Foundation Day
and
24th General Body Meeting

5th June, 2017

Presidential Address

Reforms in Agricultural Research and Development

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Reforms in Agricultural Research and Development

Esteemed Fellowship of the Academy, it is my pleasure to welcome you all to the 24th AGM of NAAS and congratulate you on the 27th Foundation day of the Academy. With your valuable support and cooperation our Academy has completed 27 eventful years to emerge as scholastic platform for policy and its advocacy on issues concerning agricultural research, education and extension for development. We are confident to make the Academy more vibrant and responsive to national aspirations in order to achieve the goal of promoting ecologically sustainable, economically viable and socially equitable agriculture in the country.

2. The achievements in the agricultural sector are attributed in large part to technology led improvements in productivity and investments in agricultural R&D and allied sectors. Recalling the history since India got independence, our population grew from 361.1 million in 1951 to 1302 million in 2016, about 3.60 times, while food grain production grew from 51 million tonnes (mt) in 1951 to 273 mt in 2016, 5.36 times-a very laudable achievement by any standard. The horticultural production has increased from 25 mt to over 287 mt over the same period. India continues to be the largest producer of milk in world, increasing production by more than 50 mt in a span of 10 years from 102.6 mt in 2006-07 to 155.5 mt in 2015-16. Analogous progress was also achieved in fish and poultry production. Several studies have conclusively proved that these achievements have been enabled by research efforts with benefits varying amongst crops/ commodities/techniques. Even though we have made considerable progress in achieving self-reliant food security but prevalence of

hunger among large population in the country remains a cause of concern. In this context I would like to cite FAO report, *State of Food Insecurity in the World-2015* that shows India has about 195 million undernourished people, the highest in the world. India is still to achieve MDG goal of reducing hunger while many developing countries have reached their targets.

3. The *2016 Global Hunger Index* (GHI) report, estimation reveals that globally, about 795 million people are chronically undernourished, roughly one in four children is stunted and 8 % of children suffer from wasting. India continues to have serious levels of widespread hunger forcing it to be ranked a lowly 97 among 118 developing countries. Over 40% of worldÊs undernourished children are our own children. It is estimated that the high under-nutrition in the country annually costs us about 3% of the national GDP. As per the Human Development Index-2015 (HDI) among 188 countries India was positioned at 131. Now the UNDP has identified 17 Sustainable Development Goals (SDGs) to be achieved by 2030 for which we have less than 15 years to meet the targets, the first two goals relate to hunger and poverty, and the remaining 15 also have a bearing with agriculture and need to think of right approach so that we do not miss the SDG targets.

4. Last century agriculture witnessed three distinct phases of growth. First, the sustenance agriculture till 60Ês where it was more dictated by food needs of the family and little saving for meeting other essentials and social requirement. It also did not entail much on the depletion of natural resources and was also deprived of technological support. From late sixties through the decades of 1970s to 1990Ês, in the second phase we saw the technology and production input driven agriculture which led to significant increase in production of important crops, especially rice and wheat in better resourced areas and led to what we call the ÂGreen RevolutionÊ in the country. During the third phase, in the years following Green Revolution, the emphasis

was given towards diversification of agriculture with inclusion of non-cereal crops including fruits and vegetables, livestock and fisheries with prime objectives of improving the household nutrition, improving farmersÊ income, rural employment as well as sustainability. The efforts resulted in White Revolution in milk production and Blue Revolution in fish production. This further accelerated holistic growth in agricultural sector. Agriculture research has significantly contributed in various ways to change production practices, reduction in drudgery, and shift from heavy manual work towards mechanization, increase in resource use efficiency etc. Looking ahead we see that while the food demand is likely to double by 2050, serious yield and total factor productivity gaps still exist in our food and agriculture.

5. India is projected to be the most populous country in the world with about 1.5 billion people by 2030. Hence Food Security for all would be the most important challenge. The agro-climatic conditions, in terms of seasons, rainfall, temperature regimes, soils and biological diversity that we have are probably unmatched elsewhere in the world. India is recognised as one of the mega-centres of biodiversity, accounts for 2.4% of the global land, 11.2% of arable land, 4.2% water and over 8,000 km of coastline. More importantly the country sustains 17.4% of the world population implying thereby that every 6th person in the world is an Indian. We have coexistence of tropical, temperate, semi-arid and conditions with wide range of soils and landforms. These resource endowments being unique to our country should be appreciated as our strengths and their potential needs to be harnessed to the advantage of agriculture sector.

6. An emerging strength is that by year 2020 the average age of IndiaÊs population will be around 29 years, the lowest in the world. According to our National Youth Policy-2014 that defines youth as those belonging to the age group of 15-35 years, India will have largest number of youth. It is this population of young people which will constitute, for India, a potential demographic dividend. The youth

offer us a rare opportunity for development by harnessing their talents and energies towards constructive channels. But how to do this is a major challenge. Agriculture needs to be made intellectually stimulating and a rewarding profession to attract talent in this sector. Improving the quality of agricultural education holds the key to driving not only agricultural growth but also developing technologies for sustainable agriculture leading to livelihood and nutritional security.

7. Climate change is now globally accepted threat and a serious concern for all the countries. We are witnessing aberrant climatic phenomena as floods, droughts, cyclones, extreme temperatures, disease outbreak, emergence of new pests and diseases etc. These events occurred in the past as well but their intensity and frequency in the present times is worrisome. Besides the loss of precious lives, both humans and animals, climate changes pose a major threat to very sustainability of agriculture, livelihood security of farmers and household food and nutritional security. The projected increase in these events will result in greater instability in food production and will threaten farmersÊ livelihood security. Producing enough food for increased demand against the background of changing climate scenario is a challenging task for agricultural research. In this context, Academy organized XIII Agricultural Science Congress-2017 on the theme of Climate Smart Agriculture (CSA) and the deliberations converged in Bengaluru Declaration, reflecting the commitment of diverse stakeholders to make the agriculture climate smart.

8. In the recent years, large scale land degradation, estimated to be over 120 million hectares, is posing threat to our food and environmental security. Increasing industrialization, urbanization and infrastructure development are resulting in a shift of land use from agriculture to non·agricultural uses. While industrialization and urbanization are essential for national economic growth, there is need to balance these developments with the concerns of sustainability of agriculture and environment. For proper management of natural

resources and to ensure sustainable agriculture growth in the country, there is need for a land use policy which should be integrated with all developmental programmes for a holistic growth while safeguarding natural resources. The Academy being aware of this issue is going to organize a discussion on the land degradation in a few days from now and would come out with a policy document.

9. Our country annually produces nearly a billion tonnes of raw food crops and commodities and some of these, mainly fruits, vegetables, milk, meat and fish are highly perishable. With its huge production base, India can easily become one of the leading food supplier to the world market and at the same time serving its vast growing domestic market of over a billion people. IndiaÊs large market size, with growing incomes and changing lifestyles, offers enormous market opportunities for primary food producers, processors, machinery makers, food technologists and service providers in this sector.

10. It has been estimated that present levels of post-production losses are about 2.8-10 % in durables, 6.8-12.5% in semi-perishables and 5.8-18% in perishable products. Only about 16% of milk produced in the country is handled in organized sector. A country like ours, with such a high prevalence of hunger, cannot afford food wastage of this scale. Today we say that we are producing more to lose (waste) more and, therefore, the question being raised is Âshould we produce or protect or do both produce and protect? Obviously, the answer will be produce and protect but then what would be the investment priorities for each? We conveniently say that we waste more than 10% of our food grains and about 20% percent of highly perishable fruits and vegetables or in monetary terms we say Rs.60-80,000 crore worth produce gets lost every year. In term of produce it will amount to approximately 25 mt of food grains and 40-50 mt of fruits and vegetables plus wastage in dairy and fisheries sectors. This colossal waste is good enough in quantity to feed few nations.

11. About 50% of these losses could be prevented using appropriate post-harvest approaches. Efforts must be made to develop processing and value addition units near the production areas; develop cold storage facilities and link the producers and the markets effectively. This would require greater attention to post-harvest engineering research and development. Earlier this year, burning of rice straw was blamed for the smog that enveloped vast area in northern parts of the country. Technologies that convert agricultural waste to wealth are called for as these will not only generate more income, employment but also reduce environmental damage. Technological interventions that ensure food quality and safety are needed for growth of food processing sector and to meet objectives of „inclusive growth‰ and „food security‰. The private sector has to come forward in a big way to support the developments as food processing sector remains, by and large, unorganized.

12. Moreover, about 90% of farmersÊ produce is sold at the farm gate without any processing and/or value addition. We have not been able to develop these facilities in rural settings. Needs reiterating at the cost of repetition that agriculture is and will continue to be the largest employer in India but again it is depressing to say that we have not supported the sector to create infrastructure in rural setting to create employment opportunities. In processing and value addition we are still at the low on the ladder compared to several developing countries in the region. As per the Ministry of Food Processing Industries Report-2015-16, the Food processing sector employs more than 17 lakhs people and account for approximately 12% of the industrial employment besides around 48 lakhs in the unregistered sector. In the whole chain of development, agriculture production, protection and processing have to go together and not one after the other. This calls for a massive investment over a period of time. These steps will check migration and decongest the cities and create job avenues in rural settings where population can live happily without disturbing the ecology and environment.

13. Agricultural biotechnology has a considerable potential to address many of the future challenges in the agriculture including post-harvest processing and value addition. Use of transgenic technology for sustainable agricultural production is well established. The past two decades of biotech crop commercialization is a long-term proof that biotechnology provides massive benefits worldwide and now 18 million farmers are using transgenic seeds. Globally there is a 100-fold and rapid increase in biotech crop adoption from 1.7 million hectares in 1996 to 179.7 million hectares in 2015. This technology has been successfully employed for targeting traits such as herbicide tolerance, insect-pest resistance, virus resistance, delayed fruit ripening, nutritional and oil composition, male sterility and restoration systems, thereby saving not only the resources but also safeguarding the environment. Indian farmers have benefited immensely from transgenic Bt cotton in which production has taken a quantum jump from 13.7 million bales in 2003-04 to an estimated 32.0 million bales in 2016-17.

14. Issues related to biosafety of transgenics are gaining significance in the changing global scenario, and we need to take adequate measures for safeguarding our biodiversity and natural wealth. Biosafety is also required to promote safe laboratory practices, procedures, proper use of containment facilities, equipment, risk assessment and management, evaluation of genetically modified organisms (GMOs) etc. Very recently the release of high yielding GE mustard for cultivation has been in the news and scientists are struggling for its release. India is major importer of GE Canola (Canadian Mustard) and GE Soybean oils. India has been consuming GE Cotton oil produced domestically by our cotton farmers. India is consuming nearly 5 million tons of Vanaspati oil for cooking every year. Farmers in Canada, Australia, and USA have been benefitting from GE Canola since 1996 and today GE Soybean and GE Canola contribute a major portion of global trade in edible oilseeds, edible

oils and edible feed. After 20 years of painstaking research experiments and regulatory security, Genetic Engineering Appraisal Committee (GEAC) has recommended the environmental release of GM mustard-Dhara Mustard Hybrid-11 (DMH-11) developed by team of Indian scientists but unfortunately it is facing a rough time even today. At this juncture, I wish to mention that during 2015-16, our import of vegetable oil was worth Rs. 68676.62 crores accounting for 49% of our total agricultural imports. These precious finances must be saved through application of new technologies and the resources can be put to use for improving agriculture in the country and *inter alia* the farmers. We, as the Fellowship of the Academy, must firm up our views on scientific lines with regard to the merits and demerits of the GM technology and put our views strongly before policy and law makers since so much of research investment has gone into developing this technology in the country.

15. Higher agricultural education in the country is our priority area and of late a general concern is with regard to dilution in the quality of education. The universities that have come up in large number, across the country are faced with inadequate infrastructure, faculty, financial support and erosion in autonomy. To ensure academic excellence, universities may be accorded enhanced level of autonomy coupled with accountability. There is tremendous disparity in regional assessment, as quite a number of regions of our country have not been benefited by the developments. There is a need for establishing more Central Universities like IITÊs with required infrastructural facilities and human resource. Periodic review and revision of curriculum consistent with national and global scenario, market trends, self-employment avenues and industries requirements is called for.

16. The ICAR Report of the Fifth DeansÊCommittee-2016 recommends that education for Agriculture in the 21st Century should aim at imparting skills so that every agricultural graduate is capable

of becoming an entrepreneur. Thus, as suggested by the Committee, business management should be mainstreamed in major applied courses, e.g. Seed Technology, Dairy Technology, Fish Technology, Food Processing etc., besides establishing new Faculties or Departments of Agricultural Business Management. Private companies and cooperatives, manufacturing and distributing agricultural inputs and related products should, other things being equal, give preference to such agricultural graduates for employment and granting licenses and dealerships.

17. Our institutions of agricultural research and education are the primary centers of technology and human resource development. The National Agricultural Research System (NARS) spearheaded by the ICAR is one among the largest in the world has more than 100 research institutions, 60 All India Coordinated Research projects, 19 Network projects, 73 State Agricultural Universities, 3 Central Agricultural Universities and 665 Krishi Vigyan Kendras at the rural district level, as an innovative institutional model for assessment, refinement and transfer of new agricultural technologies. I am mentioning these because much of the expansion of the existing institutions and establishment of newer institutions has been bereft of any matching increase in the budget and any manpower. The move has led to thin spread of resources with a larger share going towards meeting the establishment costs and leaving meager funds for the research programmes. This concern was raised even 30 years before as Report of G.V.K.Rao Committee-1988, made several recommendations that aimed at making the „ICAR *tall, slim and healthy".* I feel our Academy should give a critical assessment of the resource use and suggest to the authorities to control expansion and focus on integration of intra and inter- institutional and multidisciplinary research efforts.

18. Under the circumstances, our efforts on research, education and technology dissemination have to be more vigorous as now we have

to sustainably produce more from less for more. Innovations in approach for generating innovative technologies supported by adequate investments hold the key to sustainability of agricultural growth and development. It has become increasingly important today to restore the enthusiasm and interest of farmers (especially youth) in farming and teachers and researchers in teaching and research, which is showing a decelerating trend.

19. Sustained public funding, the main policy instrument of agricultural R&D in the country, has been useful in creating scientific infrastructure and human capital. The share of investment in agriculture and allied sectors that were 4.9% of the total outlay fell to 4.7 in the 12th Plan. The investment in agricultural research and education has marginally increased from 0.59% to 0.70% of GDPAg in 10th Plan to 11th Plan, respectively. This strategy has paid rich dividends in terms of economic and other impacts of agricultural research. Research has been a major source of growth in total factor productivity of agriculture. Also, the impact of agricultural research on reduction of rural poverty through higher agricultural growth is twice of that in the non-agricultural sector. This is therefore the best use of public funds for larger social gains. Increased private investment is necessary for translating R&D outputs into commercial outcomes. The investment in agricultural R&D must be stepped up to a level which is commensurate with needs to modern science.

20. The Government has set target to attain 4% agricultural growth in agriculture and has given a call to double the farmersÊ income by the year 2022. This is more applicable to the 85% of the farmers who are categorised as marginal and small based on the size of their landholding and who are in need of technologies to remain economically stable. To bring in equity among the farming community with the workers in non-farm sector we must provide technological interventions to see that small farms remain beautiful.

21. Much talked about „Doubling Farmers Income by 2022‰ is engaging every agencyÊs attention at center and state levels and the machinery is geared up in achieving the target within the time schedule. Even today and earlier village, block, district has farmers where variation in farmer income ranges from one to three or four times on regular basis. Most farmers with low income are small and marginal. The reasons for variations in their income are mostly, farm size, farmersÊ resources, his level of training and knowledge in farming, his access to market, technology and input resources etc. which are very well known or can be quickly assessed. Now the question is how to provide similar opportunities to those millions of small and marginal farmers which his neighbour is able to avail and have 2-4 times more income in similar climatic and edaphic environment. Unless we assure these to all those deprived, I am afraid the doubling farmerÊs income, if at all achieved in targeted time, will be short lived and, if done in haste ignoring the above said minimum provisions, might even have a negative impact in longer run. We have also experienced that in country like ours the prices for agricultural produce have been varying very widely (say for example onion but common for many produce especially perishables has varied from 50 paisa a kilo at one time recently to Rs 150 a kilo at some other time). How to restore the confidence of the farmers in selecting desired crop for farming and assure them to trade their produce at reasonable prices is a major challenge in the total process of production-consumption today.

22. The Government is implementing various schemes to enhance the viability of farming and in this endeavour has launched several schemes as Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) to achieve convergence of investments in irrigation at the field level, enhance the adoption of precision irrigation and other water saving technologies (more crop per drop); Pradhan Mantri Fasal Bima Yojana (PMFBY) with restructured pilot Unified Package Insurance Scheme

(UPIS) and Weather Based Crop Insurance Scheme (WBCIS); Soil Health Management (SHM) to promote Integrated Nutrient Management (INM); Soil Health Card scheme to provide information to farmers on soil nutrient status of their soil and recommendation on appropriate dosage of nutrients to be applied for improving soil health and its fertility. Similarly, there are other schemes on popularising organic farming, expanding horticulture and agro-forestry. Our esteemed Fellowship constitutes a rich storehouse of expertise in all major disciplines of agriculture. We must devise appropriate mechanism to link up NAAS with the national initiatives by assessment of projects, monitoring, evaluation, accountability and outcome/impact and thereby contribute to ensure the success of the programmes.

23. The future path of growth in agriculture must be different to ensure congruence among enhanced productivity, sustainability, profitability and equity. In other words, there has to be simultaneous improvement in productivity and natural resources used for production and not one at the cost of other as is the case today. In other words, the future agriculture growth should specially and economically be dispersed so that the rain fed dry lands, marginal lands, resource poor farmers and the other unreached should be reached. The strategy, however, should not be a „Food First‰ or a „Food Self Sufficiency Strategy‰ that quests to increase food production at all cost at exclusion of other promising options. Such a strategy is not necessarily desirable or helpful in alleviating food insecurity and may furthermore be unsustainable in agro-ecological and/or economic terms as it may result in serious resource degradation and/or misallocation of resources.

24. Through all these decades and years in one and a quarter century we notice one thing common that farming has improved but farmer has not, the rural-urban income divide has widened, and farmers interest in farming has declined as evident from increasing farmers

suicides over years and nearly 40% willing to opt for engagement in profession other than agriculture. While we feel proud that we have achieved food self-sufficiency to our population, we have not been able to bring happiness and prosperity to farmers, especially small and marginal once, who are more than 80% of the farmers and can alone sustain and maintain this self-sufficiency or self-reliant kind of condition. If farmers (especially young ones) interest is not restored, I am afraid we shall get trapped into a situation which shall be from bad to worse of what we have seen in the past. If we are serious we have to move from promises to action and seriously decide priorities of sectors in national context. Needless to repeat the same sayings that agriculture and agriculturists both have not received their dues in all these years what so ever we claim and/or say. Let us rethink and ring the alarm loudly and boldly by saying that India can survive only if Indian Agriculture and Indian farmers survive. We all voice these slogans but unfortunately have done very little so far. Let us actualize it now before it gets too late.

25. It may not be out of place to mention that the reforms and liberalization of the 90Ês have virtually by-passed the Indian agriculture sector. As a result, 90Ês represent a Âlost decadeÊ for agriculture. This is particularly true against the backdrop of the golden era that agriculture has witnessed during much of 70Ês and 80Ês, thanks largely to the Green Revolution in the mid 60Ês. Needless to say that while the first revolution in Indian agriculture was driven by technology, the second revolution that we need to usher in has to be driven by reforms. The reforms suggested herein are essentially designed to unleash forces and creative energies of the total agro-system covering, the farmers, the producer of farm inputs, the agro-processor and finally the consumer. The end result hopefully would be the all-round improvement of efficiencies in all links of the value-added chain in agriculture from production and processing to distribution and retailing. The reform proposals embrace effective liberalizing in pricing

environment, trading environment, investment environment and institutional framework environment.

Finally, reorientation of research and education policy and strategy in future must be in tune with developments taking place at the national and international levels. The increasing role of markets, growing participation of the private sector in research, rapid advances in science, and strengthening of intellectual property rights have a significant bearing on the organization and management of agricultural research. The need for change also stems from the fact that the Indian system has now reached a stage where it must address Âsecond generation problemsÊ relating to organizational rigidities, inefficiencies, and difficulties in sustaining funding. In the rapidly evolving scenario both for agricultural research for development NAAS must carve a niche for itself and play a more proactive advocacy role in matters of voicing concerns for policy issues and providing advisories relating to Government programmes/initiatives in agriculture. I am sure that our Fellowship spread across the country will be forthcoming to make NAAS an important partner in the national development.

Thank you!