Cropping Systems in India

February 15, 2021

The agriculture and allied sector continues to be pivotal to the sustainable growth and development of the Indian economy. Not only does it meet the food and nutritional requirements of 1.3 billion Indians, it contributes significantly to production, employment and demand generation through various backward and forward linkages. Moreover, the role of the agricultural sector in alleviating poverty and in ensuring the sustainable development of the economy is well established.

In news: Agriculture and its management in India
Placing it in syllabus: Agriculture
Dimensions

- Types of Cropping Systems
- Land Use Statistics
- Rainfed Agriculture
- Watershed Management

Content:

Types of Cropping Systems

- The term cropping system refers to the crops, crop sequences and management techniques used on a particular agricultural field over a period of years.
- It includes all spatial and temporal aspects of managing an agricultural system.
- The Indian agriculture is decided by the soil types and climatic parameters which determine overall agro-ecological setting for nourishment and appropriateness of a crop or set of crops for cultivation.
- There are three distinct crop seasons in India, namely Kharif, Rabi and Zaid.
- The Kharif season started with Southwest Monsoon under

which the cultivation of tropical crops such as rice, cotton, jute, jowar, bajra and tur are cultivated.

- The Rabi season starts with the onset of winter in October-November and ends in March-April.
- Zaid is a short duration summer cropping season beginning after harvesting of Rabi crops.

Type of Cropping Systems are as follows:

Monocropping

- Monocropping is the agricultural practice of growing a single crop year after year on the same land.
- Rice,Maize, soybeans, and wheat are common crops often grown using monocropping techniques.
- Monocropping allows for farmers to have consistent crops throughout their entire farm. They can plant only the most profitable crop on their entire farm, which **may increase overall farm profitability**.
- It allows a farmer to specialize in a particular crop, which means that he or she can **invest in machinery designed specifically for that crop** to generate a large volume of the crop at harvest.
- It **severely depletes the soil**, as the plant will strip the soil of the nutrients it needs.
- This forces farmers to use fertilizers, which can disturb the natural balance of the soil and contribute to a **host of environmental problems, from pollution to desertification.**
- The practice can also **contribute to the proliferation of crop pests and diseases**, which can be a serious liability when a farmer’s land is planted exclusively with one crop.
- Monocropping also generally **reduces crop diversity.**
- If a crop does become subject to a particular pest or disease, it becomes especially vulnerable. In a world where only a few strains of corn are grown, for example, if a pest develops to attack one, it could devastate

global crops, and farmers might not have another strain to fall back upon.

- Additionally, the practice is **very dangerous when natural disasters or shifting weather devastate a crop**. Farmers may find themselves heavily in debt at the end of the season, and the lack of harvest could translate into famine or general hardship.

Intercropping

- Intercropping is a farming method that involves **growing two or more crops** together **at the same time and on the same piece of land.**
- There are at least four types of intercropping according to spatial arrangement
    - **ROW INTERCROPPING** is the growing of two or more crops at the same time with at least one crop planted in rows. In farms grown to perennial crops, annual crops like corn, rice and pineapple are commonly grown as intercrop between the rows of the main crop.
    - **STRIP INTERCROPPING** is the growing of two or more crops together in strips wide enough to allow separate production of crops using mechanical implements, but close enough for the crops to interact.
    - **MIXED INTERCROPPING OR MIXED CROPPING** is the growing of two or more crops at the same time with no distinct row arrangement.
    - **RELAY INTERCROPPING OR RELAY CROPPING** is a system in which a second crop is planted into an existing crop when it has flowered (reproductive stage) but before harvesting. There is thus a minimum temporal overlap of two or more crops.
- It helps to suppress weeds since the crops take up much space that would have allowed the weeds to grow. Some weeds also find it difficult to grow alongside some

crops

- Growing two crops alongside each other can be of great benefit, especially if their interactions increase the fitness of one or both plants. For instance, plants that are likely to tip over in wind may gain structural support from their companions. Some plants may also provide shade to the light-sensitive plants.
- Pests can be controlled through intercropping by trap cropping, repellant intercropping, or push-pull cropping.
- A possible problem is that the intercrop may compete with the main crop for light, water and nutrients. This may reduce the yields of both crops.

Sequential cropping

- This involves growing two crops in the same field, one after the other in the same year.
- In some places, the rainy season is long enough to grow two crops: either two main crops, or one main crop followed by a cover crop.
- Growing two crops may also be possible if there are two rainy seasons, or if there is enough moisture left in the soil to grow a second crop. If the crops are different, this is a crop rotation.

Crop rotation:

- This means changing the type of crops grown in the field each season or each year (or changing from crops to fallow).
- Crop rotation is a key principle of conservation agriculture because it improves the soil structure and fertility, and because it helps control weeds, pests and diseases.
- Crop rotation is one of the oldest and most effective cultural control strategies. It means the planned order of specific crops planted on the same field.

- It also means that the succeeding crop belongs to a different family than the previous one. The planned rotation may vary from 2 or 3 year or longer period.

Alley Cropping System

- Alley cropping system is the cultivation of food, forage, or specialty crops **between rows of trees**.
- This system is a larger version of intercropping or companion planting conducted over a longer time scale.
- In the Alley cropping system, rows of trees are planted at wide spacing with a companion crop grown in the Alleyways between the rows.
- Alley cropping improves farm income, crop production, and protects crops.
- It allows the farmer to effectively use available resources and yield more benefits.
- One main disadvantage of the Alley cropping system is that additional labour is required to prune the trees.

Land use statistics

- The agriculture sector employs nearly half of the workforce in the country. However, it contributes to 17.5% of the GDP at current prices
- Over the past few decades, the manufacturing and services sectors have increasingly contributed to the growth of the economy, while the agriculture sector's contribution has decreased from more than 50% of GDP in the 1950s to 15.4% (at constant prices)
- As per the latest available land use statistics (2012-13), out of the total land mass of 328.73 million hectares in India.

The statistics about land use in India are as follows:

- Forest area: 70 mha (21.30 per cent)
- Non-agricultural uses: 26.5 mha (8.05 per cent)
- Barren & uncultivable: 17.3 mha (5.26 per cent)

- Permanent pastures:10.2 mha (3.12 per cent)
- Agricultural land: 181.95 mha (55.3 per cent)
    - Net Sown Area: 139.9 mha (42.57 per cent)
    - Miscellaneous tree crops: 3.2 mha (0.96 per cent)
    - Culturable waste:12.6 mha (3.83 per cent)
    - Fallow land: 26.3 mha (8 per cent)

- Over the years, there has been a gradual increase in the area of land under non-agricultural uses. During the period 2001-02 to 2012-13, the area under non-agricultural uses has increased by 2.60 million hectares (11 per cent).
- During the same period, cultivable land has marginally declined by 1.60 million hectares (0.9 per cent) and net sown area has stagnated at about 140 million hectares.
- As a normal process of urbanization and development, while the area under non-agricultural uses is increasing, agricultural land is decreasing at a slow rate due to various measures taken by the government to bring degraded/culturable wasteland under cultivation.
- The net sown area increased significantly, i.e., by about 18 per cent, from 119 million hectares in 1950- 51 to 140 million hectares in 2012-13,
- the cropping intensity increased from 111 per cent to 139 per cent during between 1950 and 2013

Irrigation

- Water is the most critical resource for agriculture, gaining primacy even over soil.
- India has only about 4 per cent of the world’s freshwater resources.
- Thus, large tracts of land are dependent on seasonal rainfall for crop cultivation, which
- hampers productivity and the adoption of high yielding varieties and other inputs.
- Yields in rainfed areas remain low, and this low yield underscores the importance of irrigation in the country

- As per the Report of the Task Force on Irrigation (2009) constituted by the then Planning Commission, for a gross irrigated area of about 91 mha and Net irrigated area is sound 66 mha.

Forest Area :

- This includes all land classified either as forest under any legal enactment, or administered as forest, whether State-owned or private, and whether wooded or maintained as potential forest land.
- The area of crops raised in the forest and grazing lands or areas open for grazing within the forests remain included under the “forest area”.

Area under Non-agricultural Uses :

- This includes all land occupied by buildings, roads and railways or under water, e.g. rivers and canals, and other land put to uses other than agriculture.

Barren and Unculturable Land :

- This includes all land covered by mountains, deserts, etc.
- Land which cannot be brought under cultivation except at an exorbitant cost is classified as unculturable whether such land is in isolated blocks or within cultivated holdings.

Permanent Pasture and other Grazing Land:

- This includes all grazing land whether it is permanent pasture and meadows or not.
- Village common grazing land is included under this heading.

Land under Miscellaneous Tree Crops, etc. :

- This includes all cultivable land which is not included

in ‘Net area sown’ but is put to some agricultural uses.
- Land under casuring trees, thatching grasses, bamboo bushes and other groves for fuel, etc. which are not included under ‘Orchards’ are classified under this category.

Culturable Waste Land:

- This includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other .
- Such land may be either fallow or covered with shrubs and jungles which are not put to any use.
- They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings.

Fallow Lands other than Current Fallows :

- This includes all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years.

Current Fallows:

- This represents the cropped area which is kept fallow during the current year.

Net Area Sown:

- This represents the total area sown with crops and orchards. Areas sown more than once in the same year are counted only once.

Total Cropped Area:

- This represents the total area sown once and/or more

than once in a particular year, i.e. the area is counted as many times as there are sowings in a year.
- This total area is known as gross cropped area.

Rainfed Agriculture

- Rainfed agriculture is a type of farming that relies on rainfall for water.
- About 56 % of the total cultivated area in India falls under rainfed agriculture.
- Rainfed agriculture contributes to 40 % of India's food production.
- It accounts for much of the national area under coarse cereals (85%), pulses (83%), oilseeds (70%) andcotton (65%); and holds 60 % of the total livestock populations.
- A major concern about the rainfed agriculture in India is the low level of productivity, in fact one among the lowest in dry and rainfed regions in the world.
- While irrigated crops have registered an improvement in yield and total productivity since the 1960s, those of rainfed crops or dry farming have stagnated.

Watershed Management:

- Watershed management aims to care for natural resources in a way that supports human needs for water, food, fiber, energy, and habitation
- A watershed is an area of land and water bounded by a drainage divide within which the surface runoff collects and flows out of the watershed through a single outlet into a larger river or lake.
- Watershed technology is used in Rainfed areas.

National Watershed Project for Rain fed Areas – NWDPRA

- To alleviate the troubles of farmers in the rainfed areas, Indian government has extended support through

the National Watershed Development Project for Rain fed Areas or the NWDPRA.

- Launched in 1990-91, NWDPRA was based on the two essential pillars – integrated watershed management and sustainable farming systems

Some of the activities undertaken by the project are:

- Treatment of land for soil fertility and moisture retention. Certain activities are also aimed at biomass production like afforestation, horticulture, and pasture management.
- Treatment of arable lands for enhanced in-situ soil and conserving moisture to increase the production of crops through efficient cost-effective, sustainable, and reliable cropping strategies with the use of minimum resources.
- Development of aquatic resources and improving the recharging process of underground aquifers.
- Improving the social status and the standard of living of watershed reliant farmers.
- To increase the average income of the farmers small and marginal through increased employment

Mould your thought: Distinguish between Alley Cropping and intercropping. What are their advantages over monocropping systems?

Approach to the answer:

- Introduction
- Mention the difference between Alley Cropping and intercropping
- Discuss their advantages
- Conclusion