

Cropping Systems in Bangladesh

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Concept

Cropping system is the order in which crops are cultivated on a piece of land over a fixed period of time. It represents cropping pattern used on a farm and their interaction with other farm enterprises and available technology which determine their makeup.

Factors influencing choice of cropping system

The choice of a cropping system is influenced by multiple factors, often varying based on geographical, socio-economic, and environmental contexts. Below are some key factors that affect the choice of cropping systems:

1. Climatic Factors

Temperature: Determines the types of crops that can be grown (e.g., tropical, temperate).

Rainfall: Dictates water availability, influencing irrigation needs and suitability for rainfed or irrigated cropping systems.

Sunlight: Impacts photosynthesis and growth rates of different crops, affecting crop choice and season.

2. Soil Characteristics

Soil Type and Texture: Different crops thrive in different soil textures (e.g., sandy, loamy, clay).

Soil Fertility: Nutrient availability impacts the selection of high-nutrient-demanding crops.

Soil pH: Influences nutrient uptake and crop choice, as some crops prefer acidic or alkaline soils.

Soil Drainage: Well-drained soils are suitable for most crops, while poorly drained soils may limit options.

3. Water Availability and Irrigation Facilities

Irrigation Infrastructure: Availability of irrigation determines whether the system can support high-water-demanding crops or rely on rainfed crops.

Water Quality: Salinity or contamination can limit crop selection.

4. Economic Factors



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Market Demand: Farmers choose crops based on market trends, profitability, and demand for specific crops.

Input Costs: The cost of seeds, fertilizers, pesticides, and labor can influence crop choice and system (e.g., low-input vs. high-input systems).

Government Policies and Subsidies: Subsidies, support prices, and incentives for certain crops can drive the choice.

5. Technological Factors

Availability of Improved Varieties: Access to high-yield, drought-resistant, or pest-resistant varieties can influence crop choices.

Farming Techniques and Mechanization: Level of mechanization and access to modern farming technologies (e.g., precision farming) impact the feasibility of certain systems.

6. Pest and Disease Pressure

Historical Outbreaks: Areas with a history of specific pests or diseases may avoid susceptible crops.

Integrated Pest Management (IPM): Availability of IPM strategies may allow for more diverse crop choices.

7. Farmer's Knowledge and Experience

Traditional Practices: Historical knowledge and preference for certain crops play a role.

Access to Extension Services: Information and guidance from agricultural extension services can impact choices.

8. Sustainability Considerations

Soil Health: Long-term impact on soil fertility and structure influences sustainable cropping choices (e.g., crop rotation, intercropping).

Environmental Impact: Concerns about biodiversity, carbon footprint, and ecological balance may promote more sustainable systems like agroforestry or organic farming.

9. Socio-cultural Factors

Food Habits: Local dietary preferences and cultural importance of certain crops influence cropping choices.

Community Practices: Peer influence and cooperative farming approaches may lead to uniform cropping practices in certain areas.

10. Risk Management and Adaptation to Climate Change



Diversification Needs: Farmers may adopt mixed cropping or intercropping systems to spread risks from market price fluctuations or crop failures.

Adaptation to Climate Change: Climate-resilient systems, like conservation agriculture, are becoming more popular in areas prone to extreme weather events.

11. Landholding Size and Land Tenure

Small vs. Large Landholdings: Smaller farms may opt for intensive systems, while larger farms may favor extensive systems or monoculture.

Land Ownership: Tenant farmers may have less flexibility in choosing long-term sustainable practices compared to landowners.

These factors collectively shape the choice of cropping systems, whether it be monocropping, crop rotation, intercropping, agroforestry, or conservation agriculture. Farmers often weigh these factors to balance productivity, profitability, and sustainability.

Cropping system in Bangladesh

The cropping system in Bangladesh is diverse and influenced by the country's climatic conditions, agroecological zones, soil types, and socio-economic factors. The cropping systems are designed to maximize the use of land, water, and resources in a densely populated country with limited arable land.

The country is divided into 30 agroecological zones, each with unique characteristics influencing cropping patterns.

Major Cropping Systems in Bangladesh

The cropping systems in Bangladesh can be broadly categorized into rice-based, non-rice-based, and mixed systems.

A. Rice-based cropping system

Rice is the dominant crop in Bangladesh, occupying about 75% of the total cropped area. The rice-based systems include:

- **Boro-Fallow-T. Aman:** Boro rice (irrigated) grown in the Rabi season, followed by T. Aman (transplanted Aman rice) in the Kharif season. This is one of the most common systems in irrigated lowlands.
- **Aus-T. Aman-Fallow:** Aus rice (early rice variety) in the pre-Kharif season, followed by T. Aman rice in the Kharif season, with a fallow period in the Rabi season.
- **Fallow-Boro-Fallow:** Boro rice grown in the dry Rabi season in areas with irrigation facilities, leaving the land fallow during the Kharif season.

B. Non-rice-based cropping system

In regions where rice cultivation is less dominant, farmers grow other crops like:



- **Wheat-Mungbean-Fallow:** Common in the northwest region, where the climate is suitable for wheat in the Rabi season and mungbean in the pre-Kharif season.
- **Maize-Mungbean-T. Aman:** Increasingly popular in areas with sandy loam soil, particularly in the northwestern districts.
- **Sugarcane-based System:** Sugarcane is grown as a main crop for an extended period, often intercropped with pulses or vegetables.

C. Mixed cropping and intercropping systems

- **Jute-Rice-Fallow:** Jute grown in the Kharif season followed by T. Aman rice, common in the central and southern regions.
- **Mustard-Boro-Rice:** Mustard grown in the Rabi season as an oilseed crop, followed by Boro rice, especially in areas with irrigation facilities.
- **Vegetable-Based Systems:** High-value vegetables like tomatoes, eggplants, and chillies are grown intensively in peri-urban areas.

Emerging cropping systems

With changing climatic conditions and the need for sustainable practices, newer systems are emerging:

- **Maize-Rice System:** Adoption of hybrid maize as a cash crop, followed by rice, driven by increasing demand for maize in the poultry feed industry.
- **Relay Cropping:** Introducing short-duration crops like mungbean or lentils into standing rice fields before harvest to maximize land use.
- **Agroforestry Systems:** Integration of fruit trees (e.g., mango, jackfruit) with seasonal crops to increase resilience and diversify income sources.

Regional variations in cropping systems

- **Northwest (Barind Tract):** Wheat, maize, lentils, and vegetables are dominant due to less irrigation and lower rainfall.
- **Coastal Areas:** Saline-tolerant crops like saline rice varieties (BRRI dhan67) and vegetables like watermelon.
- **Hill Tracts:** Slash-and-burn (Jhum) agriculture with mixed cropping of maize, ginger, and turmeric.
- **Floodplain Areas:** Deepwater rice (floating rice varieties) in flood-prone regions.

Challenges in the cropping system of Bangladesh

- **Climate Change:** Erratic rainfall, floods, and droughts affect traditional cropping patterns.
- **Soil Degradation:** Intensive farming practices lead to soil nutrient depletion and erosion.
- **Water Scarcity:** Over-dependence on irrigation (especially for Boro rice) depletes groundwater resources.
- **Pest and Disease Pressure:** Monocropping, especially of rice, increases vulnerability to pests and diseases.



Sustainable practices and future trends

- **Crop Diversification:** Promoting non-rice crops to reduce pressure on water resources and enhance food security.
- **Conservation Agriculture:** Adopting practices like minimum tillage, cover cropping, and crop rotation.
- **Integrated Farming Systems:** Combining crop production with livestock, aquaculture, and agroforestry for resilience and resource optimization.

The cropping system of Bangladesh is dynamic, adapting continuously to socio-economic demands, environmental changes, and technological advancements.

