

Forthcoming Programmes

- 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/Chair: Prof Anupam Varma)

Change of Addresses

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Obituary

Badrinarayan Ramulal Barwale, Born in Hingoli (Maharashtra) on August 13, 1931 a philanthropist and father of the seed industry, breathed his last in Mumbai on 24th July 2017.

He founded India's first private seed company, Maharashtra Hybrid Seeds Company Pvt Ltd (Mahyco), in 1964. Dr Barwale went on to become one of the iconic figures in the agriculture sector and is known for his contribution to seed sector and food security. He is widely regarded as father of the Indian seed industry due to his efforts to develop a strong seed pipeline in India. Gradually MAHYCO became a pioneering seed company in India that created a participatory base of farmers producing the quality seed and processing by the companies. Millions of farmers have become part of seed production and this itself became a new opportunity for the farmers to earn more from their small farm lands. Dr Barwale trained, nurtured and skilled farmers to become entrepreneurs by engaging them into quality seed production of different varieties and hybrid seeds. He was also a great leader and built team of scientists in MAHYCO who dedicated for the cause of farmers. The Jalna became hub of seed business in the country. He introduced the first genetically modified Bt-cotton in India in 2002 and India became the country of "White Gold" displacing USA and China to second and third position in the world's cotton production. His commitment to the poor people is reflected by developing health care and educational support, by construction of many hospitals and educational institutions. He liberally supported scientific interactions with national research system like ICAR, CSIR, DBT and SAUs. He was conferred with Honorary Degree of Doctorate of Science (h.c) by Tamil Nadu Agriculture University in 2002; Honorary D.Lit Awarded by Dr Babasaheb Ambedkar Marathwada University in 2010; ICAR Excellence Award for Innovative Contribution to Indian Agriculture in 2014. The National Academy of Agricultural Sciences elected his foundation as Corporate Fellow in 1999.

In recognition of his many accomplishments including developing private seeds enterprise in India, Dr Barwale was aptly felicitated with 12th World Food Prize in 1998. The President of India conferred him with Padma-Bhushan civil award in 2001 for his distinguished service in promoting the trade and economic activity related to agriculture. More recently, the Prime Minister Shri Narendra Modi felicitated him during the 1st International Agro-biodiversity Congress 2016, in New Delhi, in recognition of his immense contribution to Indian agriculture development including science, serving the cause of farmers and philanthropic activities.

All NAAS Fellowship express heart-felt condolences to the bereaved family on the sad demise of great leader of Indian Agriculture whose contribution to Indian seed industry is unparallel. The Academy feels saddened to lose one its distinguished corporate fellows. May His Soul Rest in Peace!

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

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