SMART agriculture for nutritional security

In the era of smart phones, super computers, and rapidly growing space science, agriculture sector in India also has to gear up with Systematic Management of Agricultural Resources and Technology (SMART). As agriculture has a prime role in our economy, it is the right time for a complete makeover in the context of Food Security Bill and meeting nutritional security. For this, a systematic approach towards management of available agricultural and germplasm resources with latest cultivation practices and improved implements for mechanization is known as SMART agriculture. A paradigm shift in changing food security to the nutritional security is the need of the hour. The recent Food Security Bill is framed for hunger elimination in terms of calories estimated than on nutritional quotient to bring up a better society. For this purpose, we can opt for sustainable use of available resources from diverse germplasm sources and underutilized crops along with nutritional improvement in major cereals, pulses and millets cultivated in different parts of the country. The balanced nutritional security has to be given greater priority than food security per se, as malnourishment has taken a upper hand than hunger. The National Family Health Survey (2005–06) estimated malnourished children under 5 years are above 40%, and children with low birth weight are about 21%. The Union Planning Commission (2012) reported that 217 million are undernourished. Global Hunger Index (International Food Policy Research Institute, 2012) showed India in 65th position among 79 countries. United Nations Development Programme Human Development Report (2012) ranked India at 134th position among 187 countries. Nutrition Barometer (Save the Children, 2012) reports very low position for India[1]. To combat this and to achieve a balance in available nutritional sources, agriculture should be diversified to include new and diverse nutritional sources to acknowledge the need of technologies for diversified cropping and management of available resources to be devised.

For SMART, the varieties or germplasm sources should be evaluated based on their ability to establish well on marginal and small lands with least input. Development of improved crops, viz. rice, wheat and maize with enhanced nutrients and quality, higher protein, iron, zinc and other micronutrients; pulses, oilseeds and millets with improved quality are required, than concentrating only on yield-linked traits. The present-day crop improvement programmes are targeted by recent methodologies such as marker-assisted selection, genomic selection, sequencing of genomes, high-throughput phenotyping, etc. for development of biotic, abiotic stress tolerance with yield quantitative trait loci[2]. Though not evenly distributed, at present, the world is producing enough food grains for equal sharing in terms of quantity. Most of our farmers do not plan the crop based on the climate or market. Intermediaries also play a major role in Indian market.

As we are concerned about the management of available resources, we are blessed with diverse agro-climatic zones and diverse germplasm wealth which has already been documented and preserved for further use. Being one of the biggest agrarian communities in the world, we are having very less per capita land availability. Apart from this, global warming, changing climate, decline in soil fertility, groundwater level, agricultural productivity and urbanization of rural regions, force a threat on conversion of cultivable lands[3]. Thus the agriculture is forced to be within the limits of marginal lands, where the eroded lands and problem soils are taken up for cultivation. Hence, sustainable agriculture relies on management of available resources for ensuring food and nutritional security. To combat these problems, scientists should concentrate on selecting crop components suitable for multiple cropping, crop rotation and other cropping systems with components of food, fodder, forestry, animal husbandry and fisheries. Several food crops with improved nutrition are available with scientists and it should reach farmers to enable them to have multiple crops and also enhance availability of quality food sources. The technological achievements accomplished in crop management, post-harvest handling and food processing have reached only few farmers and still a large part of the potential agrarian community is deprived of access to modern mechanization. SMART also involves reducing the gap between scientists and farmers. The periodical labour scarcity forces the farmers to give-up farming. If they are available and trained to go for complete farm mechanization, then it will give an added advantage[4].

The nutritional security through SMART will produce surplus food crops of higher quality and quantity to reduce the burden and dependence on imports of legume and oil produce[5]. The reduction in labour contribution due to mechanization will compensate for labour scarcity and application of advanced farming or mechanized farming. This will lead to reduction in GDP share from agriculture, as the working force is diverted from agriculture and an economic revolution is expected. The direct consequence may be invisible during a lag period, but the nutritional security will be its immediate impact. If the cultivation practices are improved and modernized, it may change the present-day status of agriculture from inherited practice to a profession. At present, only marketing in agriculture has become a profession for many. If the image of the farmer has been changed from someone drenched in mud to a person handling high-tech equipment, definitely it will be a profession of choice than chance. Thus SMART, if implemented at right time with required resources, will lead to evergreen revolution and also a smile on million faces.

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