

Crop Diversification: A Crucial Need

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Farming continues to be the major source of food, nutrition, income and employment for the most of the rural population in India. The country's farming is characterized by presence of a large number of small and marginal scale farmers with small farm holdings. However the country is blessed with diverse agro-climatic conditions which enable the farmers to produce a large number of agricultural commodities. The challenge of producing enough food for the growing population with the reducing holdings is a herculean task. With the development of commercial agriculture techniques during the post independent period the agriculture sector has been able to cater to the domestic and international markets. In the light of the focus on commercial farming the rich tradition of crop diversity of Indian farming lasts its glory. Few crops are occupying major production area and are grown repeatedly year after year. This has resulted in emergence of several field levels biotic and abiotic constraints and overall reduction in the benefits realized from farming.

The country has made considerable progress in the farm sector during the last 50 years. From 'hand to mouth' conditions in the early sixties, the country has not only become self-reliant in food grains but has acquired sufficient resilience to tide over the adverse conditions. The achievements in food production is the outcome of a policy framework of improving rural infrastructure including irrigation, research, extension, provision of agricultural inputs at reasonable prices, mechanization in farming, marketing support through minimum price mechanism, promotion of FPOs etc. Though an impressive achievement has been made in Indian agricultural sector farming continues to face poor infrastructure conditions and vagaries of climate change. Only around 40 per cent of the cultivated land is under irrigation system and farmers on the on the remaining 60 per cent of the land are completely dependent on rainfall, which is also greatly characterized by large variations in terms of precipitation both spatially and temporally. This has been further complicated by the vagaries of climate change. For a large majority of farmers in different parts of the country gains from application of science tools and technologies in agriculture have yet to be realized. As a result, the productivity levels of many major crops in India do not compare very favourably with the yields obtained in agriculturally advanced countries. Due to limited capacities of the farmers to take advantage of the opportunities presented by liberalization is further limited. Efficient and effective management of agriculture is a crucial aspect in the years to come for acquiring enduring self-reliance and ensuring sustainable growth. Similarly, economic factors play a relatively stronger role in influencing the crop pattern in areas with a better irrigation and infrastructure potential. In such areas, commercialization and market networks co-evolve to make the farmers more dynamic and highly responsive to economic impulses.

What is most notable is the change in the relative importance of these factors over time. From a much generalized perspective, Indian agriculture is influenced more by economic factors. This need not be surprising because irrigation expansion, infrastructure development, penetration of rural markets, development and spread of short duration and drought resistant crop technologies have all contributed to minimizing the role of non-economic factors in crop choice of even small farmers. What is more, the reform initiatives undertaken in the context of the on-going agricultural liberalization and globalization policies are also going to further strengthen the role of price related economic incentives in determining crop composition both at the micro and macro levels. Obviously, such a changing economic environment will also ensure that government price and trade policies will become still more powerful instruments for directing area allocation decisions of farmers, aligning thereby the crop pattern changes in line with the changing demand-supply conditions. Emergence of Farm Producers Organizations in some of the states has resulted in the coverage of vast area of cultivated land under one crop to ensure desired volume of the produce has brought significant changes to cropping pattern and has added a different dimension to farming by small farmers.

Consequences of changes in cropping pattern:

Various initiatives that have led to the changes in cropping pattern as discussed above have also brought in several socio-economic and environmental consequences. Introduction of high yielding varieties, hybrids and intensive crop production technologies have fomented, among other things, an increasing tendency towards crop specialization and commercialization of agriculture. While these developments have positive effects on land/labour productivity and net farm income, they have also endangered a number of undesirable side effects like reduced farm employment and crop imbalances and loss of crop diversity at the farm level. Although the expansion of commercialized agriculture has fomented new sets of rural non-farm activities and strengthened the rural-urban growth linkages, it has also weakened the traditional inter- sectoral linkages between the crop and livestock sectors. Besides, crop pattern changes also lead to serious environmental consequences that take such forms as groundwater depletion, soil fertility loss and water logging and salinity - all of which can reduce the productive capacity and growth potential of agriculture over the long-term.

A strategy for Nutritional security and Poverty alleviation

Crop diversification can be used as a strategy for addressing food and nutritional security. The diversification of horticultural crops especially fruits and vegetables have been very important in ensuring nutrition security. This also has played a pivotal role in poverty reduction. It is not only in the increase of food grain production but also the production of commercial crops like cotton, oilseeds, sugar cane, fruits and vegetables as well as livestock production including fisheries have contributed significantly to poverty reduction. Crop diversification can help the farmers in addressing the important determinants of poverty such as (i) lack of income and purchasing power (ii) lack of productive employment (iii) the continuous increase in price of food (VI) inadequacy of social infrastructure, affecting the quality of life of the people and their employability. The governments at the centre and the state are focussing on doubling food production with a focus on food grains such as rice, wheat, coarse cereals, pulses; oilseeds; sugar cane; fruits and vegetables; meat; milk and fish. The Action Plan envisages a detailed strategy and specific problems of productivity to

substantially increase the supply of various food items in such a way that the demand for such items for the entire population is comfortably met and some exportable surplus also becomes available.

Crop Diversification As Strategy For Issues Of Natural Resource Management:

Subdivision and fragmentation of land holdings in the country apart from diversion of cultivable land for various other purposes provides very little scope for further expansion of the net sown area (142 m/ha) and that land scarcity will become an acute feature of the rural economy. Water is another important natural resource which is facing several challenges and there are several concerns regarding water resources in the country and the states. Therefore, a judicious use of land and water resources will have to be the central theme for sustainability of agricultural growth. There has been a growing concern in recent years about the deteriorating conditions of soil health and water resources due to unscientific management. The deterioration in land and water resources has been in the form of land degradation, water logging and decline in water table. There is a greater need to have an integrated approach in the management of plant nutrients, chemicals and taking effective measures to deal with the overall pollution problems. There are several possible technologies and alternatives to reduce the use of chemicals in agriculture. These alternatives are not perfect substitutes to chemicals but adoption of these can substantially reduce the adverse impact on environment. Proper land and water management policies would reduce environmental degradation. Community and village level farmers institutions have to be encouraged to participate in protecting natural resources from degradation. Programmes for regeneration of land and water resources need to be strengthened. Scientific crop diversification options are to be planned suiting the land capabilities.

Constraints in crop diversification:

The concept of crop diversification in the country is taking the form of increased areas under commercial crops including vegetables and fruits since independence. However, this has gained momentum in the last decade favouring increased area under vegetables and fruits and also to some extent on commercial crops like sugar cane, cotton and oilseeds crops specially soybean. The major problems and constraints in crop diversification are primarily due to the following reasons with varied degrees of influence: (a) More than 60 per cent of the cropped area in the country is rain fed and is dependent on rainfall (b) Sub-optimal and over-use of resources like land and water resources, causing a negative impact on the environment and sustainability of agriculture (c) Inadequate supply of improved and quality seeds and planting material of improved cultivars (d) Fragmentation of land holdings and lack of mechanization of agriculture due investment constraints and land holding sizes (e) Poor basic infrastructure like rural roads, power, transport, communications etc (f) Inadequate post-harvest technologies and inadequate infrastructure for post-harvest handling of perishable horticultural produce (g) Very weak agro-based industry (h) Inadequate research - extension - farmer linkages (i) Inadequately trained human resources and large scale illiteracy amongst farmers (j) Emerging species of diseases and pests affecting most crop plants (k) Poor database for horticultural crops and insufficient investments in the agricultural sector.

Opportunities in Crop Diversification Due To Globalization:

With the advent of WTO and India being a member and signatory to GATT, the scenario of the agricultural sector cannot be the same as that of past. With the liberalization of trade and providing the market access of agricultural produce between the different countries, the country will be required to promote much more diversified agriculture. For crops on which we have substantial area and production, especially foodgrains, the import market has to be insulated through increased productivity which gives us a kind of comparative advantage and also a level playing field so that large scale importation is contained and farmers' interests are protected. The crops which are traditionally exported like basmati rice and spices and condiments also need to be supported in terms of area expansion and quality improvement to look towards much more opportunity for export. Crop diversification in the areas of certain tropical fruits and also a few vegetables also need support for both production and post-harvest handling in terms of their export opportunity. Accelerated growth in fruits and vegetables production is also required for improved nutrition of the country's population. In future, with improved living standards along with increased purchasing power, more and more people will look for nutritional and quality foods which will also call for greater crop diversification. There are some production areas such as food crops, plantation crops, poultry, dairy, sugar, cotton and oilseeds in which India has made its mark. There are some in which its emerging strength is already evident - sericulture, marine and inland fisheries for example. There are also others which now attract less attention, but in which the competitive advantages that India possesses can put it on the top of the world. No country grows such a wide range of fruits, vegetables, and flowers and in such abundance as India and yet it has no record worth mentioning in horticultural exports. The rich variety when processed and marketed can help India take care of the health needs of its population besides being major export commodities.

Opportunities due to Emerging Technologies:

It is being increasingly realized that agriculture is no longer a subsistence activity carried out by peasant cultivators, but rather an enterprise and manufacturer of biomass using land, water, genetic material and the latest in technology. The agriculture of the twenty first century will increasingly be farmers' entrepreneurship harnessing technologies to optimize returns from his land and investments he makes on it. Biotechnology and genetic engineering in crops with focus on primary productivity and also on many quality traits will go a long way to improving the yield and quality of many important crop plants. With the advent of such emerging technologies and consequent scope for increased economic returns, the diversification in favour of such crops will be the future focus. Many other related technologies and their adoption will also inject an added dimension in crop diversification. Decision support systems, governmental policies, geographic information system, application of information technology leading to market information etc., will also lead to crop diversification primarily on economic considerations.

Research and developmental support for crop diversification

In order to support the crop diversification sound research and development initiatives are essential. The future agriculture is much more science knowledge and skill based rather than the traditional subsistence agriculture. In the wake of globalization and opening up of several

opportunities in the global market, there will be much more opportunity for entrepreneurship development in agriculture. This also calls for paradigm shifts in research and technology development and also the transfer of technology for successful crop diversification. The research system not only needs to address the issues connected with continuance and indulgence and knowledge in the areas of emerging technologies but also create a cadre of scientists through the continuous upgrade of skills and human resource development. The researchers also need to popularize the technologies, impart knowledge and skills to the extension functionaries for the transfer of technologies to the farmers. This knowledge-based farming will call for much more interaction between the researchers, extension workers and farmers. The fruits of the innovative technologies should reach the farmers at the earliest and also spread in the quickest possible time. The use of ICT in agriculture can be one solution for transfer of technologies. The revolution brought about by the mobile telecommunication can be used to the advantage of transfer of technologies to the farmers.

Institutional and infrastructure developments in support of crop diversification

To sustain and operationalize crop diversification, institutional support is required. Crop diversification in terms of reducing the risk of rainfed farmers is vital for India. However, crop diversification in well endowed area is more of an economic consideration. The National Agricultural Research System with its Crop and Commodity based Institutions, Natural Research Management Based Institutions and State Agricultural Universities are jointly addressing the issues connected with the crop diversification. The government of India has also developed a counter support mechanism through the establishments of Crop Directorates for each of the major crops and groups of crops for development and technology transfer focus on each of these crops and commodities. These Directorates act as coordinating agencies between the research and development activities on the one hand and between the central and state governments for technology transfer and other promotional activities.

Policies and Strategies For Crop Diversification:

Realizing the importance of crop diversification, the central and state governments have taken several initiatives. Horticulture sector has been given highest importance considering its importance in nutrition security. Some of the important programs of the government include (a) launching of National Horticulture Mission (b) Launching of Technology Mission for the Integrated Development of Horticulture in the North-Eastern Region (c) Implementing National Agriculture Insurance Scheme (d) Operationalizing Technology Mission on Cotton (e) Provision of Capital Subsidy for construction/modernization/expansion of cold storages and storages for horticultural produce (f) Creation of Watershed Development Fund at the National level for the development of rain-fed areas (g) Infrastructure Support for Horticultural Development (h) Strengthening Agricultural Marketing (i) Seed Bank Scheme (k) Cooperative Sector Reforms etc are some examples. Similarly state of Karnataka has also initiated several programs that directly and indirectly support crop diversification in the state. Some of them include: (i) Launching of a program for promoting Farm Producers Organizations in horticulture sector (ii) Weather-based crop insurance for horticulture crops (iii) Promotion of protected cultivation of high value vegetables (iv) Establishment of IFAB (International Flower Auction Bangalore) for promotion of production of flower crops (v)

Promotion of green house cultivation of vegetables etc have lead to diversification of farming. More such programs are required to further diversify the farming in the state and the country for the benefit of farmers.

CONCLUSIONS:

Crop diversification would provide the farmers with a wider choice in the production of a variety of crops in a given area so as to expand production related activities on various crops and also to bring down the possible risk. Crop diversification in India is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops. The crop diversification is also taking place due to governmental policies, thrust on some crops, market reforms, infrastructure development, government subsidies, certain other price related support mechanisms, higher profitability and stability in production also induces crop diversification.

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