



Good Agriculture Practices (GAP): Concept and Strategies

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Agriculture provides the largest source of livelihood in India and remains a key driver of national economic growth. During 2017-18, India recorded a food grain production of 279.51 million tonnes, while production of horticulture crops was estimated at 307.16 million tonnes (MT). India is the second largest fruit and vegetable producer in the world. With rising incomes and awareness about nutrition, demand for fruits and vegetables has been increasing. There is also a growing demand for safe and quality produce, which shall be a major challenge for all stakeholders of the value chain of fruit and vegetable industry in the future. With trade in agriculture and horticulture going global, harmonizing local production systems with the standards and requirements of international markets can be achieved through the implementation of Good Agricultural Practices (GAP) standards. In addition to improving the yield and quality of the products, GAP standards also have environmental and social dimensions. Implementation of GAP promotes optimum utilization of inputs such as pesticides, fertilizers, water, and eco-friendly agriculture. For the implementation of INDGAP, it was necessary to define certain minimum standard. The concept of Good Agricultural Practices (GAP) has evolved in recent years in the context of a rapidly changing and globalizing food economy and as a result of the concerns and commitments of a wide range of stakeholders about food production and security, food safety and quality, and the environmental sustainability of agriculture. These stakeholders include governments, food processing and retailing industries, farmers, and consumers, who seek to meet specific objectives of food security, food quality, production efficiency, livelihoods and environmental benefits in both the medium and long term. Broadly defined, GAP applies available knowledge to addressing environmental, economic and social sustainability for on-farm production and post-production processes resulting in safe and healthy food and non-food agricultural products. Many farmers in developed and developing countries already apply GAP through sustainable agricultural methods such as integrated pest management, integrated nutrient management and conservation agriculture. These methods are applied in a range of farming systems and scales of production units, including as a contribution to food security, facilitated by supportive government policies and programs. It is about producing safe, wholesome, and high-quality food while ensuring sustainability and fairness throughout the production chain. Good Agricultural Practices (GAP) provide a structured approach to achieve this balance. By adopting GAP, farmers can not only meet the growing expectations of consumers but also safeguard natural resources and improve the well-being of farming communities. GAP engages several recommendations and accessible guidelines or information with the aim of ensuring safety and quality of produce in food chain; capturing new market advantages by modifying supply chain governance; improving natural resources

use, workers health and working conditions and creating new market opportunities for farmers and exporters in developing countries (Banzon *et al.*, 2013).

The Four Pillars of GAP

1. **Economic Viability** : Farming should be profitable and efficient. It includes smart resource use, cost-effective practices, and long-term planning.
2. **Environmental Sustainability** : Protecting soil, water, and biodiversity is key. Sustainable irrigation, organic inputs, and soil conservation are part of this pillar.
3. **Social Acceptability** : Workers' health, safety, and fair treatment are crucial. Communities should benefit from farming practices.
4. **Food Safety and Quality** : Safe handling, storage, and processing ensure consumers receive high-quality, contaminant-free food.

GAP Strategies

Summer ploughing : To replenish the soil profile, carry out extensive summer plowing (off-season tillage) in conjunction with pre-monsoon precipitation in May. It makes it easier to plant crops as soon as the southwest monsoon begins. Off-season tillage lowers runoff while raising the water content of the soils. Additionally, it lessens weed and pest infestation. The strength of the weeds determines how many and how deep to plough. Before the onset of the monsoon, two summer ploughings are, at most, completed at intervals of fifteen to twenty days. A cultivator or harrow can be used for a single third plowing to assist break up the soil and prepare field beds for planting or sowing shortly after the first monsoon rain.

Crop rotation : One of the earliest agronomic techniques used by farmers to manage nutrient and water balances, weed, pest, and disease infestations, and risk exposure is rotating crops in a variety of intricate patterns. This practice also helps to improve system resilience and meets the needs of humans and livestock for food and feed (Chongtham *et al.*, 2017). Diversified rotations are crucial to designing more sustainable agricultural systems because they have a significant influence on the functioning of agroecosystems as well as the economic, environmental, and cropping system outcomes and performances (Schonhart, *et al.*, 2011).

Sowing of crop at right time & right geometry : It's a crucial technique that all farmers ought to do. Some of the most significant techniques used in these diverse ways are broadcasting, dibbling, planting behind the country plow (both mechanical and manual drilling), seed drilling, and nursery transplanting. For crop production, there are several crop geometries available. Among them are: Television, produces unpredictable geometry, does not preserve equal space, and either overuses or underuses resources. Plants are planted using the square technique, also known as square geometry, with equal spacing between each plant. Tree crops are cultivated using the square method and are primarily perennial crops. This is a rectangular sowing method where the plants are spaced apart by a greater distance between rows and columns. This mostly involves three planting techniques: skip row (a row of planting is skipped), paired row arrangement (a rectangular arrangement, crop requires 60 cm x 300 m spacing and if paired row is to be adopted, the spacing is altered to 90 cm instead of 60 cm in order to accommodate an intercrop), and solid row (each row will have no proper spacing between the plants).

Use of good quality organic manure : To improve water retention and speed up the fermentation process, it is typically used with straw or crop leftovers. One of the most common types of manures is cow dung; other manures from poultry are quite heavy in potassium, phosphate, and nitrogen. Compost, which is primarily trash or the leftovers of other operations, has a significant impact by raising the carbon, useable nitrogen, and/or phosphorus concentrations. Because of its high C/N ratio, biochar application can be a useful instrument in the shift from conventional to sustainable and ecological systems, enabling us to quickly raise the proportion of organic matter. Many crops, mostly legumes, are grown as green manures either during or after the primary crop's regular growing season (Flores-Félix *et al.*, 2020). The purpose of crops employed as green manures.

Concentration on livestock : Livestock-based farming systems can significantly reduce environmental problems such as contaminated water, soil erosion, and declining soil fertility. Ruminants will undoubtedly continue to play a significant role in sustainable agricultural systems. They are particularly useful in converting vast quantities of renewable resources from pasture, rangeland, agricultural waste, and other wastes into edible food. Ruminant systems in developing countries can be described as making relatively inefficient use of resources. Because most of these production systems have considerable yield discrepancies, research and development might greatly contribute to the creation of more sustainable solutions by increasing the efficiency of the livestock industry through sustainable intensification techniques.

Conclusion

At the moment, agriculture produces enough food to satisfy demand. Sustainable agricultural practices are crucial to sustaining the growth and development of farming. Since the soil remains the most crucial element in production, output must be maintained while maintaining the soil's health. It is now simpler to produce high-quality produce that is chemical-free or uses no chemicals at all thanks to the adoption of several cultural operations, including field sanitation, suitable seed and variety selection, planting date, row spacing, seeding rate, fertilization, water management, crop rotation, hedge rows, companion planting, and intercropping. A variety of tasks should be made simpler for farmers, and timely information updates ought to be provided frequently.

References

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