Agricultural sustainability in India: Contemporary Challenges and Actions

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Abstract:
Agricultural growth faces a serious challenge in terms of sustainability. Whereas the main problem faced by the developing countries in the south pertains to sustainability of resource use, the main challenge facing the developed economies in the north is overuse of chemical inputs. These problems have led to increasing awareness and a felt need for moving away from the input intensive agriculture perused during the Green revolution phase, to sustainable farming in different parts of the world.

While the need for a paradigmatic shift in the growth strategy is well recognized, the transition from input intensive to sustainable farming however, has certain inherent difficulties. Notwithstanding these limitations, policies in both the north as well as the south have led increased emphasis on promoting sustainable agriculture. In the above setting, the paper made an attempt to briefly analyze the need for sustainable agriculture and further it also advocates for Policies of sustainable agriculture and organic farming with possible actions in India are discussed.

Keywords: Agriculture, Sustainable, Environment, Ecological, Policies

I. INTRODUCTION

World Agriculture Scenario has experienced a phenomenal change over the decades. The growth, driven by Green Revolution technology, has made a significant dent on aggregate supply of food grains, ensuring food security to the growing population.

Negative Environmental Consequences
The term agricultural treadmill has frequently been used to explain how the development of agriculture in developed countries resulted in a range of negative environmental consequences (Ward, 1993). In this context, it
refers to farmers becoming increasingly dependent on pesticide use, resulting in the disruption of ecosystems and the consequent need to use more chemicals to maintain effective pest control — thus, ‘trapped on a treadmill’. More generally, agricultural intensification of the kind that took place in the post-war years is associated with: land and soil degradation, Stalinization of water resources, pesticide pollution of soil, water and food chains, depletion of ground water, genetic homogeneity of agricultural products and associated vulnerability (Altieri & Rosset, 1996). All of this raises serious concerns about the sustainability of modern agriculture. The next stage of agricultural growth however, faces a serious challenge in terms of sustainability. the existing challenges faced by agriculture.

It is increasingly clear that climate change as the dominant global scale environmental concern will have a profound influence on the agro-ecological conditions under which farmers and rural populations need to develop their livelihood strategies, manage their natural resources and achieve food security and other ends. Some major challenges to the sustainability of the world’s agriculture are:

1. Pollution
2. Biodiversity loss
3. Soil Degradation/ Nutrient loss/Erosion
4. Water Scarcity/ Salinity
5. Carbon Foot-print
6. Natural Resource Depletion

Enhancing food security requires agricultural production systems to change in the direction of higher productivity and also, essentially, lower output variability in the face of climate risk and risks of an agro-ecological and socio-economic nature. More productive and resilient agriculture requires transformations in the management of natural resources (e.g., land, water, soil nutrients, and genetic resources) and higher efficiency in the use of these resources and inputs for production. Agriculture also presents untapped opportunities for mitigation.

Whereas the main problem faced by the developing countries in the south pertains to sustainability of resource use, the main challenge facing the developed economies in the north is overuse of chemical inputs. These problems have led to increasing awareness and a felt need for moving away from the input intensive agriculture perused during the Green revolution phase, to sustainable farming in different parts of the world. While the need for a paradigmatic shift in the growth strategy is well recognized, the transition from input intensive to sustainable farming however, has certain inherent difficulties. Notwithstanding these limitations, policies in both the north as well as the south have led increased emphasis on promoting sustainable agriculture.

Today, concerns about sustainability centre on the need to develop agricultural technologies and practices that: (i) do not have adverse effects on the environment (partly because the environment is an important asset for farming), (ii) are accessible to and effective for farmers, and (iii) lead to both improvements in food productivity and have positive side effects on environmental goods and services. Sustainability in agricultural systems incorporates concepts of both resilience (the capacity of systems to buffer shocks and stresses) and persistence (the capacity of systems to continue over long periods), and addresses many wider economic, social and environmental outcomes.
While the need for a paradigmatic shift in the growth strategy is well recognized, the transition from input intensive to sustainable farming however, has certain inherent difficulties. Notwithstanding these limitations, policies in both the north as well as the south have led increased emphasis on promoting sustainable agriculture. India can safely be characterized as an agricultural country despite the recent spurt in manufacturing and services and the declining share of agriculture in the national income, since majority of its workforce (65%) are still engaged in agriculture and allied activities. It has been the noblest profession in India since the time immemorial and has been carried out on sustainable basis.

It is only relatively recent phenomenon that large-scale forest areas, grazing lands and waste lands have been converted into croplands to support the rising population, which has caused ecological imbalance and atmospheric pollution. With no further scope for expansion of agricultural land efforts have been made to enhance the production of food grains using high-yielding variety of seeds, fertilizers and irrigation along with advanced farm equipments. However, so-called green revolution is confined to a few crops, viz, wheat, rice and maize and has been possible only in restricted areas, i.e., Punjab, Haryana and Western Uttar Pradesh and certain selected districts of Andhra Pradesh, Maharashtra and Tamilnadu. Naturally much work is needed to lift the agriculture to a level where it is least affected by vagaries of monsoon and needs little from outside the farm, i.e., lesser dependence on chemical fertilizers and water. The limited success of green revolution has been a mixed bag in that it has given rise to new set of problems: overuse of water and fertilizers. Excessive use of water results in water logging and salinization whereas excess of fertilizers and pesticide cause pollution of water bodies contamination of ground water. India has the largest area of irrigated land (55 million hectares) of which about one-third land is already degraded and 7 million hectare have been abandoned. In such a situation a renewable and lasting alternative, sustainable agriculture, has to emerge for successful agricultural revolution.

The present paper made an attempt to briefly analyze the need for sustainable agriculture and further it also advocates for Policies of sustainable agriculture and organic farming with possible actions in India are discussed.

II. METHODOLOGY

A descriptive and explorative methodology is followed. The secondary data based on various reports from Govt depts. and International NGOs. The published sources such as Web sites, periodicals and news paper Reports are liberally used for the preparation of the paper.

Section 1: Need for sustainable agriculture

There are three broad types of farming such as traditional production systems, conventional modern agriculture (such as Green Revolution technologies), and sustainable agriculture. We can compare them across three dimensions: ecological, economic and social.
Ecological sustainability

Many traditional and most conventional farm practices are not ecologically sustainable: they overuse natural resources, reducing soil fertility, causing soil erosion, and contributing to global climatic change. Sustainable agriculture has several major advantages over both traditional and conventional practices:

Soil fertility: A continuous fall in soil fertility is a major problem in many parts of India. Sustainable agriculture improves fertility and soil structure and prevents erosion, so would be an answer to this problem.

Water: Irrigation is the biggest consumer of fresh water, and fertilizer and pesticides contaminate both surface- and groundwater. Sustainable agriculture increases the organic matter content of the topsoil, so raising its ability to retain and store water that falls as rain.

Biodiversity: Sustainable agricultural practices frequently involve mixed cropping, so increasing the diversity of crops produced and raising the diversity of insects and other animals and plants in and around fields.

Pollution: Pesticides are hazardous to human health as well as to the local ecology. Incorrect handling, storage and use of pesticides lead to health and pollution problems. Sustainable agriculture reduces or eliminates the use of hazardous chemicals; instead it controls pests with a variety of biological and agronomic measures and the use of natural substances.

Landscape: Agriculture and forestry clothe the rural landscape. Inappropriate use causes erosion, landslides and flooding, clogs irrigation channels, and reduces the ability of the land to support the local population. Impoverished rural people flock into the cities in search of jobs, forming unsightly, insanitary slums that further destroy the landscape. Rehabilitating ecologically damaged areas needs huge investments that few countries can afford. Sustainable agriculture avoids these problems by improving productivity, conserving the soil, avoiding the expansion of farming into unsuitable areas, and preserving rural jobs.

Climate: The way agriculture is practiced contributes significantly to global climatic changes. Conventional agriculture contributes to the production of greenhouse gases in various ways: by reducing the amount of carbon stored in the soil and in vegetation, through the production of methane in irrigated fields, and through energy-intensive activities such as the production of artificial fertilizers. Adopting sustainable agriculture would reduce these impacts significantly.

Economic sustainability

Agriculture cannot be sustainable unless it is economically viable over the long term. Conventional agriculture poses greater long-term economic risks than “sustainable” alternatives.

Export vs. local orientation: Governments tend to view export-oriented production systems as more important than those that supply domestic demands. This is misguided. 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 (either by farmers producing food for themselves, or by selling produce for cash they can use to buy food) as equally important to the visible trade balance.

Debt: The Green Revolution raised India’s grain output significantly, but a vast number of small-scale farmers ran into a debt trap: they took out loans to raise their production, and then found they could not pay the money back. About 40,000 were so desperate that they committed suicide.
Risk: Concentrating on specific commodities seems to promise high economic returns. But market production implies certain risks: markets change quickly, and international agricultural prices are dropping. 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 cannot protect its farmers behind tariff walls.

Niche markets: Organic agriculture is one of the strongest ways to farm in an environmentally sustainable way. The demand for certified organic products is increasing quickly, opening opportunities to expand sales of such products and to explore niche markets.

Employment: Farming is the main source of employment for rural people. 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 programmes. Sustainable agriculture, with its emphasis on small-scale, labour-intensive activities, helps overcome these problems.

Social sustainability

The social sustainability of farming techniques is related to the ideas of social acceptability and justice. Inclusiveness: Development cannot be sustainable unless it reduces poverty for the broad masses of people in India. The government must find ways to enable the rural poor to benefit from agricultural development.

Political unrest: Gaps between the “haves” and “have-nots” feed a feeling of social injustice among those who feel neglected and excluded from development opportunities, as well as from better-off sympathizers. The result is a climate favorable to political opposition and even violence.

Local acceptance: Many new technologies fail because they are based on practices or assumptions from outside. Sustainable agricultural practices usually are based on local social customs, traditions, norms and taboos, so local people are more likely to accept them and adapt them to their own needs.

Indigenous knowledge: Sustainable agricultural practices often rely on traditional knowhow and local innovation. Local people have a wealth of knowledge about their environment, crops and livestock. They keep locally adapted breeds and crop varieties. They have social structures that manage and conserve common resources, help people in need, and maintain the social fabric. Rather than ignoring or replacing this knowledge, sustainable agricultural development seeks to build on it and enrich it with appropriate information from outside.

Gender: In traditional agriculture, women traditionally bear the heaviest burdens in terms of labour. In modern conventional farming, too, men often benefit the most: they control what is grown and how the resulting income is spent. Sustainable agriculture attempts to ensure that the burdens and benefits are shared more equitably between men and women.

Food security: Traditional farming techniques often fail to produce enough food, or enough variety of food for a balanced diet. Conventional modern farming focuses on a few commodities, so people still do not have a balanced diet. Sustainable agriculture improves food security by improving the quality and nutritional value of the food, and by producing a bigger range of produce throughout the year.
Participation: Traditional society in India is riven by wealth and caste distinctions. Introducing conventional farming innovations tends to exacerbate these: the rich and higher-caste tend to benefit, while the poor and lower-caste are left out. Sustainable agricultural interventions consciously target the less well-off, and empower them so they can organize and speak with their own “voice”, so promoting dialogue and democracy.

Sustainable Agriculture in India
The sustainable agriculture may be defined as any set of agronomic practices that are economically viable, environmentally safe, and socially acceptable. If a cropping system requires large inputs of fertilizer that leak from the system to pollute ground water, drinking supplies and distant coastal fisheries, the system may be sustainable economically as the long-term supply of fertilizer is stable and the economic cost of fertilizer is easily borne by larger grain production but it is not sustainable environmentally or socially, since it does not cover the cost of environmental damage or social costs. The organic agriculture focuses on “living soil”, on optimizing the use of biological processes and on avoiding the use of synthetic chemicals and fertilizers.

Advocates of sustainable agriculture agree with biological focus and hope to reduce but not necessarily eliminate chemical use. In the context of sustainable agriculture another term “alternative agriculture” has been prominently used. Definition of alternative agriculture sheds much light on operational aspects of sustainable agriculture. Any food or fiber production that has a more thorough incorporation of natural processes, reduced use of off-farm inputs with less harm to environment and consumers, a more productive use of biological and genetic potential of plants and animals, a better match between cropping patterns and the physical capacity of lands and, An improved emphasis on conservation of soil, water, energy and biological resources, is defined as alternative agriculture.

The normal agricultural practices using irrigation, chemical fertilizer, pesticides and high-yielding variety of seeds is called conventional agriculture. With increasing use of chemical fertilizers and pesticides the conventional agriculture is major source of pollution of inland water bodies and coastal seas. There has been growing criticism of conventional agriculture for its side effects, the “external costs” which impact communities, the environment, and human health.

As for indicators of sustainability there is no single prescription. Sustainable practices will vary by cropping system, local environment and socio-economic system. Still, experience tells us that locally sustainable systems tend to be more resource conservative than less sustainable system and tend to rely less on external inputs and more on internal ecosystem services.

Section 2: Policies for Sustainable Agriculture and Organic Farming in India
The Indian government’s policies have always emphasized food grain self-sufficiency, which has not necessarily coincided with agricultural sustainability. The growth of agricultural production and productivity, which had risen significantly during 1970s and 1980s, declined during 1990s. These slowdowns have worsened since 2000, both overall agricultural production and food grains production have shown negative growth rates in 2000-01 to 2002-03 period. Decline in the growth rates of agricultural production and productivity is a serious issue considering the questions of food security, livelihood, and environment. As such, a critical examination of the approaches for sustainable agricultural development is necessary. This examination must be framed not only by India’s ongoing need to ensure food self-sufficiency but also by the consequences of access to international markets.
Sustainable Agriculture – Possible Actions in India

- Improvement of existing production systems (e.g. altered crop rotations, introduction of green manuring, use of plant species adapted to specific locations)
- Improved protection of natural resources (e.g. erosion protection)
- Increase in efficiency of existing resources (e.g. irrigation, use of technology, basic and advanced training)
- Introduction of regenerative branches of business (e.g. horticulture or aquaculture)
- Introduction of a new production element in existing enterprises (such as fruit trees to stabilize terraced fields, fish-farming in rice fields)
- Optimization of post-harvest systems (e.g. storage)
- Increase the value of agricultural products through further processing (e.g. production of yoghurt from milk)
- Improvement of channels of distribution (e.g. market access, transport)
- Access to loans and other financial services
- Covering risk (e.g. through land law, support of producer groups)

III. CONCLUSION

Under the changing agricultural scenario, the agricultural technologies needs a shift from production oriented to profit oriented sustainable farming. In this direction, the pace of adoption of resource conserving technologies (RCTs) by the Indian farmers is satisfactory to a larger extent but, under the present scenario, we are in the half way of conservation agriculture. The CA systems will leads to sustainable farming and will be the most thrust of the future 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. They now see the potential and importance of these practices not only for their direct economic interest but also as the basis of further intensification and ecological sustainability. This does not mean that agrochemicals can be abandoned. Also, research has an important role to play. Bankers and funders should think of how best to provide incentives and credits, accessible to poor farmers and women, to make investment in dry land farming possible. As conditions for farming will continue to change, the key to sustainable agriculture is the capacity of farmers and all other actors in agricultural development, as well as the wider society, to learn, experiment, adapt and cooperate in an effective way. To conclude, a small farm management to improve productivity, profitability and sustainability of the farming system will go a long way to ensure the all round sustainability.

REFERENCES:


AAFC (2003), Sustainable Development Strategy Sustainable Agriculture: Our Path Forward, Departmental Publication Services, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada.


AAFC (2003), Sustainable Development Strategy Sustainable Agriculture: Our Path Forward, Departmental Publication Services, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada.

