

## IMPORTANT BITS AND QUESTIONS

Course Title: Fundamentals of Agronomy

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1. Term agriculture is derived from **Latin** words '*ager*' or '*agri*' meaning *soils* and '*cultura*' means '*cultivation*'
2. Agronomy is derived from the Greek words '*Agros*' meaning *field* and '*nomos*' meaning *to manage*.
3. **Agriculture** is a very broad term encompassing all aspects of crop production, livestock farming, fisheries, forestry etc.
4. **Agronomy** is a branch of agricultural science which deals with principles and practices of soil, water, and crop management
5. India is known as "**Land of Villages**" and **67%** of India's population live in villages.
6. **70%** of the rural population earns its livelihood from agriculture and other occupation allied to agriculture.  
Father of Agronomy: **Pietro de crescenzi**
7. **Seed** is a fertilized mature ovule consisting of intact embryo, stored food material (endosperm) and seed coat which is viable & has got the capacity to germinate.
8. Seed should contain **12-14%** moisture for storage.
9. Optimum temperature range for satisfactory germination of seed is **25 to 30°C**.
10. **Dormancy**: It is the failure of mature viable seed to germinate under favourable condition of moisture.
11. Thumb rule for depth of sowing is **3-4 times** more than the diameter of the seeds
12. **Scarification** is removal of dormancy due to the presence of hard seed coat or impermeable seed coats
13. **Rubbing and puncturing seed coat** come under mechanical scarification of seeds
14. **Stratification** is the placing of seeds close together in layers in moist sand or peat to preserve them or to help them germinate.
15. Primary tillage implements – **Mould board plough, Disc plough**
16. Secondary tillage implements – **Disc harrow, blade harrow**
17. **Thio-urea** solution is useful to break dormancy in Potato tubers.
18. The Indian Seed Act was enacted in **1966** but enforced from **October 2<sup>nd</sup>, 1969**.
19. Tag colour of breeder seed is **Golden Yellow**
20. The progeny of breeder seed is **foundation seed**
21. Tag colour of foundation seed is **White**
22. The genetic purity of foundation seed is **99.5%**
23. Tag colour of registered seed is **Purple**
24. **Certified seed** is the progeny of foundation seed
25. **Basic nutrients: C,H,O**
26. **Macronutrients: N,P,K,Ca,Mg,S**
27. **Micronutrients: Fe,Mn,Cl,B,Zn,Cu,Mo,Ni**
28. Tag Colour of certified seed is **Azar blue**
29. **Purity test** denotes the percentage of seeds (by weight) belonging to the variety under certification
30. The weight of **thousand seeds** of uniform size is called **test weight**
31. The per cent of seeds that produce or are likely to produce seedling is called **Seed viability**
32. **Tetra Zolium test** determines the percentage of viable seeds which may be expected to germinate.
33. **Sprinkler irrigation** is type of irrigation where WUE is more and also suitable for slopy areas
34. Weeds compete with plants for **all the resources** needed by plants
35. **Drilling** is followed for small seeded crops and **Dibbling** is used for bold seeded crops
36. Row to row and plant to plant spacing is not followed in **broadcasting method**
37. **Jethro Tull** is considered as '**Father of Tillage**'
38. **Jethro Tull** is the author of '**Horse hoeing Husbandry**'
39. **Tillage** is the physical manipulation of soil with tools & the tilling of land for the cultivation of crop plants
40. **Tilth** is the soil condition resulting from tillage
41. The relative proportion of different sized soil aggregates is known as **size distribution of soil aggregates**
42. Higher% of larger aggregates i.e. more than **5 mm** are necessary for **irrigated agriculture**
43. Higher% of smaller aggregates (**1-2mm**) are desirable for **dry land agriculture**.
44. Ideally the best size of granules or aggregates ranges from **1-6 mm**.
45. **Mellowness or friability**: is that property of soil by which the clods when dry become more crumbly.
46. **Fine seedbed or fine tilth** is required for **small seeded crops**
47. **Coarse/rough seedbed or rough tilth** is required for **bold/large seeded crops**
48. CO<sub>2</sub> in atmospheric air is about **0.03%** & in soil air **0.2 to 0.3%**
49. Tillage operations that are carried out from the time of harvest of a crop to the sowing of the next crop are known as **preparatory cultivation/ Tillage**.
50. **Primary tillage** is the ploughing operation which is opening of the compacted soil with the help of different ploughs.
51. Lighter or finer operation performed on the soil after primary tillage are known as **secondary tillage**
52. The tillage operations that are carried out in the standing crop are called **inter tillage operations**.
53. **Minimum Tillage** is aimed at reducing tillage operations to the minimum necessary for ensuring a good seedbed.

54. **Primary tillage** is common in all types of minimum tillage but **secondary tillage** is confined to the **row zone**.
55. **Zero tillage** is also called as **no till** or extreme form of minimum tillage
56. The word tillage is derived from **Anglo-Saxon**.
57. **Primary tillage** is completely avoided and **secondary tillage** is restricted to **row zone** only.
58. **Herbicides** usage is more in zero tillage
59. Herbicides used in zero tillage are **Paraquat** and **glyphosate**.
60. **Stubble mulch tillage** is year round system of managing plant residue with implements that undercut residue, loosen the soil and kill weeds.
61.  **puddling** is ploughing the land with standing water so as to create an **impervious layer**
62. **Conservation tillage** is disturbing the soil to the minimum extent & leaving crop residues on the soil.
63. **Conservation tillage** includes **minimum & zero tillage** which can reduce soil loss up to 99% over conventional tillage.
64. Number of plants per unit area in the cropped field is called as **plant population**.
65. Number of plants required to produce maximum output or biomass per unit area is called **Optimum plant population**
66. The elasticity is due to **tillering** and **branching** habit of the plants.
67. **Crop geometry** is the arrangement of the plants in different rows and columns.
68. Example for Nitrogen (N) and Phosphorus(P) containing fertilizer is **DAP**
69. **Example for Calcium(Ca) and Sulphur(S) containing fertilizer is SSP**
70. Plant needs **17 elements** for their growth and completion of life cycle.
71. Carbon, Hydrogen and Oxygen were called as **Basic nutrients**
72. Example of Straight fertilizers: **Urea, SSP and MOP**
73. The nutrient content of **Urea** is **46%** whereas the nitrogen content of **Anhydrous ammonia** is **82%**
74. The indicator plant for potassium deficiency is **Potato**
75. The shortest time span during the crop growth when weeding results in highest economic returns is called **Critical period**

Phosphorus	<b>root growth, photosynthesis, respiration</b> and <b>overall plant growth</b>
Potassium	Overall resistance to cold, diseases, insect pests, etc. Promotes the formation of flower buds
Calcium	Plays a vital role in plant structure, <b>root growth</b> and the <b>ripening of fruit and seeds</b> .
Magnesium	<b>Important part of chlorophyll. Ripening of fruits and seeds</b>
Sulfur	<b>Required by oilseed crops</b> , Component of several <b>proteins, enzymes and vitamins. Contributes to chlorophyll production</b>
Iron	<b>Essential for chlorophyll production</b> . Also contributes to the formation of some <b>enzymes and amino acids</b>
Molybdenum	Essential for <b>nitrogen assimilation by plants and nitrogen fixation by bacteria</b>
Nickel	Key component of <b>selected enzymes</b> involved in <b>N metabolism and biological N fixation</b>

76. Blue green, or red-purple leaves is due to deficiency of **Phosphorus**
77. The crop with lowest WUE is **Rice**
78. The crop with highest WUE is in millets. **Eg: finger millet**
79. Terminal points are affected due to lack of **Calcium** and **Boron**
80. Leaves show interveinal chlorosis with reddish purple colour is a deficiency symptom of **Magnesium**
81. Rough, cracked, or split fruits is a deficiency symptom of **Boron**
82. **Butachlor** and **Alachlor** herbicide belongs to **amides group**
83. **Paraquat** and **diquat** herbicide belongs to **Bipyridyliums group**
84. **Atrazine** and **simazine** herbicides belong to **Triazines group**
85. **2,4-D, 2,4 , 5-T** and **MCPB** belong **Phenyl group**
86. Example of herbicide which is selective to **all grasses, sedges and broadleaved weeds: Pyrazosulfuron**
87. The most often used herbicides belong to **Organic and non-oils**
88. The least often used herbicides belong to **Inorganic type**
89. Physical methods of weed control include **hand weeding, moving, sickling and digging**
90. The herbicide useful for **post emergence application** is **2,4-D** and **Glyphosate**.
91. The herbicide suitable for **Pre-planting application** is **Fluchloralin**.
92. **Simazine** and **Atrazine** are used for **Pre-emergence application**.
93. The **broadleaved weeds** are controlled in cereal crops like **rice, wheat** and **maize** by **2,4-D** application.
94. Excess **phosphorus** causes deficiency of **iron** and **zinc**
95. The average annual rainfall of India is **1194 mm**
96. **Manures** are plant and animal wastes that are used as sources of plant nutrients.
97. **Bulky organic manures** contain small percentage of nutrients and applied in large quantities.
98. **Concentrated organic manures** contain more percentage of nutrients and applied in smaller quantities.
99. Nutrient content of FYM is **0.5% N, 0.2% and .0.5% K<sub>2</sub>O**.
100. The nutrient which is mostly lost via leaching is **Nitrogen (N)**
101. Chemical preservatives used to reduce losses and enrich farmyard manure are **Gypsum (CaSO<sub>4</sub>.2H<sub>2</sub>O)** and **Superphosphate**
102. Sheep and goats are kept overnight in the field and urine and fecal matter added to the soil is called **Sheep/goat penning**

103. **Composting** is the natural process of 'rotting' or decomposition of organic matter
104. The critical stage of irrigation in maize is **knee high stage, Tasseling stage** and **silking stage**
105. The critical stage of irrigation in wheat is **CRI (crown root initiation)**
106. The critical stage of irrigation in rice is **Panicle Initiation, Flowering**
107. The plant nutrient which is highly mobile in plants but immobile in soil is **Phosphorus(P)**
108. The compost made from waste like sugarcane trash, paddy straw, and weeds is called **farm compost**.
109. The average nutrient contents of farm compost are **0.5% N, 0.15% P<sub>2</sub>O<sub>5</sub>** and **0.5% K<sub>2</sub>O**.
110. The plants absorb nitrogen in the form of **NH<sub>4</sub>, NO<sub>3</sub>** and in **Amide form**
111. **Aerobic decomposition** is first and after which **anaerobic decomposition** takes place in **Bangalore method**
112. Black muddy solid portion of the drain is called **sludge** and the liquid is called **sewage**.
113. Oil cakes which can be safely fed to livestock are called **Edible oil cakes**.
114. Oil cakes which are not safe to livestock are called **non-edible oil cakes**
115. Crops grown from **June-July to September-October** are called as **Kharif crops**
116. Crops grown from **October-November to January-February** are called as **Rabi crops**
117. Crops grown from **February-March to May-June** are called as **Summer crops**
118. Highest Nitrogen content of **7.9%** is present in decorticated **Safflower cake**.
119. Highest Phosphorus and Potassium content of **2.9% and 2.2%** is present in **Cotton seed cake**
120. Nitrogen content in **vermicompost** is **3 percent**
121. The soil water potential at permanent wilting point is **-15 bar**
122. The **surface dwelling earthworms** Red worms (*Eisenia foetida*) and composting worm (*Peronyx excavatus*) should be used for vermicompost preparation
123. Scientific names of Sun hemp is *Crotalaria juncea*
124. Application of **green leaves and twigs of trees, shrubs** and **herbs** collected from elsewhere is known as **green leaf manuring**.
125. The presence of water in excess of field capacity is termed as **Gravitational water**
126. Placing the seeds in the field with the help of dibbler is called **dibbling**.
127. Planting the seedlings raised in the nursery beds in the main field is called **transplanting**
128. Example of **amide** containing fertilizers are **Urea** and **Calcium cyanamide**.
129. Except **rice**, all crops absorb nitrogen in nitrate form
130. The green manure crop which will produce nodules on stem is **Sesbania rostrate**
131. Examples of edible oil cake: **Groundnut cake, Sesamum and linseed cake**
132. Examples of non-edible oil cakes: **Karanj cake, Castor cake, etc**
133. The water use efficiency is expressed in **kg/ha/mm**
134. The Nitrogen content of various nitrogen fertilizers

Fertilizer	Nutrient content
<i>Ammonium sulphate</i>	20.6% N and 24% S.
<i>Ammonium chloride</i>	26% N

135. Free-living N fixing bacteria: *Azotobacter*
136. Symbiotic N fixing bacteria: **Rhizobium**
137. **Arbuscular mycorrhiza** is Phosphate solubilizing bacteria
138. **Pseudomonas** is a Plant growth promoting rhizobacteria
139. The Rhizobia have seven genera and highly specific to form nodule in legumes, referred as **cross inoculation group**.
140. The rhizobium strain required for **pea** is *Rhizobium leguminosarum*
141. The rhizobium strain required for **Soyabean** is *Rhizobium Japonicum*
142. The **Azotobacter** and **azospirillum** are required for **non-leguminous crops**
143. The **azolla** is in symbiotic relationship with cyanobacteria i.e **Anabena azolla**
144. The protein content of **azolla** on dry weight basis is 25 – 35 per cent.
145. The most common method of biofertilizer is **seed treatment**
146. The root dipping method of biofertilizer is followed in **transplanting vegetable crops**
147. Nutrient use efficiency (NUE) may be defined as **yield per unit input**.
148. Only **2.6%** is fresh water resources
149. Out of 400 mm of rainfall, **75%** of it is received during **south-west monsoon period**
150. **Crop water requirement** is the quantity of water regardless of source, needed for normal crop growth and yield in a period of time at a place and may be supplied by precipitation or by irrigation or by both
151.  $WR = CU + \text{application losses} + \text{water needed for special operations}$ .
152.  $WR = IR + ER + S$
153. Artificial application of water to the soil for the purpose of crop production is called **Irrigation**
154. The yield of marketable crop produced per unit of water used in evapotranspiration is called **Water use efficiency (WUE)**
155. Different methods in Climatological approach are **IW/CPE ratio method** and **pan evaporimeter method**
156. The problem associated with excessive irrigation on poorly drained soils is called water logging
157. The water logging can be prevented by **proper drainage**
158. In water logging conditions **oxygen (aerobic)** in rot zone is replaced by **carbon dioxide (anaerobic)**

159. The amount of water required to produce a unit amount of dry matter is known as **transpiration ratio**
160. Plants excrete allelochemicals in soil which inhibit germination and growth of other plants – Allelopathy
161. The critical period of weed competition is approximately **1/3rd** of the duration of the crop.
162. Minimizing the weed population and their growth below the level of economic injury to the crop is called **weed management**.
163. The complete elimination or destruction of all live plant parts and seeds of a weed infestation from an area is called **Weed control**
164. Limiting any given weed infestation to extent that it permits economic crop production is called **weed eradication**
165. The **black polythene mulch** is more effective for controlling weeds.
166. The growing of same crop year after year in the same field is called **monoculture**
167. Altering different crops is called **crop rotation**.
168. Fast growing and fast shading crop is called **smother crops** and this is phenomenon is called **smothering**.
169. **Solarization** is a method where the soil temperature is further increased by 5 to 10<sup>0</sup> C by covering a pre-soaking fallow field with transparent plastic sheet.
170. The **Selectivity of herbicides** enables control of target weed species inspite of the presence of other plants.
171. **Selectivity of herbicides** is considered to be the greatest single factor that helped in the success of chemical weed control.
172. Cutting and burning of forests to create field for agriculture is called **Slash and burn technique**
173. The plant growth inhibitor causing closure of stomata in plants is **ABA (Abscisic acid)**
174. An adjustment by an organism to the environmental condition is termed as **adaptation**
175. The crops grown for covering soil and to conserve moisture due to leaching and erosion by wind and water is **cover crops**
176. The soil property which is not affected by tillage is **Soil texture**
177. Tillage under saturated condition is termed as **Wet tillage** or **puddling**
178. Available water is between **Field capacity (FC)** and **PWP (Permanent Wilting point)**
179. Tillage operations for a crop from the start of crop season to the crop harvest is known as **inter-tillage operations**
180. In populations of similar genotype, in the absence of weeds, the competition is known as **Intra-species competition**
181. The 4R's of nutrient practices are **right time, right method, right place, and right quantity**.
182. The term ideotype was coined by **Donald** in **wheat**
183. **ICAR** was established in which **year- 1929**
184. **Acidity** indicates the soil reaction
185. Application of fertilizer through irrigation water is called **fertigation**
186. Rainfall received in Odisha, Andhra, west Bengal is mostly through **south-west monsoon**
187. Rainfall is measured by **rain gauge**
188. The atmosphere contains **0.04 % CO<sub>2</sub>, 21 % O<sub>2</sub> and 78 % N<sub>2</sub>**
189. The total geographical area of India is **328 million ha**
190. Growing of two or more crops simultaneously on the same piece of land is **intercropping**
191. Growing of two or more crops simultaneously intermingled without any row pattern is **mixed cropping**
192. Growing hardy or thorny crops around the main crop is **guard crop**
193. Growing sub-groups (augmenting) to maintain the yield of main crop is **augmenting crop**
194. **Sequence cropping** is growing of two or more crops in sequence on the same piece of land in a farming year
195. **Ratoon cropping** is revising a crop with regrowth coming out of roots or stalks after harvest of the crop
196. **Adaptation** is any feature of an organism which has survival value under existing conditions of its habitat
197. **Acclimation** is non-heritable modification of plant characters caused by exposure to new environmental conditions
198. Physiological response of plants to day length and dark periods is called **photoperiodism**.
199. Short day plants require **less than 10 hours** of photoperiod Eg: rice, soybean, onion
200. Long day plants require more than **14 hours** of photoperiod. Eg: wheat, barley
201. Intermediate day plants require **10 to 14 hours** of photoperiod. Eg: Sugarcane
202. Day neutral plants examples are **tomato** and **sunflower**
203. Response of plants towards temperature is **thermoperiodism**
204. Highly saline soil's tolerant crops are **barley and cotton**
205. **Lime** is used for reclamation of **acid soils and gypsum for alkali soils**

Match the following:

- |                            |   |  |
|----------------------------|---|--|
| 1. Tillage                 | - | bulk density                                 |
| 2. Sustainable agriculture | - | agro-ecology                                 |
| 3. Agronomist              | - | crop protocol                                |
| 4. Crop geometry           | - | spatial arrangement                          |
| 5. Synergism               | - | Stimulation                                  |
| 6. Cohesion                | - | attraction of water molecules for each other |
| 7. Adhesion                | - | attraction of water to soil particles        |
| 8. Field capacity          | - | 1/10 to 1/3 atm                              |
| 9. Permanent wilting point | - | 7 to 32 atm                                  |
| 10. Hydraulic conductivity | - | permeability                                 |
| 11. Podu cultivation       | - | hilly tracts                                 |
| 12. Jetro tull             | - | Tillage, weed, horse hoeing husbandry        |
| 13. Gap filling            | - | plant population                             |

#### 14. Earthworm - vermicompost

##### Differentiate between the following:

1. Meteorological drought vs Hydrological Drought
2. Soil fertility vs Soil productivity
3. Physiological maturity vs harvest maturity
4. Saline soil vs sodic soils
5. Tropical crops vs temperate crops
6. Oxilophytes vs Halophytes
7. Determinate plant vs indeterminate plant
8. Pre-planting herbicide vs pre-emergence herbicide
9. Pre-emergence herbicide vs post emergence herbicide
10. Surface drainage vs Sub-surface irrigation
11. Tillage vs tith
12. Mixed cropping vs intercropping
13. Cash crop vs catch crop vs trap crop
14. Monocropping vs monoculture
15. Primary tillage vs secondary tillage
16. Primary vs secondary nutrients

##### Sort answer questions

1. Puddling
2. Square planting
3. Yield attributes
4. Multiple cropping
5. Cardinal temperature
6. Acid soils
7. What is threshing? Write about threshing methods
8. Scope of agriculture in India
9. Management of waterlogged soils
10. What is scarification? Name different types
11. What is certified seed? Which colour tag is kept in the package of certified seed?
12. What is tillage and who is considered as father of tillage
13. What is Stubble mulch tillage?
14. What is Zero tillage or No-tillage?
15. What is straight fertilizer? Give one example of straight fertilizers containing each of nitrogen, phosphate and potash
16. In which forms nitrogen, phosphorus and potassium are absorbed by the plants?
17. What is vermicomposting?
18. What is brown manuring?
19. What is water requirement of crops
20. What do you mean by water use efficiency (WUE) and nutrient use efficiency (NUE)
21. Crop ideotype characters of Rice and wheat?

##### Long answer questions

1. What are the objectives of tillage? Write the characteristics of a good tith?
2. What do you mean by puddling? Write the procedure of puddling, its advantages and disadvantages.
3. What is crop/plant geometry? Explain the role of plant population on crop growth and yield.
4. What is cropping system? Write the principles and advantages of crop rotation
5. What do mean by integrated nutrient management? Write the components of INM and their role in maintaining soil health
6. What is bio-fertilizer? Write their types as per source of nutrients available. Write the method of application of different types of bio-fertilizers and quantity to be applied
7. Agriculture is an art, science as well as business of crop production. Justify with examples
8. Write the factors affecting crop production? Discuss in brief the role of environmental factors influencing crop production and productivity
9. Define agronomy. Describe the scope of agronomy
10. What are the methods of sowing? Describe different sowing methods with advantages and disadvantages of each
11. What is green manuring? Describe the process of green manuring. What are the advantages of green manuring?
12. Classify nitrogenous fertilizers with examples? Why split application of nitrogenous fertilizers is practiced?
13. Why bio-fertilizer is important in nutrient management of plants?
14. Briefly discuss about different plant growth substances?
15. Factors affecting growth and development of plants