AGRO - 111
Fundamentals of Agronomy-I

Important Topics

1) Define Agronomy & write scope and importance of Agronomy.

Agronomy-
'It is the branch of agricultural science which deals with the principles and practices of field management for the crop production.'

Scope-
scope means at which things or places we can apply the knowledge of Agronomy. We can get all possible things (production, yield) which the basic farmers or producers need. We can study of the following contents…..

- Crop production - by maximizing our yield.
- Soil management - by improving soil fertility & productivity.
- Proper method of tillage - by using modern concept of tillage (Minimum tillage, Zero tillage).
- Suitable time of sowing - most important for seed germination & stability of plants.
- Proper method of sowing - (Drilling, Dibbling etc) for maintaining plant population.
- Maintaining farm implements & machineries in proper shape.
- Management of livestock including their feeding, management & disposal of farm and animal products like milk and eggs etc.

Importance-

For getting higher yield, agronomy benefits in…

- Organic farming
- Sustainable agriculture
- Forestry
- Mixed farming
- Poultry production
- Sheep & Goat rearing
- Mixed & Inter Cropping etc.

2) Explain relationship of agronomy with other sciences & Role of agronomist in short.

Relationship with other sciences –

agronomy has a deep relation with the following sciences these are…

- Soil science & agriculture chemistry
- Genetics & plant breeding
- Horticulture
- Crop physiology
- Animal husbandry & dairy science
- Agro meteorology
- Agriculture extension
- Agriculture engineering
- Agriculture economics
- Agro-forestry
- Statistics
- Basic science like Mathematics, Zoology, Ecology etc

Role of agronomist- are…

- He should know the deep knowledge of agronomy.
- He should have the ability to convert his theoretical knowledge into practical.
- He is the co-ordinator of different SMS. (subject matter specialist)
- He is the consultant for the farmers.
- He should have mastery in agriculture production through research.
- He has well information of conducting experiments on different aspects like sowing time, seed rate, spacing, fertilizer requirement, weed management, cropping systems etc.

3) Define Tillage & write Objectives of Tillage.

-

Tillage- <u>'The manipulation of soil with tools & implements for loosening the surface crust and bringing conditions favorable for the seed germination & crop growth.'</u>

Objectives-

- To make the soil loose and porous (friable).
- To remove weeds.
- To mix manures and fertilizers.
- To destroy insects and their eggs.
- To aerate the soil.
- To increase the soil temperature.
- To remove stubbles.
- To break hard pan (big stones).
- To incorporate organic manures.
- To have repeated exchange of air & gases. Etc.

4) What is Soil tilth or Tilth ? Explain the characteristics of good soil tilth & how soil tilth is measured.

-

Tilth - 'It is the physical condition of soil resulting from tillage & said to be good when the soil is soft, friable and properly aerated.'

Characteristics of good soil tilth -

- It should have higher % of larger aggregates (more than 5 mm diameter) for irrigated farming.
- It should have higher % of smaller aggregates (1-2 mm diameter) for dry-land farming.
- Good soil tilth should be porous & has free drainage up to water table.
- Micro-pores (capillary) & Macro-pores (non-capillary) should be in equal proportion.
- The soil particles should not be easily eroded by water or wind.
- Soil should not be sticky when moist.
- Soil should permit easy infiltration of water.

Note (Aggregate means Different sized soil particle)

Measurement of soil tilth -

It can be measured by following methods

- 1) Feel and appearance method
- 2) Pore space content – equally divided in micro & macro pores.
- 3) Measuring size of soil aggregates – best size of soil aggregates ranges from 1 to 6 mm.

5) What are the Types of Tillage ? write the names of tools & implements used in different tillage operations.

Types of tillage operations…

A) Preparatory tillage

'Tillage operations which are carried out from the time of harvesting of the previous crop to the sowing of the next crop are known as preparatory tillage/cultivation.

i) Primary tillage – Ploughing (cutting & inverting the soil)

ii) Secondary tillage – Clod crushing, Land leveling, Discing (Disking), Manure mixing.

B) Seedbed preparation

After preparatory tillage the land is to be laid out properly for irrigating crops if irrigation is available for sowing or planting seedlings which is known as seedbed preparation.

i) Harrowing

ii) Preparation of irrigation layouts – Ridge & Furrow, Flat beds, BBF etc

iii) Sowing & covering of seeds

C) Intercultural operations / Inter-tillage / Inter-cultivation

The tillage operations which are carried out in the standing crops. Viz.

i) Thinning ii) Gap filling

iii) Weeding iv) Hoeing

v) Top dressing of fertilizers vi) Earthing up etc.

❖ **Tools & implements used in tillage operations**

- Ploughing – MB plough, Chisel plough, Desi plough, Disc plough, Sub soil plough etc.
- Clod crushing – Norwegian harrow, Plank etc.
- Land leveling – Bulldozer, Keni, Plank-leveler etc.
- Manure mixing – Manually, Disc harrow, country plough, cultivator etc.
- Harrowing – Blade harrow, Disc harrow etc
- Irrigation layout – Ridger, Bund former (Sarayantra), Blade harrow etc
- Inter-tillage – Weeding hook (khurpi), Hoe, Japanese hoe.
- Harvesting – Combine harvester etc.

6) Explain the Modern Concept of Tillage.

-

Main aim of modern concept of tillage is to minimize the cost of cultivation by reducing some tillage operations.

Need of modern concept of tillage is very necessary today. In India maximum farmers are marginal according to area & cost of cultivation is also increasing day by day, so the generation of Minimum & Zero tillage is helpful.

Modern concept includes….

1) Minimum Tillage
2) Zero Tillage
3) Stubble Mulch Tillage

Modern Concept	**Preparatory Tillage**		**Seedbed Preparation**
	Primary	**Secondary**	
Minimum Tillage	Carried out	Reduced (1 instead of 2 harrowings etc)	Reduced by combining Agril. Operations like (seeding & fertilizer application)
Zero Tillage	Avoided	Avoided	Row zone only

&

Stubble Mulch Tillage –

Clean cultivation and unnecessary ploughing lead to soil erosion due to heavy rains and wind in the arid lands. A new approach has been developed for protecting soils all the time either by growing crops or spreading of crop residues.

'Covering the soil surface with crop residues or stubbles during the fallow periods for protecting soil is known as stubble mulch tillage or stubble mulch farming.'

7) Define Seed and write the qualities/characteristics of good seed.

-

Seed - 'Any material used for sowing or planting or propagation of a crop is called as seed. It may be in the form of seed or seedlings or tubers or bulb or rhizome or root or cuttings or graft or any other vegetatively propagated material.'

Characteristics/Qualities of good seed…

- It should be genetically pure.
- It should have high germination percentage.
- It should be free from any insect pests.
- It should be free from disease bearing organisms.
- It should be free from any admixture, dirt & inert material.
- It should be free from noxious, objectionable & satellite weed seeds.
- It should be clean, dry, bold, uniform in size & shape etc.

8) Define Seed Treatment & write the objectives of seed treatment.

-

Seed Treatment - 'It is the process in which the seeds are treated before sowing to overcome heavy losses due to natural & unforeseen infections.'

Healthy seed materials, free from pests & diseases and having high viability is essential for establishment of crop.

Objectives of seed treatment…

- Convenience in sowing.
- Disease control includes seed born, soil born & air born diseases.
- Insect control like white ants and other ants, termites.
- Quicker germination.
- Better yield.
- Protection against insects.
- Increasing nitrogen fixation.
- Inducing earliness (Vernalization).

Note- (Vernalization – is the treatment in which the seeds are soaked in water for inducing germination. By giving this treatment, the maturity period of long durational crop is shortened.)

Name of crops	Seed treatment	Diseases
Sorghum	300 mesh fine sulphar dust @ 3gm/kg of seed.	Grain smut
Bajra	20 % brine solution (NaCl or common salt solution)	Ergot
Rice	3 % brine solution.	Blast
Wheat	Thirum (Fungicide) @ 2.5 gm/kg of seed.	Smut

9) Define Seed Dormancy. Write down the causes of seed dormancy.

-

Seed Dormancy- 'It is an internal condition of viable seed which does not allow its actual germination, although suitable temperature, moisture and aeration etc are provided.'

Causes of seed dormancy-

- Inadequate supply of oxygen due to poor soil aeration.
- Excess or deficiency of moisture in the soil.
- Lower or higher soil temperature than the requirement of the crop.
- Attack of insects pests, diseases and birds on seed or newly emerging seedlings.
- More or less depth of sowing than the optimum depth of sowing.
- Rough or poor seedbed preparation.
- Faulty seeds – seeds with poor germination, diseased seeds, damaged seeds etc.

10) Short notes on A) Types of Dormancy.
B) Methods of breaking dormancy.
C) Types or Stages of Seed multiplication.

-

A) Types of Dormancy - there are 3 types.

i) Innate dormancy - occurs due to the genetical characters of the seed or due to hard seed coat, immature embryo etc.

ii) Enforced dormancy - due to conditions of deficient oxygen, excess CO_2 & deep placement of seed in the soil etc.

iii) Induced dormancy – due to sudden physiological change in seed by unfavorable climatic conditions.

B) Methods of breaking seed dormancy - by

i) Scarification- hard seed coat is broken by chemical (by dipping seeds in dilute solutions of HNO_3, HCl or H_2SO_4) Or by mechanical means (by filling the seeds in gunny bags & beating them to rupture the seed coat).

ii) Exposure of seed to light.

iii) Gas treatment.

iv) Soaking seeds in hot water - deep seeds in boiling water for 2-3 minutes.

C) Stages of seed multiplication –

- Seed viability is the ability or capacity of the soil to germinate.

There are five stages of seed multiplication

1) Nucleus seed 2) Breeder's seed

3) Foundation seed 4) Certified seed 5) Truthful seed.

11) Enlist different methods sowing & explain any one in detail.

-

Sowing of crop is done by following methods

1. Broadcasting
2. Drilling or line sowing.
3. Dibbling
4. Transplanting
5. Planting
6. Putting the seeds in plough furrow.

12) Define plant population. What are the effects of plant population on crop growth and yield.

-

Plant population- 'It is defined as the number of plants per unit area'. Eg. Optimum plant population of *kharif* hybrid sorghum is 1,37,000 to 1,50,000 plants/ha. (plants pe hectare).

Effect of plant population plant growth & yield – Plant densities influence the crop growth considerably….

1. High density is conducive for building up of pests diseases.
2. At very high density, seedling mortality is common.
3. High plant density may decrease protein & oil content.
4. At high plant density lodging is more.
5. With increasing density, competition for light, plant height increased.
6. Widely spaced plants have circular root distribution.
7. There is interpenetrated root growth at high density.

13) Define Crop/Planting geometry. Explain it.

-

Crop geometry or plant geometry is the pattern of distribution of plants over the ground or the shape of the area available to the individual plant.

It includes – 1) Solid planting 2) Paired planting & 3) Skip Row planting

1) Solid planting – sowing of crop on a solid basis by drilling or dibbling method at same spacing. (Eg. Groundnut at 30 cm × 10 cm)
2) Paired planting – sowing of crop on a given area in a specific paired arrangement. (Eg. Soybean at 45 cm × 15 cm, but skip the one or two rows).
3) Skip Row planting – sowing of a crop in a specific row pattern and add the other one row of different crop in it.

14) Define manures & Fertilizers. Write the importance of manures and fertilizers.

-

Manures – it is a well decomposed refuse from stable and barn yards including both animal excreta and straw or other litter.

Fertilizers – these are industrially manufactured chemicals containing plant nutrients which when added to the soil makes it productive and promotes plant growth.

Importance of manures and fertilizers –

- Manures and fertilizers are the main source of essential plant nutrients.
- Application of manures & fertilizers overcomes the deficiency symptoms of nutrients.
- Manures increase the physical condition of soil thereby productivity increases
- Manures increase the fertility of the soil.
- Fertilizers increase the per hectare yield of crop.
- Fertilizers help in giving maximum output (yield) than manures.
- Application of some fertilizers is helpful in different climatological calamities like in excess rainfall, in drought condition. Etc.

15) Give the classification of manures & fertilizers with suitable examples.

-

Mainly three basic types…

A) Organic (Natural) – includes

Bulky organic manures	Concentrated organic manures
FYM	Groundnut cake
Compost	Linseed cake
Vermi-compost	Neem cake
Green manure	cotton seed cake
Sheep manure	Bone meal
Sewage waste	Meat meal
Sludge	Slaughter house refuse etc

B) Inorganic (Artificial) – includes

Nitrogenous	Phosphatic	Potassic	Others
Urea	SSP	MOP	Gypsum
Calcium nitrate	DSP	Sulphate of potash	Lime
Ammonium sulphate	Rock phosphate	Potassium nitrate	Complex fertilizers
Ammonium nitrate	Basic slag	-	Micro-nutrients
Etc	Row bone meal	-	Etc

C) Biofertilizers –

1. Rhizobium 2. Azotobacter 3. Azospirillum
4. PSB 5. Blue green algae

16) Enlist the methods of fertilizer application & explain any one. Write the time of fertilizer application in short.

-

Methods of fertilizer application are…

1. Broadcasting
2. Drilling
3. Band placement
4. Point placement
5. Injection into soil
6. Fertigation
7. Root dipping
8. Foliar application

Time of fertilizer application…

1. Before sowing
2. At sowing
3. After sowing
4. Slit application

17) Define Green Manuring, write types of green manuring with example, write advantages & disadvantages of green manuring.

-

'Green manuring is a practice of ploughing or turning the undecomposed green plant tissues into the soil for the purpose of improving soil fertility.'

Types of green manuring	Crops used in green manuring
1) Green manuring in situ	Sunhemp, Dhaincha, Guar beans, Kulthi, Senji etc.
2) Green leaf manuring	Glyricidia, Sesbania, Karanj etc.

Advantages of green manuring –

1. It increases the fertility of soil.
2. Being a legume, it fixes atmospheric nitrogen in the soil.
3. Being a quick growing crop, it helps in suppressing the weed growth.
4. It improves the soil structure, water holding capacity & decreases run off.
5. It adds organic matter & stimulates activities of soil micro-organisms.

Disadvantages of green munuring –

1. It may increase the incidence of pests & diseases.
2. There is loss of one season especially kharif.

18) Define Weed & explain the characteristics of weeds.

-

Weed – Any plant not sown in the field by farmer is out of place called weed.

Weed is an unwanted plant growing where it is not wanted & it is extremely noxious, useless and poisonous.

Characteristics of weeds…

1. Weeds have high reproductive capacity.
2. They thrive well under adverse climatic condition.
3. They have morphological similarities with associated crops.
4. They can protect themselves from animal and human being.
5. They are harmful to crops, cattle and human being.
6. Weed seeds have similarities with crop seeds.
7. Weeds have competitive in nature. Etc.

19) Give the classification of weeds. & explain any one

-

Classification

A) Based on Life cycle.
B) Based on Habitat or place of occurrence.
C) Based on Dependence on other hosts.
D) Based on Soil type.
E) Based on plant family.

A) Based on Life cycle -

1. Annual - weeds complete their life cycle within a year. In *kharif* season or in winter season.
Ex. Aghada, Hazardana etc
2. Biennial - weeds require two years for completion of their life cycle.
Ex. Wild carrot etc.
3. Perennials - weeds continue their life cycle for years together.
Ex. Lavala, Hariyali etc.

20) Write Advantages (benefits) & Disadvantages (damages/losses) occurred by weeds.

- advantages disadvantages

Weeds add nutrients & organic matter into the soil.	Reduction in crop yield.
Weeds control soil erosion.	It increases the cost of cultivation.
Weeds are useful as fodder for animals.	It reduces the quality of produce.
Weeds have medicinal value.	Harm to animal and human being.
Weeds are used as vegetables.	Check the flow of water in irrigation water.
Weeds serve as ornamental plants.	Harbour insects & diseases.
Weeds are used in reclamation of alkali land.	Depreciate the land value. Etc.

21) Enlist the methods of weed control. Explain any one.

-

Classified in two groups.

A) Preventive – it consists of…
- Use clean seed.
- Use well decomposed FYM/Compost.
- Cut the weeds before seeding.
- Remove weed growth or keep irrigation & drainage channels clean or free from seeds.
- Clean all the farm implements before using it. Etc

B) Curative – it includes
1) Mechanical/Physical methods
2) Cultural methods
3) Biological methods
4) Chemical methods

Explanation-

1) Physical
i) Hand weeding ii) Hoeing iii) Hand pulling iv) Burning
v) Flooding etc

2) Cultural
i) Crop rotation ii) Kind of crops
iii) Use of fertilizers iv) Date & seed rate of sowing etc

3) Biological
Using of living organisms (insects) for controlling the weeds.
Ex.

	Bio-Agents (insects)	Host weeds
1.	Cochineal scale (insect)	Prickly pear (Nagphana)
2.	Moths	***Lantana camara*** (Ghaneri)
3.	Zygograma bicolorata (beetle)	Parthenium (Gajar gavat) etc

4) Chemical
Using of different types of chemicals for the control of weeds.
Ex.
2,4-D, MCPA, Atrazine, Simazine, Glyphosate, Alachlor, Diuron, Pendamethalin etc

22) Define herbicides and classify it. Write short notes on Allelopathy or Allelopathic effect of weed.

-

Herbicides are the chemicals used for weed control and which suppress or destroy the growth of weeds.

Classification of herbicides –

A) Based on chemical composition
B) Based on selectivity
C) Based on time of application
D) Based on formulation
E) Based on residual effect.

B) Based on selectivity-

1) Selective		2) Non-selective	
i) Foliage	ii) Soil application	i) Foliage	ii) Soil application
DNBP	Simazine	Glyphosate	**Soil fumigants -**
Nitrofen	Atrazine	Paraquat	Cynamide
Propanil	Butachlor	Dalapon	Methyl bromide
2,4-D	MCPA	Sulphuric acid	**Soil sterilents**
MCPA	Nitrofen	Sodium cloride	NaCl
MCPB	Dinitrophenols	Etc	Atrazine

Allelopathy or allelopathic effect of weed –

Allelopathy is a biological phenomenon by which an organism produces one or more biochemicals that influence the germination, growth, survival and reproduction of other organisms. These biochemicals are known as allelochemicals and can have beneficial (positive allelopathy) or detrimental (negative allelopathy) effects on the target organisms and the community.

Some weeds also secrete the chemicals from their roots into the soil. These chemicals are mostly harmful to the other crops. Thereby ultimately it cause effect on crop growth & development.

23) Define Crop Rotation. Write Principles & Advantages of crop rotation.

-

'Crop rotation is the recurrent succession of crops on the same piece of land either in a year or over a longer period of time.' OR

'It is a process of growing different crops in a succession on a piece of land in a specific period of time, with an objective to get maximum profit from least investment without impairing the soil fertility.'

Principles of crop rotation-

1. The crop rotation should be adaptable to the existing soil, climatic & economic factors.
2. It should be cover all type of crops viz. cereals, pulses, fodder etc.
3. It should be helpful to the land by adding OM into it.
4. It should be arranged in a specific manner for controlling weeds, diseases & insect-pests.
5. It should give maximum yield and minimum soil erosion.
6. It should provide maximum employment to the family as well as labors. Etc

Advantages of crop rotation-

1. There is an overall increase in the yield of crops.
2. It adds organic matter (OM) content into the soil.
3. There is regular flow of income throughout the year.
4. It supply various needs of farmers & their cattle.
5. It supply the more nutrients into the soil.

Example of crop rotation-

1. Cotton – Jowar/Bajra – Groundnut
2. Sugarcane – Rice – Gram
3. Soybean – Jowar/Safflower/Gram
4. Sunflower – Jower
5. Groundnut – Wheat – Vegetables
6. Sorghum – Wheat – Greengram – Cotton – Groundnut. Etc.

24) Define growth & development. Explain Growth Curve. Write the factors affecting growth & development.

-

Growth- may be defined as an irreversible permanent increase in size, volume or mass of a cell or organ or whole organism accompanied by an increase in dry weight.

Development- Plant development is an overall term which refers to the various changes that occur in a plant during its life cycle.

In consideration of various horticultural crops and products, Watada et al. (1984) proposed the following definition of development: **'the series of processes from the initiation of growth to death of a plant or plant part.'**

Growth Curve -

It is an 'S' shaped curve obtained when we plot growth against time. It is also called **'sigmoid curve'**.

This curve mainly shows four phases of growth-

1. **Lag phase** - Initial slow growth occurs
2. **log phase/grand period of growth/exponential phase** - The rapid period of growth where maximum growth is seen in a short period.
3. **Diminishing phase** - where growth is seen slow.
4. **Stationary/steady phase** - where finally growth stops.

Factors affecting growth & development

Includes –

A) Genetic factors - (Internal factors)

1) Genes
2) Chromosomes
3) Genomes etc.

B) Environmental factors – (External factors)

1) Temperature
2) Moisture supply
3) Radiant energy
4) Composition of the atmosphere
5) Soil aeration
6) Soil reaction
7) Biotic factors
8) Plant nutrients.

25) Define plant ideotype. Write in short types of ideotype.

-

The term Ideotype was introduced by **Donald** (1968).

Acc. to him ideotype- **is a biological model which is expected to perform or behave in a predictable manner within a defined environment.**

This term has a following synonyms viz. Model plant type, Ideal plant type.

Types of ideotype - 3 types

1) Isolation ideotype - The model which perform best when the plants are space-planted. Isolation means planting distance.

2) Competition ideotype - The model which perform well in genetically heterogeneous (different) population. The crops in this model are able to compete with its less aggressive neighbors. Such ideotype's crops have following features viz. annual habit, tallness, leafy canopy, tillering or branching, seed size, speed of germination & root characters.

3) Crop ideotype - This ideotype performs best at commercial crop densities because it is a poor competitor. In case of cereals a crop ideotype is erect, sparsely-tillered plant with small erect leaves.

Other types -

4) Market ideotype - includes traits like seed colour, seed size, cooking & baking qualities. Etc.
5) Climatic ideotype - includes traits like heat & cold resistance, maturity duration, drought resistance. Etc.
6) Edaphic ideotype – includes traits like salinity tolerance, mineral toxicity, deficiency tolerance. Etc.
7) Stress ideotype – traits resistant to water stress.
8) Disease & pests resistance ideotype. Etc.

Examples of crop ideotype -

1) Wheat ideotype by Donald
2) Rice ideotype by Jennings in 1964
3) Maize ideotype by Mock & Pearce in 1975
4) Cotton ideotype by - Singh & Coworkers in 1974 for irrigated cultivation
And Singh & Narayanan in 1993 for rainfed condition.

26) What is nutrient use efficiency. Write the factors affecting nutrients use efficiency.

-

Nutrient use efficiency (NUE) may be defined as yield per unit input. In agriculture this is usually related to the input of fertiliser, whereas in scientific literature the NUE is often expressed as fresh weight or product yield per content of nutrient.

The nutrients most commonly limiting plant growth are N, P, K and S. NUE depends on the ability to efficiently take up the nutrient from the soil, but also on transport, storage, mobilization, usage within the plant, and even on the environment.

Factors affecting nutrient use efficiency

1. Type of soil
2. Climate
3. Type of fertilizer
4. Time of fertilizer application.
5. Method of fertilizer application.
6. Quantity of fertilizer (How much ???)
7. Nutrient's interaction. Etc.

27) What is mean by Crop adaptation & its Distribution.

-

Crop adaptation - the ability of a crop (or variety) to respond positively to changes in agricultural conditions. The trait is genetically controlled and provides an ability to exploit environmental attributes, both natural and agronomic.

Values of relative adaptability can be determined by the regression of the yield of the tested crop over the average yield of compared crops from several environments.

Crop distribution - it is the transfer of crop or crop varieties or new technology from one place to the another place (locality).

Factor responsible for crop adaptation & distribution –

1) Physical – i) Climate – Temperature, Growing Season, Altitude, Rainfall & Wind.
   ii) Soil
   iii) Slop of land
2) Human – i) Owner occupiers
   ii) Tenants or landless labourers
   iii) Market condition
   iv) Transport facilities
   v) Capital (money availability)
   vi) Technology
   vii) Government facilities (MSP, Government policies). Etc.

28) Define Harvesting. Write sign of maturity of Cereals, Pulses & Oilseed.

-

Harvesting- 'The process of separating crop plants from the field. OR The removal of entire plants or economics parts after maturity from the field is known as harvesting.

Sign of maturity of cereals –

1. All the plant parts become dry.
2. Generally yellowing & drying of the leaves and stems occurs.
3. When ear head is pressed in between palms, seeds come out of capsule.
4. Grains break down into pieces if pressed under teeth. Etc

Sign of maturity of pulses –

1. Pods give peculiar noise when shacked in hands.
2. Drying of leaves & stems.
3. Grains break down into pieces when pressed under teeth.

29) Define Threshing. Write down the methods of threshing.

-

Threshing- 'The process of separating grains from earheds is known as threshing.'

Methods of threshing crops -

1) Beating - threshing of earhead is done by beating with stick.
2) Use of bullock power - threshing is done under the feet of bullock on threshing yard.
3) Use of hand driven machinery - Ex. Maize Sheller, Paddy foot thresher etc.
4) Use of power driven machinery - By Tractor, Thresher etc.

30) What is physiological maturity & harvesting maturity ? Write about Cleaning, Drying & Storage of field crops.

-

Physiological maturity - is the developmental stage after which no further increase in dry matter occurs in the economical part. Translocation of photosynthesis is stopped to economic part at the physiological maturity stage.

Harvesting maturity - it occurs generally seven days after physiological maturity. Loss of moisture from the plants occurs at this stage.

Cleaning – after threshing of earheds, grain should be separated from the bhussa. For this purpose we can use natural wind or artificial wind by holding the threshed grains against wind.

Drying – grains should be dried in bright sunshine to remove excess moisture for keeping the quality of grains.

Storage – we can store the grains in gunny bags, containers, storage house, bins, pots etc. for the purpose of future use.