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Modern Farming Methods: An Initiative towards Increasing the Food Productivity

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ABSTRACT

In India agriculture is a source of livelihood for more than two third of our population. But before 1950 the Indian agricultural system was not strong as today and hence the production was not sufficient to fulfill the demand for food with the increasing population. In late 1960 the Green revolution has been the major success story of Indian agriculture which used some modern farming methods. This was the reason that the nation was frequently plagued by famines and various food shortages before green revolution and today we are in a position where we are challenging with the problem of surplus. Today with the development of various agricultural technologies/systems which include organic farming, genetic manipulation of crop plants, use of vertical farming, precision agriculture (PA) etc. increases the crop production with this India combat the current issues in agricultural production and fulfill the world current and future food demand.

Unlike developed nation, still agriculture is the backbone of our country, which likely to contributed in the Indian economy. India is a country with varying environmental conditions over the single year and hence India's agriculture is composed of many crops, with the primary food staples being rice and wheat. Indian farmers also grow cereals, pulses, tubers, sugarcane, oilseeds, and non-edible items such as cotton, tea, coffee, rubber, and jute. However, it was observed that the productions of these crops are challenged by various biotic and abiotic stress, water availability and increasing global population. Enhancing grain yield per unit area is therefore key solution to relieve or resolve the contradiction between consumer demand and world food supply, which is projected to be increased by 25% or more by 2030.

Technology and modern system has numerous scope in India, slowly Indian agriculture is undergoing transformation since the introduction of green revolution technology. For agriculture modernization the recent strategy of liberalization and globalization has opened up new avenues. This has not only focus on improving agricultural inputs, infrastructural facilities in rural areas but also generating agricultural surplus for local and international markets. Latter half of the 20th century, the concept of use of modern agriculture was very successful in meeting a growing demand for food by the increase in world's population. Day by day changing environmental conditions increased the pressure and incidence of new of disease and pests infestation on crop plants which affect the crop yield. With this also area of land under cultivation was reduced down day by day because of dramatically increase in world population; therefore it is necessary today to increase crop productivity. By the use of modern agricultural technologies/system yields of major crops such as rice and wheat increased rapidly, the price of food declined and the number of people who consistently go hungry was slightly reduced down. This boost in food production has been due mainly to scientific advances and use of new technologies, including the development of new crop varieties using molecular breeding technologies, organic farming system, genetically modified crop system and the construction of large irrigation systems.

Modern farming Technologies:

Due to many challenges such as variation in climate, biotic and abiotic stress conditions at the peak period of crop, natural calamities loss the crop yield when we used the traditional farming systems. New techniques/systems are used by the farmers but the rate of adaptation of new technologies by the farmers is slow due to lack of awareness among the farmers in some rural areas. New techniques such as organic farming, genetically modified crops, vertical farming, polytonal farming, green house farming, creating new scopes for application of precision agriculture (PA) using satellites and multi-crop farming are important that help to combat today and future food demand.

1. Organic farming:

Ecological agriculture or biodynamic agriculture, are the two term used for organic farming because it works in harmony with nature i.e. whatever the agricultural practices use in organic agriculture do not cause any harm to the living population in the environment. Increasing crop productivity through

organic farming is an eco-friendly measured as a practicable alternative to the chemical fertilizer and pesticide based farming. In the recent scenario where excessive use of chemical based fertilizers and pesticides have raised the concern for eco-toxicity and health hazardous to the living population of human as well as animals and soil micro-flora. This system is based on such techniques like use of resistance variety, crop rotation, green manure, compost, use of bio-fertilizers such as *Trichoderma, Pseudomonas,* and biological pest control.

2. Vertical farming:

With the increase in world population and urbanization, the area under cultivation was decreased in last few years. There is a crucial need to solve the double-edged problem of shrinking cultivated land and produce food for an ever-increasing population. So the ground-breaking concept of vertical farming came forward to increase the crop yield using less land. The farm uses soil less farming technology such as hydroponics and aeroponics to produce more yields faster through-out the season by knowing the nutritional and temperature requirement of crop. These techniques not only increase the harvest by 3-5 times but also produce the food using less water, pesticides and fertilizers usage.

3. Development of PA technology:

To meet the challenges in the present contest, introduction and adoption of modern technology in Indian agriculture is expected. To meet the huge food grain requirement of 480 million tonnes (Mt) by the year 2050, advancement in space technology (courtesy to Indian Space Research Organization (ISRO) and IT revolutionized new scopes for farm sectors. Positioning system works by the help of different constellations of satellites. The technologies implemented were GPS, GIS, variable rate application of input, crop sensors, etc.

4. Genetic manipulation of crop plants:

Modern agriculture has taken advantage of the advancement in a large number of molecular breeding and a biotechnological tool, crop productivity has been increased in the recent past. The hybrid varieties resistance to numerous biotic abiotic stresses was developed in several important crops using marker-assisted selection (MAS), QTL mapping and gene pyramiding technologies. These techniques help in early release of varieties and more accurate methods as compared to conventional breeding techniques.

Genetically Modified (GM) crops are developed in *in-vitro* conditions by altering the genetic make-up of a host organism. This is generally performed by transferring one or more genes or the alteration to a genome of selected plants using various gene manipulating methods. At commercial level the best known most common example of GM crop in India is Bt (*Bacillus thuringiensis*) cotton having the genes *Cry1Ac, Cry2Ab*. The number of GM crops has been developed, resistance to biotic stress as well as abiotic stress which reduces the use of chemical fertilizers and pesticides and thus reduce environmental pollution. GM plants have also been developed and used for bioremediation of tainted soils. GM plants containing genes of interest which produce bacterial hydrolytic enzymes responsible for bioremediation have been utilized to remove heavy metals like mercury, selenium and organic pollutant.

Conclusion

Agricultural farming is the backbone of economy in India as it accounted more in GDP. Farmers in India are using modern agricultural systems/techniques to enhance crop yield from many years before and nowadays as well. But in present time that traditional techniques are not completely fruitful according to ever increasing requirement of today's food demand because this type of farming has many drawbacks like diseases and pest management, making them economically less beneficial. There is a necessity to shift from traditional to modern agricultural practices. The uses of new modern techniques get more productivity of crops in less land with reference to good environmental health. This century is the century of biotechnology and information technology revolution. So the use of molecular breeding technology and GM technology to improve varieties of a major crop, use of organic farming, PA and vertical farming is a key solution to combat future food supply.

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