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Scaling Innovations for Accelerated Agricultural Growth

For transforming our agri-food system to be more resilient, sustainable, productive, and profitable, we have no other option but to scale agricultural innovations aiming at linking science to society

Global population will be around 9.7 billion by 2050 needing additional 60 per cent foodgrains. An additional 167 million people have become food insecure after COVID 19 to the number of 800 million before. More than 67 countries have become food insecure. In India we add almost 11 million people per year needing >5 mt additional foodgrains over and above what we produce (330.0 mt).

Hence, complacency that we have produced enough and have become an important exporting country shall be detrimental to our food security. On the contrary, it is time to accelerate agricultural growth (> 4.0 percent) to achieve Sustainable Development Goals (SDGs) by 2030, especially to reduce poverty (still around 15 percent) and to eliminate hunger (almost 200 million people live below poverty).

To address these, we need to urgently scale the innovations that reduce cost on inputs, conserve natural resources and increase both yield and quality of agricultural produce, while ensuring higher income to the farmers, majority (80%) of whom are smallholders with less than 2 hectares of land. In the past, agricultural growth largely depended on: i) policy support, ii) good institutions and human resource, iii) infrastructure development (seeds, water, fertilizers etc.), iv) efficient transfer of technologies and v) partnership at the global level.

Second-Generation Problems Of Green Revolution

The Green Revolution in the late Sixties was an innovation-led initiative around the use of high-yielding dwarf wheat and rice varieties that responded favorably to higher inputs. As a result, despite a four and half fold increase in population, India has increased foodgrain production by six and half fold ensuring food for all. Despite these, we now face the second-generation problems of Green Revolution such as: factor productivity decline, depleting natural resources (soil, water, biodiversity), increased cost of inputs, higher incidence of diseases and pests, less farm profits and above all the adverse impact of climate change.

To address these, a paradigm shift from agricultural research for development (AR4D) to agricultural research and innovation for development (ARI4D) is urgently needed. Those nations have progressed much faster who accorded greater emphasis to scaling new innovations aiming at genetic resource management, natural resource conservation and value chain.

Regenerative Agriculture

For long term sustainability, we need to improve our soil health, mainly in the green revolution region of north-west where soil organic matter (SOM) has depleted below 0.5 percent. whereas the healthy soils do contain >1.5 to 2.0 percent soil organic matter. In an unsustainable situation like this, greater focus on improving soil health using practices around regenerative agriculture (RA) is urgently needed.

UN Food Systems Summit in 2021 and recently held G 20 meeting in New Delhi also called for reversing the on-going degeneration process in agriculture by adopting innovations that are sustainable and aim at 'One Health'. Also, the important role of local food systems (like pseudo-cereals and millets) has been recognized to diversify our food baskets for future food security.

We all know that the health of plants, animals and human beings mainly depends on soil health. Any deficiency of nutrients and micronutrients in the soil results in ailments in plants, animals and humans. It is estimated that almost 1.0 billion ha of land is degraded globally, of which India's share is about 10 percent.

Moreover, the efforts to promote soil health also demand effective and safe crop protection measures. Hence, soil and crop protection solutions that deliver agronomic and environmental benefits would require new innovations that can produce from less for more. Accordingly, soil and plant health should now be at the center stage of the development agenda.

Scaling Of Agricultural Innovations

To improve soil health, an aggressive approach to promote no till or conservation agriculture (CA) for sustainable intensification, being adopted in more than 200 million hectares in drylands of Argentina, Australia, Brazil, Canada, USA, Turkey, Central Asia etc. offers good opportunities that we have so far missed. CA can help to make our grey areas (drylands) green.

We also need to promote micro-irrigation to improve water use efficiency, have greater use of biofertilizers and use N,P K and micronutrients (Zn, Fe, Sulphur, Mn etc.) only on soil test basis. Also, we need to create mechanisms of giving incentives in place of subsidies for the adoption of good agronomic practices (GAP) and the ecosystem services by farmers.

Scaling of innovations such as: hybrid technology, genetically modified (GM) crops, conservation agriculture for sustainable intensification (CASI), micro-irrigation, fertigation, integrated nutrient management (INM), integrated pest management (IPM), protected cultivation, vertical farming, besides the use of genome editing, nano-technology, artificial intelligence, drones etc., offer new opportunities to achieve resilience and sustainability in agriculture. For this, enabling policies, public-private partnership, innovative extension systems that are private involving youth (including women), and harnessing the potential of both secondary and specialty agriculture would be desirable.

The scaling of innovations demands greater investment, incentives and rewards, including the provision of IPR. Besides, there is an urgent need to have innovative institutional and policy reforms as well as substantial increase in the investment on ARI4D at the national level (unfortunately the budget of ICAR has remained static around Rs 8500 crores since last one decade).

In addition, the expected progress can be much faster through inter-ministerial and inter-institutional coordination and monitoring of mission-mode programs to achieve defined targets in a time bound manner. To conclude, for transforming our agri-food system to be more resilient, sustainable, productive and profitable, we have no other option but to scale agricultural innovations aiming at linking science to society with the human face.