Foundation Day
and
27th General Body Meeting

August 13, 2020

Presidential Address

Catalysing Growth of Indian Agriculture: Refining Engagement of NAAS

Dr. T. Mohapatra

President, National Academy of Agricultural Sciences

National Academy of Agricultural Sciences
NASC Complex, DPS Marg, Pusa
New Delhi - 110 012
INDIA

Catalysing Growth of Indian Agriculture: Refining Engagement of NAAS

It is my privilege to deliver the presidential address on the occasion of the Annual General Meeting (AGM) of the NAAS. The Academy has grown to its current stature because of the relentless efforts of its members, particularly the founder-members who still continue to contribute to its development by associating themselves with its multifarious activities and guiding us to strengthen its functioning. I express my sincere gratitude to all of them, in particular, Prof M. S. Swaminathan, whose 95th birthday was celebrated just a few days ago on 7th August 2020. On behalf of the Academy, I conveyed to him our best wishes and regards. He is a great strength for all of us. He is the strongest of all the pillars that we have today. We are overwhelmed by his immense contribution to national and international agriculture. We always remember his humanitarian considerations for development of the downtrodden and farming community. The other founder members and past Presidents of the Academy, Late Dr V.L. Chopra, Dr R. S. Paroda, Dr Panjab Singh, Dr Mangala Rai, Dr S. Ayyappan, and Prof. R. B. Singh made significant contributions to Indian agriculture and also contributed immensely to build the Academy. We all owe a great deal to their efforts. The sudden departure of Prof V. L. Chopra is a big shock for us. The Academy will miss him.

The country has performed extremely well in the production of most of the agricultural commodities, be it the food grains, or milk, or fish or horticulture. Now we are surplus in several commodities and have been exporting these, worth more than US$30 billion. We have the target of a 5-trillion US dollar economy before us. Thanks to the honourable Prime Minister, who keeps setting new standards and new goals for us. This target is somewhat a lofty one and very challenging. In this context, where do we place the agricultural sector? Can agriculture contribute 1 trillion US dollars to the economy? How do we, as an Academy, visualize a 5 trillion US dollar economy? Where are the opportunities to really accomplish this? This is the most

important point that we should actually be deliberating. This year, despite the COVID-19 pandemic, we could produce more than 295 million tonnes of food grains, which is a very significant achievement. It is expected that the same trend would continue, given the productivity gains that we have achieved, the climate resilience that we have built over years, the multiple stress tolerance systems that we have been innovating, and new technologies like genomics assisted breeding that we are implementing in various crops. Similarly, in the case of animal production systems, the required vaccines and diagnostics are being developed and put to use so that animal health management happens, thereby enhancing productivity very significantly. During the past five years, more than 25 lakh samples have been tested for sero-monitoring of animals after FMD vaccination using the domestic kit designed by our scientists. There are other areas with significant technology interventions leading to productivity enhancement. The question before us is that how do we really enhance productivity further, particularly in the animal, fishery, and horticultural sectors?

In the animal sector, we still have 60-65% non-descript population in the country and we do not know whether all that is admixture or we have still scope to identify some pure breeds. Now 197 breeds of animals have been gazette-notified following the new procedure of notification. The productivity of the breeds is quite variable, most being low-yielding. There is scope to improve animal productivity by various management practices, including the use of nutrient mixtures and green fodder. Mainstreaming area-specific mineral mixtures and filling up the gap in green fodder supply are urgently required. Cross-breeding through Artificial Insemination (AI) has been tried in the past with some success to improve productivity. However, there are some grey areas that we have not been really able to address. I believe there is plenty of scope for the Academy to further go deeper inside and suggest measures as to how best we can manage our local breeds. The task is challenging because the local breeds are scattered, they are in their own natural tracks, and they are often with farmers and their management itself is a tough task. It's a tall order to actually improve productivity given that we do not know the bulls, neither we know the best

mothers. Unless we characterize them properly, we will not be able to improve productivity. The huge population of animals is largely untouched. Some characterization work has happened with regard to local breeds of cattle and buffalo, and others are still to be done. So, this is one area, I think, there is a need to really delve deeper to develop policy and guidelines for the government to implement.

In the fisheries sector, we have a tremendous opportunity. What should be the research and policy issues in terms of exploitation of the ocean resources, particularly the deep ocean resources? We need to look into this aspect and set targets for use of deep ocean bioresources for the benefit of the country. Decades ago the Academy brought out a document on the seaweeds. Recently, the honourable Prime Minister has emphasized its cultivation and utilization. Similarly, we developed the pearl culture technology many years ago and it has considerable potential. However, these technologies have not been promoted to the extent they deserve. As an Academy, we have the responsibility to highlight its greater focus. If we identify some such areas, the country will have tremendous opportunity to meet the targets in terms of not only meeting the domestic demands but also becoming globally competitive. We should be able to enhance agri-exports based on demand-supply analysis and then by capturing a segment of the international market. The Academy should revisit some of these policy documents to develop recommendations in the current context for effective implementation. It is also pertinent to suggest that NAAS studies the case of Vietnam, and analyse how it has been able to capitalize on the available resources including the training as well as the information it has received from India to increase significantly the export of agricultural commodities. Such case studies bring out clear pathways for India would be highly relevant.

We can help the country in taking our products to the global level, which will contribute to 5 trillion US dollar economy very significantly. We can work on the concept given by the honourable Prime Minister for being “vocal for the local”.

There are many GI products in our country, but these have not been branded to capture consumer markets. Should we not deliberate on ways and means for appropriate branding of our local products? If the pineapple of Tripura and Meghalaya is the best pineapple available and grown organically, how can we create a global brand for this organic pineapple? If organic turmeric is important in certain regions having high curcumin content, how do we really create the brand for it? I think we should have a critical analysis and guide the state/central governments to build brands of some of these products. Today, the government is already working on "one district – one product". In this context, the NAAS should play a very significant role, deliberate in-depth, and guide the programme in defining what should be that particular product for a particular district, which can be branded, and exported to capture the global market. I strongly believe, there is plenty of scopes for us to chip in and to add value.

For enhancing farmers' income, there is a need to build value chains. There is a need to have more intense deliberation on value chains in order to attract the attention of policymakers. The government is emphasizing on the formation of 10,000 farmer producer organizations (FPOs). It is expected that the FPOs will not only bring together farmers to produce more but also to process their products when required and market for higher returns. In a way, for the success of the FPOs, there is a need to develop value chains for different commodities. The value chains may take shape on their own if a proper policy exists. We can examine the case of Basmati rice. It doesn't depend on minimum support prices (MSP); neither government procures it. Basmati is driven by export. Basmati growers are relatively richer than non-basmati growers. The kind of varieties which have been developed by our scientists have capitalized on the global demand. These are examples of disruptive technologies, such as Pusa Basmati 1121, for which branding has become easier. The country is earning more than Rs. 19,000 crores annually by way of export. However, in the case of most agricultural commodities, the creation of value chains will require special efforts for a favourable policy environment, as well as for more research on trait discoveries in our local products.

Export based on a few products with heavy dependence on a few technologies to support it may not be sustainable. The country has to keep exploring new areas and new products based on consumer preferences. We may examine the case of shrimps that we export. During the early phase, India's shrimp production was largely based on *Penaeus monodon* (Black tiger shrimp). It was severely impacted by the disease White Spot Syndrome Virus (WSSV). In the year 2008, Pacific white shrimp (*Litopenaeus vannamei*) was introduced. Today, 90% of shrimp production in the country is of this species. Brood stock multiplication and seed production require a high bio-science facility. Unless we diversify to other species, for instance, indigenous shrimp species like *Fenneropenaeus indicus* as a complementary or alternative shrimp species for farming, the industry would remain highly vulnerable. How to further strengthen shrimp production in India? Diversification of freshwater, brackish water, and mariculture is essential. This involves critical thinking so that one can create new brands targeting new markets while capitalising on the existing ones by ensuring quality standards. I am confident that, the fish export which is at present to the tune of US$ 7 billion can be further expanded. This approach would also help significantly reaching 1 trillion US dollars from agriculture. NAAS can play a very important role in defining pathways to move forward.

But when we talk about the 5-trillion US dollar economy through enhancing productivity and building brands and creating value chains, what bothers us more is the widespread malnutrition, which has not really been addressed well. In fact, at the global level, this remains a serious issue. One in every nine persons in the world is hungry today and very important one in every three persons is obese. What a serious dimension? Malnutrition-related issues such as stunting, wasting, and related diseases including diabetes are weighing us down. If we compare 2005-06 with 2015-16 data collected through National Family Health Surveys, there is not much improvement with respect to nutrition. For instance, with regard to wasting of children less than five-year-old, we were at 19.8% in 2005-06 and it has increased to 21% in 2015-16. In case of stunting, we have improved a little by 3-4%. Similarly, with regard to underweight, there is little improvement, may be around 10% or so.

But the prevalence of anaemia in women has not really come down much; it reduced from 55% to 53% in 10 years, and from 24% to 22% in men.

We have made significant strides in the production of horticultural commodities, more than 320 million tonnes. Should we not mainstream consumption of horticultural products rich in vitamins, antioxidants, and micro-nutrients through awareness and appropriate policies/schemes? Should we not advocate about consuming more milk, which is being produced in plenty? We are very rich in having diverse animal species giving us different qualities of milk such as goat milk, camel milk, and donkey milk which can be appropriately branded and promoted to have better nutritional outcomes. NAAS can provide the platform for delving deeper into the quality of milk from local breeds and various horticultural products. Besides, through its Regional Chapters, the Academy can really play the important role of popularizing them through mass awareness campaigns. This will lead to the creation of demands and in turn, that will create markets. The markets, on the one hand, will drive production as well as more profits for farmers, while on the other hand, will address the consumer needs thereby impart better nutrition outcomes. Similarly, in the case of millets, their mainstreaming is required, these have to be branded as Nutri cereals. It is heartening to know that United Nations General Assembly has declared 2023 as an International Year of Millets. This will attract global attention towards millets or Nutri cereals. We have more varieties developed in millets; there are now start-ups coming up. What is important is linking the production with the market and to the consumers. What NAAS can do in this particular context? We have plenty of opportunities and in fact, we can play a pivotal role and roping other Science Academies into our fold to popularize this. This is everybody's responsibility. This is the social responsibility of every Science Academy. Taking this message of consumption of balanced and Nutri-dense food for better nutrition to the masses, even to the educated people including, the Fellows of the Academes is essential. It appears that we have forgotten our culinary diversity; there used to be the thali (plate) system of serving food with many vegetable dishes around the thali, which has vanished today. Nobody has time to cook even one vegetable

along with roti given the time constraint particularly in cities, and we have forgotten the nutrition component of the thali system. Prof M.S. Swaminathan has mentioned on several occasions that this country is so rich with regard to culinary diversity. We can create wonders with regard to a variety of dishes whether it is vegetarian or non-vegetarian. Diverse fishes with high levels of omega 3 fatty acid and other useful polyunsaturated fatty acids can be considered and promoted for non-vegetarians. NAAS can initiate some action for promoting Nutri-thali to have better nutrition outcomes. Nutri gardens in the form of backyard or small kitchen gardens, rooftop gardens, balcony hanging gardens, and vertical gardens should be supported. When I last met Prof Swaminathan, he emphasized peri-urban horticulture. In the Academy, we had a discussion on peri-urban horticulture a few years ago and a document was also published. A lot more is to be done with regard to high-tech horticulture and vertical horticulture in peri-urban situations where water, nutrient, and transport costs, as well as the environment, can be saved. I believe we can bring out necessary changes in policies based on current developments.

We have several crops called underutilized or potential crops and the scope of these crops in the country in terms of consumer preference, markets, processing and value addition, area of cultivation, and future prospects need a clear definition. There has not been sufficient deliberation on these crops covering all the required aspects. Dr Mangala Rai, our past President in one of our discussion meetings emphasised holding a brainstorming session on secondary agriculture with a focus on processing, value addition, branding, and export. India is lagging behind significantly. For instance, we are exporting castor oil and earning 5000 crore rupees annually. China is importing, adding 900 times value to it, and has captured the global market by exporting value-added products. There are many uses of castor oil after value addition. We can discuss on potential crops separately and also as a part of secondary agriculture.

The COVID-19 has placed unprecedented restrictions impacting all aspects of our life globally. Fortunately, the agriculture sector in India has been the least impacted.

Thanks to our brave farmers. However, there are several challenges that are to be met. The targets set globally to meet the sustainable development goals including nutrition outcomes, water productivity, gender issues, and enhanced partnership. Agriculture and allied sector concerns at least 10 of the 17 SDGs. How much we have discussed how agriculture can address these development goals, and what should be the national as well as global efforts in this regard? Can our Academy endeavour to work with other Academies in convergence mode and build global opinion for national governments to have a greater focus on various aspects such as addressing the greenhouse emissions, the emissions from animals and the rice fields for instance? We together can draw the attention of all concerned with regard to leveraging food systems for enhanced nutrition, sustainable use of biodiversity, conservation of natural resources, and building value chains.

COVID-19 has imposed on us an extensive use of digital platforms. We can capitalize on digital technologies and interact with greater frequency. The current era is of data science which has come up in a big way in recent years. This country has considerable strength in computational science/mathematics/statistics and there is a need to capitalise on this strength and innovate in data analytics. Can India be a global leader? I strongly believe that plenty of opportunities exists for us to make a proposal for all the Academies to come together to deliberate. We, together, should be able to sensitise all concerned for positive actions so that India becomes the global hub for data analytics, provides training and capacity building to a global community, and comes up with new algorithms, new programmes, and new software, including quantum computing. Similarly, in the area of mechanization, particularly automation, robotics, use of AI and sensors, there is scope to work more. Experts from various fields and institutions can have a deep dive into further action plans for new policies and programmes.

Education is another area impacted by COVID 19 in a big way. The schools and colleges were closed for months. To address the problems there has been increased use of e-resources and digital platforms. ICAR, through the National Agriculture

Higher Education Project, has catalysed this whole area and provided support to agri-education in a big way. Agriculture and allied sector disciplines offering professional courses do have a greater focus on practicals, requiring the physical presence of the students in the field/laboratories. To address this need during COVID 19, some of the universities have initiated the use of virtual reality and augmented reality-based applications in the classrooms. There is an opportunity to prepare virtual reality models for plant and animal systems to display the laboratory activities in virtual mode and thereby bringing the revolution in teaching. The new education policy talks about it. There are several grey areas, which need further deliberation. Thanks to Prof R. B. Singh for the Fifth Deans Committee Report, which has been very well received and appreciated. We sincerely appreciate his efforts in helping ICAR in building NAHEP. I believe, there is a need to have an indulgence of experts in this area to build novel educational models and tools for the National Agriculture Research and Education System to take note of and implement.

There are other areas of our strength and I'm sure with the abiding interest in the activities of the Academy, we should be able to deliver better than ever before. We should continue to advocate science and evidence-based policies. Not just creating documents, we need to make extra efforts for taking documents to the doorsteps of users, the stakeholders, so that our recommendations are implemented. This is not the activity of the Executive Council alone. I would request all the Fellows of the Academy to come forward, take the documents to the state governments and interact with the policymakers. I am confident that many of the expert recommendations will be accepted for implementation. Some areas of relevance include: “growing crops for biofuels to meet our energy needs”, “water budgeting”, “sustainable self-sufficiency in pulses”, “addressing malnutrition”, and “promotion of millets through value chains”. It is our shared responsibility to build tomorrow's agriculture in this country. I'm sure all of us would be coming forward and joining hands to make this Academy far more relevant, nationally and globally. We should be reminding ourselves about our social responsibility. It is never late to pay back to the society.

I take this opportunity to congratulate all the newly elected fellows. I especially thank the new foreign fellows, Dr Peter Carberry and Dr Henry T. Nguyen, who could join us today. It is highly satisfying to see the young Fellows and Associates, who took an interest to take part in today's proceedings. We should do an analysis as to how many Associates of the academy have become Fellows and how successful our target has been with regard to finding out Associates with the potential to grow in science. We can make a comparison to other Academies like INSA in this regard. We will reinvent ourselves and then strive to move much faster. That's our resolution and the promise for the future. Many of you have provided comments and valuable suggestions in the Chat box. In particular, Dr V. Prakash has provided many good ideas and some others have spoken about eloquently. We will certainly look into the content therein and take action. My sincere thanks to each one of you.