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Original Research Paper

Indian Agriculture and Sustainable Development: Emerging Issues

Economics

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ABSTRACT

Being the largest private sector 'agriculture' enjoys a very important position in Indian economy. As it is having link from various sectors like production, processing and marketing; agriculture continuously dominate to change in the India. The paper aims to study the significance of the sustainable development in the field of agriculture by using the secondary data. Agriculture is the main occupation in India as large population is living in the rural areas and having agriculture as their livelihood. Sustainable development in the agriculture sector aims to increase the productivity, efficiency and level of employment and further aims to protect and preserve the natural resources by the over utilization. It also provides mechanism to reduce the soil degradation through multiple cropping systems and through the deforestation and much other reason.

INTRODUCTION: Human beings started the practice of agriculture perhaps 10000-12000 years ago. It is the art and science of crop and livestock production. The word Agriculture is combination of two **latin** words: *Agri* (field), and **cultura** (cultivation), which means tillage of soil to cultivate the crops. It is well known fact that around 70% of the population in India earns its livelihood from agriculture. After the implementation of green revolution farmers have contributed remarkably in achieving self-sufficiency in food production of the nation. It is estimated that in 2012-2013, approximate food grains production in India was 250 million tones. The indiscriminate uses of synthetic fertilizers and chemicals pesticide polluted our environment. However due intensive agriculture the water table has gone down in various parts of the country. Pest problem is still persisting in different crops. Soil fertility is deteriorating day by day. A number of health hazards have been identified in animals and human beings.

Sustainable Agriculture Development:

The issues of sustainable development can be discussed under three broad types of farming systems viz. traditional production system, modern agriculture system and sustainable agriculture system. Further we can compare them across three dimensions, ecological, economic and social sustainability.

- **Ecological Sustainability:** Most of the traditional and conventional farm practices are not ecologically sustainable. They misuse natural resources, reducing soil fertility causing soil erosion and contributing to global climatic change. But sustainable agriculture has some major advantages over traditional practices.

- **Soil Fertility:** Continuous fall in soil fertility is one of the major problems in many parts of India. Sustainable agriculture improves fertility and soil structure.

- **Water:** Irrigation is the biggest consumer of fresh water, and fertilizer and pesticides contaminate both surface and ground water. Sustainable agriculture increase the organic matter content of the top soil, thus raising its ability to retain and store water that falls as rain.

- **Biodiversity:** Sustainable agriculture practices involve mixed cropping, thus increasing the diversity of crops produced and raising the diversity of insects and other animals and plants in and around the fields.

- **Health & Pollution:** Chemicals, pesticides and fertilizers badly affect the local ecology as well as the population. Indiscriminate use of pesticides, improper storage etc. may lead to health problems. Sustainable agriculture reduces the use of hazardous chemical and control pests.

- **Land use Pattern:** Over-exploitation of land causes erosion, land slides and flooding clogs irrigation channels and reduces the arability of the land. Sustainable agriculture avoids these problems by improving productivity, conserving the soil etc.

- **Climate:** Conventional agriculture contributes to the production of greenhouse gases in various ways like reducing the amount of carbon stored in the soil and in vegetation, through the production of Methane in irrigated field and production of artificial fertilizers etc. By adopting sustainable agriculture system, one can easily overcome this problem.

- **Economic Sustainability:** For agriculture to be sustainable it should be economically viable over the long term. Conventional agriculture involves more economic risk than sustainable agriculture in the long term. Sometimes governments are inclined to view export-oriented production systems as more important than supply domestic demands. This is not right. Focusing on exports alone involves hidden costs: in transport, in assuring local food security, etc. Policies should treat domestic demand and in particular food security as equally important to the visible trade balance. It is a popular misconception that specific commodities promise high economic returns. But market production implies certain risks as markets are fickle and change quickly. Cheap foreign food may sweep into the national market, leaving Indian farmers without a market. As a World Trade Organization signatory, the Indian government is under pressure to deregulate and open its economy to the world market so it cannot protect its farmers behind tariff walls. The main source of employment for rural people is farming. Trends towards specialization and mechanization may increase narrowly measured "efficiency", but they reduce employment on the land. The welfare costs of unemployment must be taken into account when designing national agricultural support programs. Sustainable agriculture, with its emphasis on small-scale, labor-intensive activities, helps overcome these problems.

- **Social Sustainability** Social sustainability in farming techniques is related to the ideas of social acceptability and justice. Development cannot be sustainable unless it reduces poverty. The government must find ways to enable the rural poor to benefit from agriculture development. Social injustice is where some section of the society is neglected from development opportunities. But having robust system of social sustainability can bridge the gap between "haves" and „have-nots". Many new technologies fail to become applicable in agriculture sector due to lack of acceptability by the local society. Sustainable agriculture practices are useful because it is based on local social customs, traditions and norms etc. Because of being familiar the local people are more likely to accept and adopt them .Moreover, sustainable agriculture practices are based on traditional know-how and local innovation. Local people have the knowledge

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about their environment crops and livestock.
Traditional agriculture is more gender oriented, where woman bear the heaviest burden in terms of labor. Sustainable agriculture ensures that the burden and benefits are shared equitably between man and woman. While conventional farming focuses on a few commodities, sustainable agriculture improves food security by improving quality and nutritional value of food, and also by producing bigger range of products throughout the years. Traditional farming was also driven by the caste and wealth oriented people. The rich and higher castes benefitted more, while the poor and lower castes are left out. Sustainable agriculture attempts to ensure equal participation which recognizes the voice and speech of every people.

Indian Agriculture Sector: Agriculture is one of the most preeminent sectors of the Indian economy. It is the source of livelihood for almost two third of the rural population workforce in the country residing in rural areas. Indian agriculture provides employment to 65% of the labor force, accounts for about 27% of GDP, contributes 21% of total exports and raw material to several industries. The livestock sector contributes an estimated 8.4% to the country GDP and 35.85% of the agriculture output. In India about 75% people are living in rural areas and are still dependent on agriculture, about 43% of India's geographical area is used for agriculture activities. The estimated food grain production is about 211.17 metric tons in the country.

Sustainable Agriculture:
Intensive agricultural activities give rise to various problems e.g. soil pollution, land degradation, loss of biodiversity, contamination of water resources, pesticide residue problem, depletion of groundwater and impacts on human health etc. So, what is the solution? The answer is sustainable agriculture. It is a form of agriculture which aims to produce enough food to meet the needs of present day generation without deteriorating soil fertility and irreversibly damaging the environment. Sustainable agriculture practice are those that are least toxic and least energy intensive and yet maintain productivity and profitability i.e. low input agriculture or organic farming. Thus sustainable agriculture is that which-

- Maintain the soil fertility,
- Do not use of chemical pesticide;
- Uses natural resources efficiently
- Improve over all environmental quality
- Less use of non renewable natural resources;
- Provides safe and healthy agricultural products;
- Improve the life of rural communities and farmers;
- Uses the natural resources as per their
- carrying capacity;
- Above all it save the natural resources for next generations.

Methods used to achieve Sustainable Agriculture The sustainable agriculture depends upon various factors e.g. topography of the area, type of soil, availability of water, type of crop and seeds, climate of the area and above all goal of the farmers. Different methods involved in sustainable agriculture are:

- Cultivation practices to enhance the natural and financial stability.
- Selection of varieties as per need and environmental conditions.
- Management of soil fertility by using appropriate tillage method
- Using the practice of integrated pest management.
- Integrated Nutrients Management

Actually this is the practice of agriculture which was in use before 1950s in various developing countries including India. In other word this is the traditional form of agriculture wherein farmers follow the practice of mixed cropping and crop rotation. The different techniques which can be used to achieve sustainable agriculture are:

a. Mixed Cropping: It is old agricultural technique and here two or more crops are grown together on the same plot of land at a time. The crops grown have different water and nutrients requirement. They also have different maturity time. If by chance one crop destroyed, the others crops cover the risk of total crop failure. Generally, a long duration crop is grown along with a short duration crop so that both the crops get sufficient nutrients and water. Generally a leguminous crop is grown along with the main crop. Leguminous crops improve soil fertility by fixing atmospheric nitrogen. This not only save the cost of chemical fertilizers but also prevent the ground water from nitrate contamination.

The various strategies involved in mixed cropping are:

- Different cultivars of the same crop are grown at a time on a same plot of land.
- Intercropping where two or more crops are grown e.g. cereal that uses soil nitrogen and nitrogen fixing legume that fix the nitrogen in the soil.
- Polyculture, in which different plants maturing at different times are grown together.

This practice is very beneficial because nutrient and water requirement of crops grown are different so there is less need of these inputs and soil restores nutrients naturally. In monoculture farmers sow only one type of crop e.g. wheat and rice which uses excessive chemical fertilizers, water and pesticides and causes environmental and economic problems.

b. Crop Rotation: Here different crops are grown in regular succession on the same plot of land. Actually it helps in control of diseases & pests restore soil fertility and control soil erosion. Actually soil cannot sustain high yielding varieties continuously because of their high nutrient requirement. The farmers supply only macronutrients i.e. NPK to these high yielding varieties and ignore the micronutrients e.g. zinc and boron etc. and give rise to the problem of micronutrient imbalance. In crop rotation leguminous crop are grown after the main crop. Leguminous crops improve soil fertility by fixing atmospheric nitrogen. This not only save the cost of chemical fertilizers but also prevent the ground water from nitrate contamination. Beside this, this practice also controls the pest & diseases as different crops have different types of pest and their natural predators. Farmers not only grow food crops in this practice but also grow fodder for livestock which prevent soil erosion. This practice of cultivation considers the following factors for better output:

- Leguminous crop should be grown after the main crop to replenish the nitrogen content of the soil.
- Less irrigation requiring crop should be grown after the more irrigation requiring crop.

Crops requiring fewer nutrients should be grown after one that requires more nutrients. Adopting these practices of cultivation can improve the soil as well as food quality e.g.

Green gram - Wheat Mooing crop pattern can be used to improve the soil and environmental health.

Issues & Challenges:
The central issue in agricultural development is the necessity to improve productivity, generate employment and provide a source of income to the poor segments of population. Studies by FAO have shown that small farms in developing countries contribute around 30-35% to the total agricultural output. The pace of adoption of modern technology in India is slow and the farming practices are too haphazard and unscientific. Some of the basic issues for development of Indian agriculture sector are revitalization of cooperative institutions, improving rural credits, research, human

resource development, trade and export promotion, land reforms and education.

Future Prospects and Solution for India:

Agriculture sector is an important contributor to the Indian economy around which socio-economic privileges and deprivations revolve and any change in its structure is likely to have a corresponding impact on the existing pattern of social equity. Sustainable agricultural production depends upon the efficient use of soil, water, livestock, plant genetics, forest, climate, rainfall and topology. Indian agriculture faces resource constraints, infrastructural constraints, institutional constraints, technological constraints and policy induced limitations. Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for the present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sector) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. So, to achieve sustainable agriculture development the optimum use of natural resources, human resources, capital resources and technical resources are required. In India the crop yield is heavily dependent on rain which is the main reason for the declining growth rate of agriculture sector. These uncertainties hit the small farmers and laborers worst which are usually leading a hand to mouth life. Therefore something must be done to support farmers and sufficient amount of water and electricity must be supplied to them as they feel insecure and continue to die of drought, flood, and fire. India is the second largest country of the world in terms of population; it should realize it is a great resource for the country. India has a huge number of idle people. There is a need to find ways to explore their talent and make the numbers contribute towards the growth. Especially in agriculture passive unemployment can be noticed. The sustainable development in India can also be achieved by full utilization of human resources .A large part of poor population of the country is engaged in agriculture, unless we increase their living standard, overall growth of this country is not possible. If we keep ignoring the poor, this disparity will keep on increasing between classes. Debt traps in country are forcing farmers to commit suicides. People are migrating towards city with the hope of better livelihood but it is also increasing the slum population in cities. Therefore rural population must be given employment in their areas and a chance to prosper. India has been carrying the tag of "developing" country for quite long now; for making the move towards "developed" countries we must shed this huge dependence on agriculture sector.

Conclusion:

The agricultural technology needs to move from production oriented to profit oriented sustainable farming. The conditions for development of sustainable agriculture are becoming more and more favorable. New opportunities are opening the eyes of farmers, development workers, researchers and policy makers like agri related businesses, dairy farming, poultry farming castle farming and fisheries. Now the time is to see the potential and importance of these practices not only for their economic interest but also as the basis for further intensification and ecological sustainability. To conclude, a small-farm management to improve productivity, profitability and sustainability of the farming system will go a long way to ensure all round sustainability.

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