Sustainability Concerns in Agriculture

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What is Sustainability in Agriculture? (1/2)

- '**Sustainability**' **was** first **used** in 1972 in the context of man's future. In agriculture context, 'sustainability' has become a more familiar term Since 1994
- The goal of achieving a sustainable planet, one that will accommodate the basic needs of its present inhabitants while preserving the resources that will enable future generations to flourish, has gained increasing acceptance

What is Sustainability in Agriculture? (2/2)

- Successful management of resources for agriculture to satisfy the changing human needs, while maintaining or enhancing the quality of environment

- Also includes safeguarding the health and welfare of farmers and conserving renewable natural resources

Why is it important?(1/3)

- It accelerates the productivity, efficiency and employment, and reduce the practices which adversely affect quality of soil, water resources and other natural resources
- Natural resources need to be managed in a holistic manner as there are direct linkages among the various components
- Given that India is going to be most populous nation on this planet by 2027; demand for food, feed, fiber is going to accelerate rapidly with rising per capita income, both land and water are going to be under tremendous pressure

Why is it important?(2/3)

- It is increasingly realized that water is going to be a bigger constraint in Indian agriculture than even land
- Despite about 83 per cent of supplies of water towards agriculture, more than half (52%) of Indian agriculture is still rainfed, resulting in underachievement of potential productivity and profitability
- This situation emerges primarily due to highly skewed distribution of irrigation water amongst crops
- This skewed water allocation and inefficient irrigation practices like flood irrigation are raising flags regarding sustainability of water use in Indian agriculture

Why is it important?(3/3)

- Production of sufficient human food, feed, fiber, and fuel to meet the needs of a sharply rising population
- Protection of the environment and expansion of the natural resources supply
- Sustainment of the economic viability of agriculture systems

Climate Change & its Impact

- Gained significant international attention over the past few decades due to concerns of deleterious long-term impacts on agriculture, water supply and human welfare
- It can impact agriculture in various ways. For example:
  - Soil getting drier, reduced productivity
  - reduced supply of water for Irrigation,
  - Increased ranges and populations of **Pests**
  - Increased diseases and heat stress on **Livestock**

Strategies for sustainability

- Conservation Agriculture and Residue Management
- Integrated Farming System (IFS)
- Watershed Management
- Good Agricultural Practices
- Rainfed agriculture

Conservation Agriculture and Residue Management (1/2)

- Advocated as an alternative to the conventional production system
- Has been adopted by the Food and Agriculture Organization (FAO) of the United Nations as a lead model for improving sustainability
- The primary focus of developing and promoting CA (Conservation Agriculture) practices in India has been the development and adoption of zero tillage cum fertilizer drill for sowing crops

Conservation Agriculture and Residue Management (2/2)

- Concerns about burning of crop residues and its increasing costs of management, declining water tables and increasing environmental problems are the major factors forcing a look at alternative technologies
- Development and promotion of appropriate farm machinery are needed to facilitate collection, volume reduction, transportation and application of crop residues, and sowing of the succeeding crop

Benefits of Conservation Agriculture

- Economic benefits that improve production efficiency
- Agronomic benefits that improve soil productivity
- Environmental and social benefits that protect the soil and make agriculture more sustainable

Integrated Farming System (IFS) (1/2)

- Positive interaction of two or more components of different nature such as crops, livestock, fishery, trees within the farm to enhance profitability in a sustainable and environmentally friendly way
- A judicious mix of two or more of these farm enterprises with advanced agronomic management tools may compliment the farm income together with help in recycling the farm residues
- The selection of enterprises must be based on the cardinal principles of minimizing the competition and maximizing the complementarity between the enterprises

Integrated Farming System (IFS) (2/2)

- IFS is a practical way forward for agriculture that will benefit the society, not just those who practise it
- It is a dynamic concept which must have the flexibility to be relevant on any farm, in any country, and it must be receptive to change and technological advances
- IFS is an entire complex of development, management and allocation of resources as well as decisions and activities, within an operational farm unit, or combinations of units

Watershed Management

- Study of the relevant characteristics of a watershed aimed at the sustainable distribution of its resources
- The purpose is to sustain and enhance watershed functions that affect the plant, animal, and human communities within the watershed boundary.
- It helps creating jobs and incomes for the welfare of the watershed community

Good Agricultural Practices (GAP) (1/2)

- The Food and Agricultural Organization (FAO) of the United Nations uses Good Agricultural Practice (GAP) as a collection of principles to apply for on-farm production and post-production processes

- Purpose is to guide the production systems towards a sustainable agriculture and ecologically safe, obtain harmless products of higher quality, contribute to food security generating income through the access to markets and improve working conditions of producers and their families

Good Agricultural Practices (GAP) (2/2)

- The concept of GAPs has evolved in recent years in the context of a rapidly changing and globalizing food economy
- A broadly accepted approach using GAP principles, generic indicators and practices will help guide national policies, actions and preparation of strategies
- This will ensure that all stakeholders benefit from the application of GAP in the food chain
- Growers who adopt good agricultural practices can go through a voluntary auditing process to verify that they follow the standards. Successful completion of an audit results in GAP-certification for the grower

Pillars of GAP

- Environmental sustainability
- Economic viability
- Social acceptability
- Food safety & quality

Key elements of GAP

- Prevention of problems before they occur
- Risk assessment
- Commitment to food safety at all levels
- Communication through the production chain
- Mandatory employee education program at the operational level
- Field and equipment sanitation
- Integrated pest management
- Oversight and enforcement

Rainfed agriculture (1/2)

- Important for the country's economy and food security since it contributes to about 40 per cent of the total foodgrains production, supports two-thirds of livestock and 40 per cent of human population
- The state of rainfed agriculture is precarious and the problems associated with it are multifarious such as scarcity of water, low cropping intensity, high cost of cultivation, poor adoption of modern technology, uncertainty in output

Rainfed agriculture (2/2)

- Solar panels may be set up on farmers' field as a third crop. The "Solar crop" can additionally act as a source of income insurance to farmers. The Solar Pump Irrigators' Cooperative Enterprise (SPICE) in Gujarat, just as an example, is worthwhile model that can be followed and scaled up
- A holistic development including rainfed agriculture is warranted for improving sustainability. A site specific Real Time Contingency Planning (RTCP) needs to be developed to ensure better performance of crops during seasonal drought and extreme events

Way forward (1/3)

- Sustainable agriculture is critical in ensuring viability and consistent growth in both farm production and income. For this, a holistic approach is required
- The implementation of Good Agricultural Practices would contribute to Sustainable Agriculture and Rural Development (SARD), will help creating new market opportunities for farmers and exporters in developing countries

Way forward (2/3)

- The challenges emerging from climate change, hint towards greater frequency, intensity and duration of droughts, floods, heatwaves, and hailstorms
- Therefore, India must focus not only on augmenting its utilizable water resources but more importantly on using scarce water resources more efficiently
- The first and foremost thing in that direction is to measure and monitor water-productivity of agriculture

Way forward (3/3)

- The inequity in irrigation water allocation among crops, with more than 60 per cent of it being utilised for cultivation of two water guzzler crops – sugarcane and paddy, add to distress in agriculture water use.
- Competing demands of water from rapid urbanization and industrialization cannot be met unless agriculture makes a paradigm shift in water use
- A production system can be considered as truly sustainable, only when it balances the economic interests with the ecological demands

Quiz

1. **Which of the following could be** Strategy(ies) for sustainability of agriculture?
   (a) Conservation Agriculture and Residue Management,
   (b) Integrated Farming System (IFS), (c) Good Agricultural Practices (d) All of these

2. **Which of the following is not a goal of Sustainability Development?**

   a) Successful management of resources for agriculture to satisfy the changing human needs

   b) maintaining or enhancing the quality of environment

   c) safeguarding the health and welfare of farmers and conserving renewable natural resources

   d) All of the above are true

3. **Which organization uses Good Agricultural Practice (GAP) as a collection of principles to apply for on-farm production and post-production processes?**

   a) FAO b) WHO c) UNESCO d) UNICEF

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Thank you