

Q.1] Define agriculture. Explain in brief scope of agriculture in India and Maharashtra.

→ Agriculture is an art, science and business of crop production and livestock management.

# Scope of agriculture in India and Maharashtra :-

- 1) National Economy
- 2) Total employment
- 3) Industrial inputs.
- 4) Food supply
- 5) Source of food for domestic consumption.
- 6) State Revenue
- 7) Trade

① National economy →

India ranks second world wide in farm output. Agriculture and allied sectors like forestry and fishing accounted for 13.6% of the GDP and employed 48% of its total workforce in 2016.

② Total employment →

Around 54% population is working and depends on agriculture and allied activities. Nearly 60% of the rural population earns its livelihood from agriculture and other occupation allied to agriculture.

③ Industrial inputs →

Most of the industries depend on the raw material produced by agriculture, so agriculture is the principle source of raw

material to the industries. The industries like cotton textile, jute, paper, sugar depends totally on agriculture for the supply of raw material.

④ Food supply →

Total food grain production is estimated at an all time high of 272 million tonnes in 2016-17, 8% higher than the 251.6 million tonnes last year, and surpassing the previous record of 265 million tonnes in 2013-14.

⑤ Source of food for domestic consumption →

Food is essential for life. We depend on agriculture outputs for our food requirements. India produces large quantity of food grains such as millets, cereals, pulses, etc.

⑥ State Revenue →

The agriculture is contributing the revenue by agriculture taxation. Farmers pay Goods and Services Tax (GST) from 1st August 2017 on purchase of various agriculture inputs.

⑦ Trade →

Agriculture plays an important role in foreign trade attracting valuable foreign exchange, necessary for our economic development. The products from agriculture based industries such as jute, cloth, tinned food, etc. contributed to 20% of our export.

Q.2) Enlist classification of crops into different crops and explain the classification of crops based on use [agronomical use].

- ① Classification of crops based on climate.
- ② Classification of crops based on season.
- ③ Classification of crops based on life of crops /duration of crops.
- ④ Classification of crops based on cultural method /water.
- ⑤ Classification of crops based on root system.
- ⑥ Classification of crops based on economic importance.
- ⑦ Classification of crops based on No. of cotyledons.
- ⑧ Classification of crops based on photosynthesis [Reduction of  $O_2$  / Dark reaction]
- ⑨ Classification of crops based on length of photoperiod required for floral initiation.
- ⑩ Classification of crops based on use /agronomic classification.

# Classification of crops based on use /agronomic classification →

① Grain crops →

May be cereals as millets cereals are the cultivated grasses grown for their edible starchy grains. The larger grain used as staple food is cereals Eg → rice, jowar, wheat, maize, barley, and millets are the small grained cereals which are of minor importance as food : eg → Bajara.

② Pulse / legume crop →

seeds of leguminous crops plant used as food. on splitting they produced dal which are of min rich in protein. Eg → green gram, black gram, soyabean, pea, cowpea, etc.

- ③ Oil seeds crops →  
Crop seeds are rich in fatty acids are used to extract vegetable oil to meet various requirements. Eg → groundnut, mustard, sunflower, sesamum, linseed etc.
- ④ Forage crops →  
It refers to vegetative matter fresh as preserved utilized as food for animals. Crops cultivated & used for fodder, hay, silage.  
Ex → sorghum, elephant grass, guinea grass, berseem & other pulse bajra etc.
- ⑤ Fiber crops →  
Grown for field yield. Fiber may be obtained from seed.  
Eg → cotton, jute, Mesta, sun hemp, flax.
- ⑥ Root crops →  
Roots are the economic produce in root crop. Eg → sweet potato, sugar beet, carrot, turnip, etc.
- ⑦ Tuber crops →  
Crop whose edible portion is not a root but a short thickened underground stem. Eg → potato, elephant yam.
- ⑧ Sugar crops →  
The two important crops are sugarcane and sugar beet cultivated for production for sugar. Eg → sugarcane.
- ⑨ Starch crops →  
grown for the production of starch.  
Eg → tapioca, potato, sweet potato.

- ⑩ Drug crop →  
used for preparation for medicines.  
Eg → tobacco, mint, pyrethrum.
- ⑪ Spices & condiments →  
crop plants as their products are used to flavour taste and sometimes colour the fresh preserved food.  
Eg → ginger, garlic, chilli.
- ⑫ Vegetable crops →  
may be leafy or fleshy vegetables.  
Eg → palak, mentha, turmeric.
- ⑬ Green manure crop →  
grown and incorporated into soil to increase fertility of soil.  
Eg → sun hemp.

Q.5) Describe Indus valley civilization.

→ INDUS CIVILIZATION [3250 BC - 2750 BC] - In the year 1992 archaeologist dug up a few places in the Indus valley and carried out excavations at Mohen-jo-dara (meaning a mound of dead) in Sind (in Pakistan) and at Harrapa on the river Ravi in Punjab. They found traces of a very ancient civilization, which flourished more than five thousand years ago. They observed that the people utilized the pots, utensils and ornaments.

These cities were built along the river Indus and hence this civilization is known as Indus valley civilization. It is also

Known as Harappan culture and occupied the areas stretching from Delhi to Gujrat. During this period the people identified the importance of ploughing for the proper sowing of crop soil has to be stirred and seed has to be covered.

Ox-drawn wheel cart was used for transport. The people cultivated wheat, barley, gram, peas, sesamum and jape. They also cultivated cotton and also devised methods of ginning, spinning and weaving.

Animal husbandry was also given more importance during this period. They domesticated Buffalo, cattle, camel, horse, elephant, ass and birds. They utilized them in agriculture and also for transport.

Q.4) Describe the need and importance for studying agricultural heritage.

# Need for studying Agricultural Heritage →

- ① Sustainability is present need future of agriculture.
- ② "Agriculture is way of life and not an occupation"
- ③ To increase awareness among people regarding rich heritage of Indian agriculture which is unique than any other civilization.
- ④ To create a sense of pride amongst the people, particularly agricultural students as our agriculture has sustainable practices for generations.
- ⑤ To build the future research strategies based on traditional technologies used in agriculture.

## # Importance for studying Agricultural Heritage

- ① Agriculture is said to be the best culture and it has lot of inherited sustainable practises passed from one generation to other generation.
- ② Agriculture in India is not an occupation ; it is a way of life for many Indian populations.
- ③ India has made tremendous progress in agriculture and its allied fields , but the emphasis on intensive use of inputs without considering there adverse impact of long term basis has created several problems related to sustainability of agriculture.
- ④ Improper use of chemical , fertilizers , insecticides and exploration of natural resources is threatening the agro - eco systems.
- ⑤ The great epics of ancient India convey the depth of knowledge possessed by the older generations of the farmers of India.
- ⑥ The ecological considerations shown by the traditional farmers in their farming activities are now - a days is reflected in the resurgence of organic agriculture.

Q.S) Define Crop . Give classification of crop on the basis of life cycle.

→ Crop is an organism grown or harvested for obtaining yield.

## # Classification of crop on the basis of life cycle

- ① Seasonal crops →

A crop completes its life cycle in one season - Kharif , rabi , summer.  
eg → jira , jowar , wheat etc.

- ② Two seasonal crops →  
Crops complete its life cycle in two seasons.  
Eg → cotton, turmeric, ginger.
- ③ Annual crops →  
Crops require one full year to complete its life cycle.  
Eg → Sugarcane
- ④ Biennial crops →  
which grows in one year and flowers, fructifise & perishes the next year.  
Eg → Banana, Papaya
- ⑤ Perennial crops →  
Crops live for several years.  
Eg → fruit crops, mango, guava, etc.

Q.6] Write information regarding ancient agricultural practises with the help of tools and implements.

→ Ancient literature of the subcontinent did not miss out on farm implements. Vedas describe a simple bullock drawn wooden plough, both light and heavy with an iron bar attached as a plough share to open the soil.

Krishi Parashara gives details of the design of the plough with Sanskrit names for different parts.

Even today the resource poor farmers use a similar bullock drawn plough. A bamboo stick of a specific size was used to measure land.

Vedic literature and Krishi Parashara also mention disc plough, seed drill, blade harrow (Bakhar), wooden spike, root harrow, planters where people domesticated camel lids and guinea pigs 2,000 years before crop cultivation.

Agriculture would have been started with the end of the last Ice Age between 15,000 and 8000 years ago.

Before this, people living the hunter-gatherer lifestyle depended upon what was available.

Q.7) Write in detail beginning of agriculture in India in the form of archaeological and historical facts.

→ Sauer the American biographer in his hypothesis about the origin and development of agriculture, propounded that :

- 1) Agriculture did not originate in communities desparately in short supply of food, but among communities where there was sufficiency of food resulting into relative freedom from want and need.
- 2) The hearths of domestication are to be sought in regions of marked diversity of plants and animals.
- 3) The primitive agriculture did not origin in the larger river valleys, subject to the lengthy floods and requiring protective dams, drainage or irrigation, but in moist hills land.
- 4) The agriculture began in forested lands, which had soft easy to dig.
- 5) The pioneers of agriculture had previously required special skills but the hunters would be least inclined towards the domestication

of plants.

⑥ The founders of agriculture were sedentary folks, because growing of crops requires constant attention and supervision and unless guarded properly, the crop will be lost.

Q.8) Write status of agricultural during vedic civilization.

→ Vedic Aryans were accustomed to cows, horses, Buffalo was a new animal which they called gauvī or govala which appears to be an extensic agent of the word gau [cow]. Indus valley is the land of seven rivers was called 'Saptasindhavah'. The seven rivers included the five rivers of the Punjab [meaning land of five rivers] viz, the Sutudri [Sutlej], the Vipas [Beas] the Paurushini [Ravi] and the Askini [Chenab] and the remaining two included the Indus and Saraswathi. Aryans began to move in search of water when the river Saraswati dried up.

It was king Bhadrivath whose efforts brought the Ganga into the plains of India and storage cultures in the Indo-Gangetic plains developed. The Aryans have been identified as nomads they always moved in search of pasture lands for their animals.

On management of cows, grazing in forests seems to have been common practise. Cows are permitted to graze in bailey fields and cattle owners apparently knew the benefits of providing clean safe water from ponds.

q.9) Define crop voyage in India and world.

→ "A journey of crops from one place to another by land is known as crop voyage."

### # Crop voyage : India

I] Indian center Crops → This area has two sub centers.

A] Main center [Hindustan] → Includes Assam and Burma, but not Northwest India, Punjab, nor Northwest Frontier Provinces.

#### Cereals and Legumes

1. Rice, *Oryza sativa*.
2. Chickpea or gram, *Cicer arietinum*.
3. Pigeon pea, *Cajanus indicus*.
4. Urd bean, *Phaseolus mungo*
5. Mung bean, *Phaseolus aureus*.
6. Rice bean, *Phaseolus calcaratus*
7. Cowpea, *Vigna sinensis*.

#### Vegetables and Tuber

- 1) Brinjal, *Solanum melongena*
- 2) Cucumber, *Cucumis sativus*
- 3) Radish, *Raphanus caudatus*
- 4) Taro, *Colocasia antiquorum*
- 5) Yam, *Dioscorea alata*

#### Fruits

- 1) Mango, *Mangifera indica*
- 2) Orange, *Citrus sinensis*

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- 3) Tangerine, *Citrus nobilis*.
- 4) Citron, *Citrus medica*
- 5) Tamarind, *Tamarindus indica*.

### Sugar, Oil and Fiber plants

- 1) Sugarcane, *Saccharum officinale*
- 2) Coconut, *Cocos nucifera*
- 3) Sesame, *Sesamum indicum*
- 4) Safflower, *Carthamus tinctorius*
- 5) Cotton, *Gossypium arboreum*
- 6) Jute, *Carrichtera capsularis*
- 7) Goktalaia, *Goktalaia juncea*.

### Spices, stimulants, Dyes and Miscellaneous

- 1) Hemp, *Cannabis indica*
- 2) Black pepper, *Piper nigrum*
- 3) Babul, *Acacia caudata*
- 4) Sandalwood, *Santalum album*
- 5) Indigo, *Indigofera tinctoria*
- 6) Cinnamon tree, *Cinnamomum zeylanicum*
- 7) Bamboo, *Bambusa tulda*

B) Indo - Malayan center crops → Includes Indo - China and the Malay archipelago.

### Fruits

- 1) Pummelo, *Citrus grandis*
- 2) Banana, *Musa paradisiaca*
- 3) Mangosteen, *Garcinia mangostana*.

Oil, Sugar, Spice and fiber plants

- 1) Coconut palm, *Cocos nucifera*
- 2) Sugarcane, *Saccharum officinale*
- 3) Clove, *Caryophyllus aromaticus*
- 4) Nutmeg, *Myristica fragrans*
- 5) Black pepper, *Piper nigrum*

III Central Asiatic Center → Includes Northwest India [Punjab, Northwest Frontier Provinces and Kashmir], Afghanistan, Tadzhikistan, Uzbekistan and western Tion-shan.

Grains and Legumes →

- 1) Common wheat, *Triticum vulgare*
- 2) Club wheat, *Triticum compactum*
- 3) Shot wheat, *Triticum sphaerococcum*
- 4) Pea, *Pisum sativum*.
- 5) Lentil, *Lens esculenta*
- 6) Horse bean, *Vicia faba*
- 7) Chickpea, *Cicer arietinum*
- 8) Mung bean, *Phaseolus aureus*
- 9) Mustard, *Brassica juncea*
- 10) Linseed, *Linum usitatissimum*
- 11) Sesame, *Sesamum indicum*.

Fiber plants

- 1) Hemp, *Cannabis indica*
- 2) Cotton, *Gossypium herbaceum*

Vegetables

- 1) Onion , *Allium cepa*
- 2) Garlic , *Allium sativum*
- 3) Spinach , *Spinacia oleracea*
- 4) Carrot , *Daucus carota*

### Fruits

- 1) Pear , *Pyrus communis*
- 2) Almond , *Amygdalus communis*
- 3) Grape , *Vitis vinifera*
- 4) Apple , *Malus pumila*.

### # Crop voyage : World

Crop voyage is a lengthy process that began several thousand years ago and still continues. The major event in the voyage of crops is a relatively modern one.

The discovery or conquest of the Americans in 1492 has had a major influence on the crop distribution of the old world. This is the so called "Columbian Exchange".

Chinese center	Near East	Americans
1) Soybean	1) Lentil	1) Potato
2) Proso millet	2) Chickpea	2) Summer squash
3) Italian millet	3) Pea	3) Corn (maize)
4) Barnyard millet	4) Barley	4) Whole dried corn
	5) Walnut	5) Pumpkin seed
	6) Almond	6) Tobacco

## The spread of crops out of Asia

Far Eastern agriculture had very little dispersal until well into modern historic times

### Westward

- To Persia along the silk routes [rice] after 350 BC
- To India [peach] AD 150
- To Africa, Madagascar [banana] AD 700-1000
- To Southern Europe along Northern Africa with Islam [citrus] 7th century

Eastwards; cereal culture declined and root crops increased such as taro, breadfruit, sago, banana.

- To Philippines 300 BC
- To Eastern Polynesia and Hawaii AD 300
- To New Zealand [Maori] AD 1050

Q.10) List out history of ancient India?

- i) Agriculture did not originate in communities desperately in short supply of food, but among communities where there was sufficiency of food resulting into relative freedom from want and need.
- ii) The hearths of domestication are to be sought in regions of marked diversity of plants and animals.
- iii) The primitive agriculture did not origin in the large river valleys, subject to the lengthy floods and requiring protective dams, drainage or irrigation, but in moist hill lands.

iv) The agriculture began in forested lands, which had soft soil easy to dig.

v) The pioneers of agriculture had previously required special skills but the hunters would be least inclined towards the domestication of plants.

vi) The founders of agriculture were sedentary folks, because growing of crops requires constant attention and supervision and unless guarded properly, the crop will be lost.

Q.11) Write short notes

- a) physical weathering.
- b) Soil types of India.
- c) Water resources of India.

a) Physical weathering →

Physical weathering sometimes called mechanical weathering, physical weathering is the process that breaks the rocks apart without changing their chemical composition. This example illustrate physical weathering.

Swiftly moving water :-

Rapidly moving water can lift, for short periods of time, rocks from the stream bottom. When these rocks drop, they collide with other rocks, breaking tiny pieces off.

Ice wedging :-

Ice wedging causes many rocks to break. This refers to the repeated freezing and melting of water within small in the occurs in the rock surface. This expansion and contraction

is also a major cause of potholes in streets. Water seeps into cracks in the rocks and as the temperature drops below freezing the water expands as ice in the cracks.

Plant roots :-

Plant roots can grow in cracks. The pressure of a confined growing root can be substantial. These pressure make cracks in the roots larger, and as roots grow, they can break rocks a part.

#### ⑥ Soil types of India →

There are six major type of soil found in India.

- Alluvial soils
- Black soils
- Red soils
- Desert soils
- Laterite soils
- mountain soils

Black soils → cotton is the most important crop grown in this soil. It is well-known for its capacity to hold moisture.

Alluvial soils → It is the important type of soil found in India covering about 40 percent of the total land area.

Red soils → It is found in Tamil Nadu, parts of Karnataka, some parts of Maharashtra, A.P, M.P, Orissa. It is red colour is due to high percentage of iron contents.

Desert soils →

Found mostly in the arid and semi-arid region like Rajasthan and Punjab.

(c) Water resources of India →

India accounts for about 2.45 percent of world's surface area & percent of the world's water resources and about 16 percent of world's population. The total water available from precipitation in the country in a year is about 4,000 cubic km. The availability from surface water and replenishable groundwater is 1,869 cubic km out of this only 60% can be put to beneficial uses. Thus, the total utilisable water resource in the country is only 1,122 cubic km.

Surface water resources →

There are four major sources of surface water. These are rivers, lakes, ponds and tanks.

Groundwater resources →

The total replenishable groundwater resources in the country are about 432 cubic km.

Q.12) Write information regarding ancient agricultural practices with the help of tools and implements.

→ Information Regarding Ancient agriculture practices :-

i) The most probably earlier cultivation of crop was started on foot hill of upland areas of easily worked soil and not in the valleys because development of agriculture

in the valleys implies water control need more skills development.

- 2) Sauer (1952) in his hypothesis about the origin and development of agriculture.
- 3) Agriculture did not originate in communities desperately in supply of food, but among communities where there was sufficiency of food into relative freedom.
- 4) The health and domestication due to be sought in region of market diversity of plants.
- 5) The agriculture began in forested lands, which had soft soil easy dig.
- 6) Raising crop was an important variation event in pre-vedic period and it put end to nomadic life.
- 7) Animal husbandry was dominant and crop varying was combined with livestock and tree.
- 8) In Arthashastra there is mention about suitability of different land for cultivation of crop.

Farm Implement : (tools and implement)

- Ancient literature of the subcontinent did not miss out farm implements.

- Vedas describe simple bullocks drawn wooden plough built eight and heavy with iron bar attached plough to open
- Krishi parashara gives details of design of the plough with sanskrit namely different parts.
- These basis design has hardly undergone any change over centuries
- Even today the resources poor farmers use similar bullock drawn plough.
- A bamboo stick of specific size was used to measure land
- Vedic literature and Krishi parashara also mention plough seed drill, black harrow, wooden spike, root harrow, where people domestically came. guinea pigs 2000 years before crop cultivation
- Agriculture wood have started with the end of last Age between 1500 and 1800.

Q.13) Write in detail (any 2) beginning of Agriculture in India archaeological & historical factors.

- 1200 to 9500 years ago →
- Hunters and food gatherers storage existed.
  - Stones implement were seen throughout the Indian sub-continent.
  - Domestication of dog in Iraq.
  - Earliest agriculture was by vegetative propagation.  
Eg → Bananas, sugarcane, yam, plums and ginger.

9500 to 7500 years ago →

wild ancestors of wheat and barley goat sheep, pig, cattle found.

7500 to 5000 years ago →

Significant features were invention plough irrigated farming, use of wheat and seed dibbling.

2000 - 1500 years ago →

- Tank irrigation was developed and practise widely - Greek and Roman trade with south India.

- Pepper moth and sandal wood were improved by Romans.
- King Karkata defeated cherate and invaded capture zoomm and used them as & loves to construct an embankment along tanks and promoted agriculture by clearing factors.

1500 - 1000 years ago →

- The Konoy empire of Harshwardhana [606-647 AD]
- Cereals such as wheat, rice and millets and fruits were extensively grow 60 days variety and fragrant varieties of rice are mentioned.

5000 to 4000 years ago →

- Harappan culture is characterized by cultivation of wheat barley and cotton plough agriculture and bullocks for drought.
- Wheeled carts were commonly used in Indus valley.
- Harappa not only grew cotton but also ginning, weaving

4000 to 2000 years ago →

In north Arothone stools were found. In nevara [Maharashtra] copper & polished stones were used.

Q.14) Write agricultural practises old stone age and bronze age

- - Hunters and food gathers [ 2500000 to 10,000 BC]
- There is period is characterized by the food gathers and hunters.
- The stone age man started making stone tools and crude choppers.
- The clipped stone tools and pebbles were used for hunting cutting & other purposes.
- Knowledge on cultivation and house buildings.
- The palaeolithic age in India is divided into these phases according to the nature of stone tools used by the people and according the nature of climate.

- ① Early palaeolithic [ 2,50,000 to 100000 BC]
- ② Middle palaeolithic [ 100000 to 40000 BC]
- ③ Upper palaeolithic [ 40,000 to 10,000 ]

Bronze age :-

Period of time between stone age and Iron.  
 The bronze age is the time period when people made tools from an alloy called bronze. Bronze is mixture mainly copper and tin.  
 Material like wood and stones were also used for tools but bronze was better for cutting and chopping and was easy to shape. The Bronze age was not at the same time everywhere because of different groups of people began to use bronze different times. In western Europe the Bronze Age latest from about 2000 BC until 800 BC.

In the middle East it started about thousand years earlier. For example bronze was first used mesopotamia around 3300BC. Archeologist think that people became more organised in the Bronze age because the making of metal tools was difficult and needed certain skills. The people who had these new skills could have been important. The new metal tools were brought sold.

Q.15) Write in brief about Neolithic agricultural developed in south India?

- ① Neolithic Age in south India was around 7000BC to 1000BC.
- ② The Neolithic Age was preceded by mesolithic Age [9000BC to 4000BC] preceded by chalcolithic Age [2100 to 700BC].
- ③ The major crop grown were ragi , horse gram, cotton , rice , wheat, barley . The people of these age domesticated cattle , sheep , goat . They resided in pit near lake side had hunting.
- ④ The people used microlithic blades in addition tool made of polished stones as well as bone. They used axes chisels cuts.
- ⑤ The Neolithic settlement have been found in North western part , southern part [Karnataka , Tamil Nadu , Andhra Pradesh]

Q.16) Write in brief about Neolithic agricultural revolution in western India?

- Food production [The Beginning of Agriculture] . The Neolithic age between 9000 to 7500 BC. Neolithic revolution occurred in western Asia between 9500 to 8500 years ago mainly in the fertile crescent [chilly regions, Iran, Israel].

- Neolithic revolution brought a major change in the techniques of food production which gave man over his environment and saved him from

the Precaucasians existence of more hunting and gathering of wild berries and roots.

- \* For the first time he lived in village and apart from security from hunger had require time to think and complete.
- \* The main feature of Neolithic culture in India
  - Neolithic culture denotes a stages in Economic and technological development in India.
  - Invented textile weaving.
  - Use of polished [stones] axes for cleaning the bushes]
  - Handmade pottery for storing food grain
  - Cultivation of rice banana sequence and in eastern part of India
  - Discovery of silk.

Q.17) Write the characteristics of indigenous traditional knowledge.

→ Characteristics of indigenous traditional knowledge.

- ① ITK is not static but dynamic
- ② Exogenous knowledge and endogenous creativity bring change to ITK
- ③ ITK is initiative in its mode of thinking.
- ④ ITK is mainly qualitative in nature.
- ⑤ ITK study needs a holistic approach.
- ⑥ ITK, if properly tapped, can provide valuable insights into resource processes, possibilities and problems in particular area ITK is recorded and transferred through oral tradition.
- ⑦ ITK is learned through observation and hands-on experience.
- ⑧ ITK forms an information base for variety
- ⑨ ITK reflects local tradition.

Q.18) Write the indigenous traditional knowledge for rice and maize production

→ Crop wise Indigenous traditional Knowledge

Rice →

- Treatment of paddy seeds in diluted bio gas slurry for 12 hours increases resistance of seedlings to pests and disease.
- About 30 kg of tamarind seeds are applied for an acre of paddy field 1 day after transplanting to boost up the crop growth and yield.
- Booking the paddy seeds in diluted cow's urine before sowing considerably reduces the incidence of leaf spot and rice blast.
- Presoaking of paddy seeds in milk increases its resistance against 'tungro' virus and 'stunt' virus.
- Dhaincha (*Sesbania spp.*) seeds are sown on paddy main fields when paddy nursery is raised and the grow up dhaincha is ploughed in-situ during field preparation.
- Cultivation of sunhemp or dhaincha helps to control the nut grass (*Cyperus rotundus*) weed.

Maize →

- If the sheaths on maize cobs are not removed, they can be stored for more than three months.
- Maize seeds are soaked in cow urine for 12 hours before sowing.
- Before sowing, maize seeds are soaked in warm water for 3-6 hours and shade dried to induce better germination and to control shoot borer.
- maize is sown after tomato in the same ridges and furrows to reduce the cost of land preparation.

- When a sample of maize grains is chewed, metallic sound indicates their optimal dryness.
- Dried maize stalks are stacked as heap on stone slabs and covered with paddy straw. This can be stored for more than a year and used as cattle feed.

Q.19) Write the different plant protection measures through indigenous traditional knowledge.

- - Application of buttermilk @ slit 1/40kg seed of pulses viz. lentil, urhar, chickpea to protect the crop from wilt disease.
- Farmers broadcast 8kg common salt to protect the paddy crop from blight disease.
- Dry neem leaves and Kanja leaves are used by the farmers to store the grain like wheat, rice etc.
- Mixed cropping of urhar & jowar to protect the urhar from wilt disease.
- Planting of marigold after 8-10 lines of tomato or chilli to protect the crop from mosaic and nematode.
- Mixed cropping like urhar + urid + til + bajra is practised.
- Ash dusting is practised in radish vegetables to control the red beetle.

- Spray of extract of 1kg garlic + 250 gm tobacco + 250 gm gum in 20 lit to control gamdhi bugs in rice.

- Farmers practise mixed cropping of onion + sugarcane to control the shoot borer in sugarcane.

- Gram seed treated with heeng [Asafoetida] @ 10gm / 10kg seed wilt disease.

- Solution containing 10 lit of cow urine + 1.5kg gum + 1.5kg mustard oil kept for ten days in shed, then added 200 lit of water and spread on paddy crops to prevent various diseases & pests.

- Farmers are applying 8-12 kg common salt per acre with seed to control the wilt in pulse crops.

- Vegetables seeds are stored by mixing with sawdust of pipe.

Q.20) Write the chronological agricultural technology developed in Indian agriculture?

→ Chronological Agricultural technology development in Indian Agriculture :-

- In India is broadly classified into five different periods before India's independence.

① Early history [ Before 15000 BCE ]

② Vedic period : Post Maha Janapadas period [ 1500 BCE - 200 BCE ]

- ③ Early common Era : High middle Ages [200 - 1200 CE]
- ④ Late middle Ages : Early modern Era [1200 - 1757 CE]
- ⑤ Colonial British Era [1757 - 1947 CE].

Indian Agriculture began by 4000 BCE as a result of early cultivation of plants and domestication of crops and animals. Settled life soon followed with implements and techniques being developed for agriculture. Double monsoons led to two harvests being reaped in one year. Indian products soon reached the world via existing trading networks and foreign crops were introduced to India. Plants and animals considered essential to th

