International Journal of Advanced Research in Management and Social Sciences
ISSN: 2278-6236
Impact Factor: 5.313

ISSUES OF SUSTAINABILITY IN INDIAN AGRICULTURE

Dr. Manjula Upadhyay*

Abstract: *The health of rural economy can be boosted through adoption of sustainable agriculture approach towards development. Large scale efforts are needed to increase production, productivity of agriculture and related products sustainably to be self- reliant and qualitatively feed our huge size of population. The quality of life and income of the farmers needs to be taken care of as it is nation's liability to care for those who feed the nation. Most of our farms are small in size therefore farmer needs more marketable surplus and climate resilient farming techniques. Knowledge, skill based and local natural resource model should be adopted instead of conventional "external input driven". Gradual withdrawal of chemicals should be done which will boost the natural fauna and flora. The adoption of sustainable agriculture techniques will reduce cost of cultivation, increase yield, increase incomes, increase access to food, help in building social capital and building organic and chemical free villages. The focus should be shifted from mono-cropping to mixed farming. Nutritional status and livelihoods of the population should improve. In the paper thus need and importance of sustainable agriculture has been highlighted and evidences have been cited from various studies through secondary data source and finally impact of sustainable agricultural practices has been concluded.*

*Assistant Professor, Department of Economics, A.P. Sen Memorial Girls Degree College, Lucknow

INTRODUCTION

The policymakers to achieve self reliance and meet food grain crisis in the mid sixties of earlier century adopted and implemented green revolution in India. It increased the total food grain production from about 50 million tonnes at the time of independence to more than 250 million tones but then it became stagnant. It requires high input resources for maximum yield and has remained confined to irrigated areas, food grain production that too wheat and rice at the cost of coarse cereals and pulses. The negative impacts of Green Revolution such as loss of soil productivity, surface and ground water depletion and pollution from pesticides, fertilizers and sediments, shortage of non renewable resources, high cost and low prices and diminishing returns exhibited, is posing problems of agricultural sector. These challenges call for adopting a path of sustainable agriculture approach. In this light the paper explores and analyses the issues and opportunities arising out of adoption of better renewable, organic, eco-friendly techniques which will revolutionize the agriculture sector in sustainable manner.

SUSTAINABLE AGRICULTURE ISSUES

Sustainable agriculture aims at conservation of its own resources, produce adequate amounts of high quantity foods, environment friendly and profitable. It asks for lesser reliance on purchased inputs and rely mostly on renewable resources of the farm itself. It combines traditional techniques that stress conservation with modern technologies, such as improved seed, modern equipment for low tillage practices, integrated pest management that relies heavily on biological control principles and weed control that depends on crop rotations. It tries to use solar and wind energy and organic material to maintain soil fertility. Sustainable agriculture emphasizes on maintaining the environment. The farmers develop alternative farming methods and systems consisting of variety of integrated practices and methods suited to the specific needs, limitations, resource bases and economic conditions of different forms. Traditional farming methods are adapted to the physical, biological and social environments. Green Revolution adopted in 1960's has benefitted the resource rich farmers whereas resource poor families have been left behind. In the Third World, much research on indigenous farming methods is needed and the top down approach to research needs to be replaced and supplemented by on farm research. (Dahama A. K.)According to Dr. M. S. Swaminathan "The greening of agriculture requires the greening of both

technology and public policy. Producing more food and agricultural commodities from less land , water and energy is a task that will call for the integration of the best in modern technology with the ecological strengths of traditional farming practices."If a farming system is economically sustainable at present but if it contributes to pollution of any kind, it is not sustainable over a long term. If a farming system does not address to the demand of the society it is not considered to be sustainable. The ultimate objective of sustainable agriculture is to maximize the benefits from the existing agricultural assets and minimize the threats to the environment from the current practices of intensive agriculture. Sustainable agriculture is designed to generate increased awareness of relationships between plants, soli, air and water under differing ecological conditions of climate and biological stress. It also includes relationship between livestock and fish production with their dependence on the vegetative productivity of the world's land and waters. The ultimate goal is to improve the quality of human life based on our ability to manage adopt and modify natural resource systems. If the regulations on use of chemical fertilizers will increase, it is expected that focus will shift on how to enhance the inherent productive qualities of soil through different farming systems and cropping pattern.

The crucial components of sustainable agricultural production and distribution system involves integration of natural biological cycles and controls, protection and renewal of soil fertility and the natural resource base, optimization of the use of non renewable resources and of on farm and off farm inputs, ensuring dependable farm income, promoting opportunity in family farming and farm communities, reducing adverse impacts on health and safety of the farming community and other aspects of integrated soil, crop, livestock, water and best management and input interventions also require precise weather and climatic information and if provided in advance can be helpful in inspiring the farmer to organize and activate their own resources in order to reap the benefits by judicious application of costly inputs. The quantity and quality of agricultural production will be boosted as with updated meteorological information farmers will efficiently use natural resources. (Rathore L.S. 2013). More productive and resilient agriculture requires transformations in the management of natural resources eg. Level water, soil nutrients and genetic resources and higher efficiency in the use of these resources and inputs for production. Some major challenges to the sustainability of the world's agriculture are: (i)

pollution (ii) biodiversity loss (iii) soil degradation/nutrient loss/erosion (iv) water scarcity/salinity (v) carbon footprint (vi) natural resource depletion

The report by Andy Hall and Kumuda Dorai "The Greening of Agriculture: Agricultural Innovation and Sustainable Growth" raised discussion points before OECD which needs to be discussed for strategy for green growth.

- Expectations of the role of agriculture in an era of environmental challenges are expanding. Agriculture is expected to replace environmentally damaging products and industrial production systems, protect biodiversity and mitigate climate change as well as address livelihoods and life styles
- The role of Research and Development and technology is a critical factor in shaping the green credentials of agriculture
- Technology is necessary but cannot alone make agriculture sustainable: deploying technology requires a high degree of policy coherence and strong communication across different stakeholder groups
- The strategies should be tailored to national context
- Civil society led movements and market led forces may be powerful forces of change towards greener agriculture
- Experiences from world need to be analysed and accordingly adopted

Concerns with regard to sustainability of modern agriculture are:

- Water scarcity and salinity- water is becoming scarce and expensive. Common problems of surface water irrigation systems include water logging and salinity resulting from excessive water use and poorly designed drainage systems (Murgai, Ali and Byerlee .2001). Ground water level is also falling and pumping cost rising
- Soil-Use of chemical fertilizers and pesticides has caused loss of essential nutrients, mono cropping, intensive mechanized tilling and ploughing practices, overgrazing, and deforestation
- Pests- Their use has direct and indirect effect on wildlife population and human health. It also led to destruction of beneficial insects and pesticide resistance in target populations
- Climate change: It may have both negative and positive effects although effects will vary across regions. Higher Co2 concentrations may have a positive "fertilizer effect"

on some plants, higher temperatures may raise sea levels and salt water may intrude in ground water aquifers. Changes in temperature, rainfall and sunlight may impact agricultural production.

Netherland with constrained agricultural land was among the first to address the issues of environmental sustainability as a result of agricultural intensification in the early nineties. It has encouraged the development of more environmentally sustainable chemicals and its Multi Year Crop Protection Plan (1991-2000) has significantly reduced pesticide use. Market initiatives have also stimulated the environmental awareness of producers. The retailers also demand the use of environmental friendly conditions in production methods. Subsidies are subsidies are also given for organic production. The agriculture sector depends on innovation to maintain its competitive edge.(OECD 2002 a)

Sustainable agriculture must use farming systems that conserve resources, protect the environment, produce efficiently, compete commercially and enhance the quality of life for famers and society. Innovations in engineering, information technology and biotechnology. These will be helpful in reducing toxin content in agricultural production, reduce nutrient losses in soils, lower gaseous nitrogen loss and reduce the amount of non renewable energy used in cropping cycle.

- Biotechnology involves bioremediation that is using micro organisms to reduce, eliminate, contain or transform soil, water or air contaminants. Crop variety which requires less tillage thereby reducing pesticides and fertilizers to reduce water pollution and industrial biotechnology applications to reduce green house gas emissions from chemical production (OECD 2009 c).The technologies should not be monopolized by commercial interests or detrimental to poor.
- ICT Applications- Precision farming uses new technologies, Global Positioning System, sensors, satellite or aerial images, information management tools, information on sowing needs. It can be used to guide the application of appropriate agricultural practices in right place, in right way and at the right time. ICT can also be used to promote communication, information exchange and networking among large number of individuals, organizations and businesses. ICT can also be used in monitoring land use patterns. China has created a range of national databases for

land evaluation and management, population, environment and sustainable development.

- Bio production Science covers the broad fields of agriculture, biochemistry, biotechnology, food science and bioengineering. Indian government is providing financial assistance to state agricultural universities and other research organizations for research on developing and producing bio pesticides and bio control agents .A number of bio pesticide production unit and plant protection clinical centers have been established and strengthened in recent year. The use of bio pesticides and bio control agents in India is rising although risky in terms of resistance development; bio pesticides are cheaper than chemical pesticides.

ORGANIC FARMING

Organic farming is a way of life in poorer regions of Third World where farmers cannot afford the technological inputs of modern agriculture. It may give lower yields but net return on investment is usually higher because they consume lesser inputs and when environmental costs are taken into account, the organic alternative is clearly superior. Organic farming involves (i) substituting manures and other organic matter for inorganic fertilizers and (ii) using biological pest control instead of chemical pest control. As per the definition of USDA study team on organic farming "organic farming is a system which avoids or largely excludes the use of synthetic inputs such as fertilizers, pesticides, hormones, feed additives etc. and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection."

The growth of organic agriculture in India has three dimensions and is adopted by farmers for different reasons. First category of organic farmers are those which are situated in no-input or low input use zones ,for them organic is a way of life and they are doing it as a tradition may be due to compulsion because of lack of resources need for conventional high input intensive agriculture. In second category come those farmer who have recently adopted the organic in the wake of ill effects of conventional agriculture, may be in the form of reduced soil fertility, food toxicity or increasing cost and diminishing returns. The third category incorporates those farmers who have systematically adopted the commercial organic agriculture to capture emerging market opportunities and premium prices. In first

category the majority of farmers are not certified, in second farmers comprise both certified and uncertified but third category farmers are certified (Yadav, A.K.).The demand for the organic products is mostly concentrated in developed and affluent countries. But in India also it is picking up and success of organic movement in India will depend on the growth of its own domestic market. The organic farming may act as an alternative system of farming which not only addresses the quality and sustainability concerns but also ensures a debt free, profitable livelihood option.

The ethical principles outlined by international federation for organic agriculture movements (IFOAM) definition of organic agriculture is based on:

- The Principle of Health implying that organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible. Organic agriculture is intended to produce high quality nutritious food that contributes to preventive health care and well-being.
- The Principle of Ecology- It should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.
- The Principle of Fairness implies equity, respect, justice to all parties-farmers, workers, processors, distributors, traders and consumers. It should ensure good quality of sufficient food and other products.
- The Principle of Care emphasizes that organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generation and the environment.

Thus organic agriculture aims at a sustainable production system based on natural process. The characteristics of organic agriculture are:

- Relies basically on local, renewable resources.
- Uses non-conventional energy resources such as solar and wind energy efficiently.
- Maintains the fertility of the soil.
- Maximizes recycling of plant nutrients and organic matter.
- Does not use organisms or substances foreign to nature.
- Maintains diversity in the production system as well as the agriculture landscape.
- Give farm animals a life condition that corresponds to their ecological role and allow them natural behavior.

Organic agriculture is advantageous to small scale farmers by increasing the income of participating farmers as certified production gives access to a premium market or better market access. Develop a system which is productive with low cost, resources conserving ad sustainable for centuries to come. The steps involved are:

- Enrichment of soil by giving up use of chemical fertilizers, use crop residue as mulch, use organic and biological fertilizers, adopt crop rotation and multiple cropping, avoid excessive tilling and keep soil covered with green cover or biological mulch
- Manage temperature by covering soil and planting trees and bushes on bund.
- Conserve soil and rain water
- Harvest sun energy
- Self-reliance on inputs i.e developing own seeds, on farm production of compost, vermin-compost, vermin-wash, liquid manures and botanical extracts.
- Maintain life forms
- Integration of animals as they provide animal product and also provide enough dung and urine for use in soil.
- Use renewal energy

SUSTAINABLE INTEGRATED FARMING SYSTEM (SIFS)

SIFS has many aspects: organic production, vertically integrated business, supply chain management and brand building can have a role to play in creating a sustainable farming business. All these activities have one common thread and it is to build a viable business model capable of preserving and improving the assets managed in the business, be they soils, water and human capital. SIFS is based on agro-ecological zones, combination of crops; horticulture, agro forestry, livestock and aqua culture are integrated into interactive relationship. SIFS involves selected, interdependent, related and inter linked production systems based on crops, animals and related subsidiary professions. This model is designed by local farmers as they may form co-operatives collaborating with grass roots expert and facilitators depending on available local natural resources, knowledge and skill. This model optimally utilizes time and space.

To ensure nutrition availability to the household it involves farm planning comprising designing home, streets ,gardens ,pathways and water bodies. Credit and market linkages are provided and small farmers are organized for increased competiveness. SIFS imitates

nature by not only utilizing crops for production but also varied types of plants, animals, bird, and fish as well as other aquatic fauna and flora.

CONCLUSION

The high population pressure in India and various developmental projects have declined per capita availability of land, there is hardly any scope for horizontal expansion of land for food production there by vertical expansion is the other option through integrating appropriate farming components which require lesser space and time for guaranteed income to the farmers. Technologies need to be explored which enhances productivity and preserves natural resource base. The negative impact on earth can be reduced through the use of organic farming.

STRATEGIES

- Participation of farmers both men and women should be assured in all processes of problem analysis, technology development, evaluation, adoption and extension leading to food security and self reliance among farmers and rural communities.
- Access and control over natural resources of the local people especially the marginalized sections needs to be strengthened.
- Environmentally safe and sustainable methods should be adopted to improve the quality and quantity of crop/plantations/livestock yields.
- Success stories regarding sustainable agriculture should be documented.
- Sustainable agriculture practices should be adopted to cope with climate change.

REFERENCES

1. Dahama, A. K. (2002) “Organic Farming for Sustainable Agriculture” AGROBIOS (India)
2. Rathore L.S. (2013) “Weather Information for Sustainable Agriculture in India” in Journal of Agricultural Physics vol. 13 no 2
3. Murgai, Ali and Byerlee .(2001) “Productivity, Growth and Sustainability in Post-Green Revolution Agriculture: The Case of Indian and Pakistan Punjabs” in World Bank Research Observer.
4. OECD (2002 a) “Adoption of Technologies for Sustainable Farming Systems” Wageningen Workshop Proceedings, OECD , Paris
5. OECD (2009 c) “The Bio-economy to 2030: Designing Policy Agenda”, OECD Paris.
6. Yadav, A.K. 2011. Organic agriculture (concept, scenario, principles and practices) training manual. National Project on Organic farming Dpt. of Agril. and Coop., Govt. of India), p: 30.