	Kharif crops	Rabi crops	Zaid crops
Time	Also known as Monsoon crops, they are sown when the rainy season begins (April-May). Harvesting is done in September-October.	Also known as winter crops, they are sown when their winter season ends (September-October). Harvesting is done in June-July.	These are summer season crops. They are grown in the short duration between Rabi and Kharif crop season (March to June).
Condition	Require wet and hot conditions to grow	Require cold and relatively dry conditions to grow	Mostly sown in Gangetic belts of the region.
Examples	Rice(Paddy), Maize, Groundnut, cotton, Soybean, Pigeon Pea(arhar), Mung bean, Red chillies, Sugarcane, Turmeric, Millets like Ragi, Jowar, Bajra	Wheat, Chickpea, mustard, linseed, oats, barley, Sesame, Peas, Sunflower, Coriander, Onion, Potato, Tomato, alfalfa, cumin, mustard, fenugreek, fennel	Cucumber, watermelon, Muskmelon, bitter gourd, pumpkin, ridged gourd

Major food crops:

Food Grains	Producing States	Soil Type	Temperature	Rainfall
Rice	West Bengal, Uttar Pradesh, Tamil Nadu, Andhra Pradesh, Haryana, Punjab, Orissa, Chhattisgarh, and Assam	Deep clayey and loamy soil	22 -32 degree Celsius	150-300 cm
Wheat	Uttar Pradesh, Punjab, West Bengal, Haryana, Uttarakhand, Madhya Pradesh, Rajasthan, Maharashtra, and Gujarat	Well-drained fertile loamy and clayey loamy	10-15 degree Celsius (Sowing time) 21-26 degree Celsius (Ripening & Harvesting)	75-100 cm
Millets	Grown in 21 states but the major impetus is in Andhra Pradesh, Karnataka,Tamil Nadu, Kerala, Telangana, Uttarakhand, Jharkhand, Madhya Pradesh and Haryana	They are less sensitive to soil deficiencies. They can be grown in an inferior alluvial or loamy soil	27-32 degree Celsius	50-100 cm
Grams	Madhya Pradesh and Tamil Nadu	Loamy Soil	20-25 degree Celsius (Mild cool & Dry Climate)	40-45 cm
Sugar Cane	Andhra Pradesh, Gujarat, and Punjab, Uttar Pradesh, Tamil Nadu, Haryana, Maharashtra, Uttarakhand, Bihar, Karnataka	Deep rich loamy soil	21-27 degree Celsius	75-150 cm

Cotton	Andhra Pradesh, Odisha, Haryana, Madhya Pradesh, Karnataka, and Punjab, Maharashtra, Gujarat, Tamil Nadu		Black soil of Deccan and Malwa Plateau. Cotton also grows well red and laterite soils of the peninsular region and in alluvial soils of the Sutlej-Ganga plain.	21-30 degree Celsius	50-100 cm
Tea	Assam, Darjeeling (West Bengal), Meghalaya, Kerala, Himachal Pradesh, Tamil Nadu, Karnataka		Well drained, deep friable loamy soil.	20-30 degree Celsius	150-300 cm
Oilseeds	Coconut	Kerala and Tamil Nadu	Well-drained light sandy loams, red, yellow and black soils are well suited for its cultivation.	20-30 degree Celsius	50-75 cm
	Linseed	Madhya Pradesh and Uttar Pradesh			
	Groundnut	Andhra Pradesh, Gujarat and Tamil Nadu			
	Rape & Mustard	Rajasthan and Uttar Pradesh			
	Sesame	Uttar Pradesh and Rajasthan			
	Sunflower	Maharashtra and Karnataka			
Coffee	Assam, Meghalaya, Arunachal Pradesh, Manipur, Nagaland, Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, Telangana, Odisha,		Well drained, deep friable loamy soil.	15-28 degree Celsius	150-250 cm

THE BIOTECH/GM CROPS:

- The Genetically Modified (GM) crops involve the technology, in which DNA (deoxyribonucleic acid) is inserted into the genome of an organism or plant, which gives it a new or different characteristic.
- These newly inserted cells are then grown in tissue culture where they develop into plants.
- With this technology, a specific stretch of DNA into the plant's genome, which gives it a new or different characteristic.

- The DNA becomes part of the GM plant's genome, which the seeds produced by these plant will contain.
- India has the world's fifth-largest cultivated area under Genetically Modified (GM) crops but unlike other big growers, India's entire GM crop area is under a single crop-cotton, incorporating genes from the Bacillus thuringiensis or Bt soil bacterium coding for resistance against Heliothis bollworm insect pests.
- In 2017, farmers across the world planted 189.8 mh under transgenic crops. This is as against 1.7 mh in 1996, the year when they were grown commercially for the first time.

SO, HOW INDIA ACTUALLY PRODUCES ITS CROPS?

The cropping patterns differ from region to region, depending on the land, topography, slope, temperature, amount and reliability of rainfall, soils and availability of water for irrigation. Adding on to these factors, the perception and evaluation of the environment also play an important role in guiding which crop should grow in a certain region. Those areas of the world where physical diversities are less, the cropping patterns are less diversified.

Keeping all the factors in mind, a farmer in India follow the following main types of cropping system:

Mono-Cropping (Monoculture):

In this practice, only one crop is grown on farmland year after year.

In March this year, the Food and Agriculture Organization (FAO) released its report "The State of the World's Biodiversity for Food and Agriculture 2019", which flagged the growing practice of monoculture, cultivation of a single crop at a given area, in food production around the world.

Only 9 plant species account for almost two-thirds of total crop production.

In many parts of the world, biodiverse agricultural landscapes have been, or are being, replaced by large areas of monoculture, farmed using large quantities of external inputs such as pesticides, mineral fertilizers and fossil fuels.

Multiple-Cropping:

Under this practice, farmers grow two or more crops in their farms in one year with intensive input management practices.

This practice includes:

Inter-cropping: In inter-cropping, farmers grow two or more crops simultaneously on the same field in one year.

Mixed-cropping: This practice involves planting two or more plants simultaneously in the same field, interdigitating the crops so that they grow together.

Sequence farming: It involves growing crops in sequence within a crop year, one crop being sown after the harvest of the other.

Primitive Subsistence Farming:

This type of farming is a 'slash and burn' agriculture, it is practised on small patches of land with the help of primitive tools like hoe, dao and digging sticks, and family/community labour.

It depends upon monsoon, natural fertility of the soil and suitability of other environmental conditions to the crops grown.

In this, farmers clear a patch of land and produce cereals and other food crops to sustain their family.

When the soil fertility decreases, the farmers shift and clear a fresh patch of land for cultivation.

It allows nature to replenish the fertility of the soil through natural processes; land productivity in this type of agriculture is low as the farmer does not use fertilisers or other modern inputs.

Intensive Subsistence Farming:

Intensive Subsistence Farming is practised in areas of high population pressure on land.

In this type, high doses of biochemical inputs and irrigation are used to obtain higher production.

Commercial farming:

In this type of farming, higher doses of modern inputs, e.g. high yielding variety (HYV) seeds, chemical fertilisers, insecticides and pesticides are used to obtain higher productivity.

FACTORS AFFECTING CROPPING PATTERN:

In India, the cropping pattern depends upon various factors such as physical & technical, economical and government policies and actions, as explained below:

Physical & technical factors:

In any region, the cropping pattern depends on physical features such as soil, climate, weather, rainfall and others.

In addition to physical features, the cropping pattern of a region also depends on nature and availability of the inputs such as irrigation, power, technology and others.

Economic factors:

In addition to the physical and technical features, economic factors including fragmentation of operational holdings, labour, land revenue system, mechanization and equipment, transportation facilities and marketing facilities also affect the cropping pattern to a greater extent.

Government Policies:

The policies made by the government plays a very important role in affecting the cropping pattern.

A farmer needs to evaluate the benefits of the government policies, existing scheme to incentivizing the crops, eligibility to avail the benefits.

RECENT INITIATIVE UNDERTAKEN BY GOVERNMENT FOR CROPS:

Price Deficiency Payment (PDP):

Recently the government launched the “Price Deficiency Payment (PDP)” scheme, which has been framed on the lines of Madhya Pradesh (MP) Government’s Bhavantar Bhugtan Yojana for the protection of oilseeds farmers only.

Under the scheme, the government pay to farmers the difference between the MSP and monthly average price of oilseeds quoted in the wholesale market.

Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA):

Procurement by private traders at MSP on a pilot basis

IFFCO iMandi:

IFFCO iMandi is a Social Commerce app for rural India. It has been built for large communities with commerce, content and communication enabled in a simple, seamless and secure manner.

It is a one-stop shop for agricultural inputs and produce, FMCG, electronics, loans, insurance, etc.

CHALLENGES IN AGRICULTURE:

Old methods: In India, agriculture has achieved grain self-sufficiency but the production is, resource-intensive, cereal centric and regionally biased. These insufficiency has raised sustainability issues.

Unsustainable practices: Slow agricultural growth is emerging as a concern for government and policymakers as two-thirds of India's people depend on rural employment for a living. The current adopted agricultural practices are neither economically nor environmentally sustainable.

Problem in storing: Storage is a major problem in India. In states, where MSP procurement is well established, problems in the storage of food grains arise. The procurement from these States exceeds the buffer stock norms, which were fixed in 2015.

Water stress: Currently, desertification and land degradation

pose major threats to agriculture. This increased stress on water resources needs a realignment and rethinking of policies.

Social issues: With time, the social aspects of agriculture are witnessing greater changes. Most importantly, the increased feminization of agriculture, mainly due to the rise of women-headed households, increased rural- urban migration by men and growth in the production of cash crops which are labour intensive in nature.

Others: Other challenges include problems such as small and fragmented land-holdings, low productivity, poor quality seeds, depletion of soil, low productivity, lack of mechanization, absence of sound marketing facilities, inadequate transport and others.

CONCLUSION:

In India, agriculture provides the livelihood to farmers, therefore, farmers first look for the economic viability of a crop within their socio-physical and political environment. Crops contribute to the overall growth of the country's economy but the numbers are not very high. To lift it up, the country needs to take innovative initiatives and to upgrade its plans and policies. Also, the latest agriculture technologies and equipment should be adopted for better output and more educated and right talent should enter to the farming sector.