

Class 12 Agriculture Sample Question Paper 2016

Class 12 Agriculture Sample Paper 2016 Solved

1 Mark Questions

1. Define soil fertility.

Ans: Soil fertility is the inherent capacity of the soil to supply nutrients to plants in adequate amounts and suitable proportions. All productive soils are fertile, but all fertile soils need not be productive. Problems like salinity/ alkalinity, acidity, waterlogging, adverse climatic conditions, etc, may cause fertile soils to be unproductive. Soil fertility is an index of available nutrients to plants.

2. Post-harvest technology is useful. Justify it giving a reason.

Ans: Post-harvest technology is an interdisciplinary "science and technique" applied to horticultural/agricultural produce immediately after harvest for its protection, conservation, processing (cooling, cleaning, sorting), packaging, distribution, marketing, and utilization to meet the food and nutritional requirements of the people in relation to their needs.

3. Define spawn?

Ans: Spawn is the mycelium of mushrooms growing in its substratum and prepared for propagating mushroom production. In other words, it is defined as a medium impregnated with mushroom mycelium that serves as the "seed" for mushroom cultivation.

4. Write one benefit of landscaping in urban area?

Ans: Cities and metropolises are densely populated. The most common problem is air, dust, and noise pollution. Trees with their huge canopy minimize these pollutions by filtering dust and absorbing gaseous pollutants. Parks and tree canopies help reduce noise, stress, and blood pressure and improve the quality of life of people living around them.

5. What is apiculture?

Ans: It is the art and science of rearing honey bees, maintaining, and manipulating honeybees colonies (hives), which could be for collecting honey and beeswax, or for pollinating crops, or for the purpose of selling bees to other beekeepers.

2 Marks Questions

6. Explain the importance of organic farming in the present scenario.

Ans: The green revolution fulfilled our aspirations by changing India from a food-importing to a food-exporting nation, which involved greater use of synthetic agrochemicals such as fertilizers and pesticides with the adoption of nutrient-responsive, high-yielding varieties of crops.

However, the achievement was at the expense of soil health and the environment and to the harm of the well-being of the people. Hence, a natural balance needs to be maintained at all costs without affecting the soil health as well as getting higher crop yields and quality of products for an ever-increasing population. Thus, organic farming is a potential alternative to conventional agriculture, which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives, etc) and to the maximum extent feasible relies upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives, and biological system of nutrient mobilization and plant protection.

7. What are blue-green algae? In which crop, blue-green algae are recommended as a biofertilizer?

Ans: Blue-green algae or cyanobacteria are photosynthetic prokaryotic microorganisms capable of fixing atmospheric nitrogen. They make a substantial contribution in the nitrogen economy of crop production. The predominant genera of nitrogen-fixing BGA are *Anabaena*, *Nostoc*, *Calothrix*, and *Tolypothrix*.

Blue-green algae are recommended for lowland rice. In submerged rice fields, BGA is applied one week after transplanting at a rate of 10 Kg /ha, and the field is flooded with 2.5 to 5 cm deep water.

8. Explain the reasons behind the use of thermal processing during food processing and preservation?

Ans: Reasons behind the use of thermal processing during food processing and preservation are

- a) Inactivation of enzymes to check biochemical reactions like ripening.
- b) To kill microorganisms, as most of them are killed in the range 82-93°C. Spores are not destroyed even at 100°C for 30 min. Therefore, to ensure sterility (total microbial destruction, including spores), a temperature of 121°C must be maintained for 15 min or longer.

9. Indian food industry is growing annually at the rate of 8-9%. What, in your opinion, are the factors hampering the growth of food processing in India as compared to other countries?

Ans: Major factors hampering the growth of the food processing sector and holding it back.

- a) Comprehensive national-level policy on the food processing sector
- b) Availability of trained manpower and cost-effective food machinery & packaging technologies

10. One of the problems with use of chemical pesticides is that it affect non-target species also. How can one solve this problem?

Ans: Chemical pesticides have proven harmful to various other species in the ecosystem that could be beneficial. However, plant-based biopesticides are devoid of these effects. Example

neem leaves, seed kernels, and neem extracts. Moreover, Bio-pesticides are preferred over chemical pesticides for the following reasons: no harmful residues; target specific and safe to beneficial organisms like pollinators, predators, parasites, etc.; growth of natural enemies of pests is not affected, environmentally friendly, and cost-effective.

5 Marks Questions

11. (a) What is Insect Pest Management?

(b) How are cultural methods applied to control pests?

(c) Illustrate the method of biological pest control with two examples.

Ans:

a) Insect pest management or Integrated Pest Management (IPM) is a system that, in the context of the associated environment and population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains pest populations at levels below those causing economic injury.

b) The cultural control is a key component of Integrated Pest Management. Cultural method of pest control involves the use of production and management techniques followed by farmers for crop productivity to manipulate the pest population. Cultural control consists of introducing minor changes in the farm practices and farm machinery that aid both in agricultural production and pest control.

Cropping Techniques	Pest controlled
Summer ploughing	Red hairy caterpillar of Groundnut
Puddling under lowland conditions in paddy cultivation	Rice mealy bug
Pest-free seed material	Potato tuber moth, Banana rhizome weevil
High seed rate	Sorghum shootfly
Plant density	Rice Brown planthopper
Trap cropping in cabbage and cauliflower. Trap crop is mustard	Diamondback moth
Earthing up	Sugarcane early shoot borer
Destruction of weed hosts (<i>Tinospora cordifolia</i>)	Citrus fruit sucking moth
Trimming and plastering	Rice grass hopper

The cropping techniques mentioned above are adopted for pest control. The cultural control can be effective if practiced at the community level. For example, farm practices like synchronised sowing, crop sanitation, crop rotation have a beneficial effect if adopted on a large scale.

c) **Biological control**

The study and utilization of parasitoids, predators, and pathogens for the regulation of pest population densities is called biological pest control. The techniques adopted for biological control are as follows:

- 1. Conservation and encouragement of indigenous natural enemies
- 2. Introduction of natural enemies into a new locality
- 3. Mass culturing and release of natural enemies to increase their population.

Parasitoids as a biocontrol:

A parasitoid is an insect parasite of an arthropod, which is parasitic in the immature stages, and adults are free-living.

- e.g. 1. *Trichogramma chilonis* on the eggs of sugarcane internode borer, cotton bollworm.
- 2. *Chelonus blackburni* on the eggs of cotton spotted bollworm.

Predators as a biocontrol:

A predator is a free-living organism throughout its life. The predator kills its prey. The predator is usually larger than its prey.

- e.g. 1. Ladybird beetle (*Coccinella septempunctata*) against aphids (pest).
- 2. Reduviid bug (*Rhinocoris fuscipes*) against cotton American bollworm (*Helicoverpa armigera*) (pest)

12. Summarize the function and deficiency symptoms of calcium and magnesium.

Ans: Functions of calcium:

- a) Calcium in plants forms Ca-pectate, which is an essential constituent of the cell wall.
- b) Calcium increases the stiffness of plants.
- c) It is involved in mitosis.
- d) It maintains chromosome structure.
- e) It regulates the meristem growth and functioning of the root tips.
- f) It protects the root cells against low pH, ion balance, and the toxic effects of Al, Fe, etc.
- g) It regulates the activities of enzymes like phospholipase, arginine kinase, amylase, and ATPase.

Deficiency of calcium:

- a) Deficiency symptoms are observed on the younger leaves as calcium is immobile in plants.
- b) Younger leaves in the calcium-deficient plants are short and distorted.

- c) Under severe deficiency conditions, the apical meristem dies, resulting in the production of tillers from the basal nodes.
- d) In case of cereal crops, the upper internodes are small and the leaves are crowded, exhibiting a rosette appearance.
- e) The root system is stunted. The flowering and maturity are delayed due to calcium deficiency.
- f) Calcium deficiency syndromes in apples are bitter pit and in tomatoes, blossom end rot.

Functions of magnesium:

- a) Magnesium is an essential constituent of chlorophyll, and so it is important for the photosynthesis process.
- b) It regulates the activities of enzymes involved in the nucleic acids synthesis and metabolism of carbohydrates.
- c) Magnesium aids in the movement of sugars and the translocation of phosphorus in the plants.

Deficiency of magnesium:

- a) Deficiency symptoms are observed in the plants with less than 0.1 % Mg.
- b) Magnesium-deficient plants lack vigour, and they are normally stunted.
- c) The older leaves exhibit the deficiency symptoms as magnesium is mobile in plants. Inter-veinal chlorosis followed by purple lesions within the chlorotic tissues is observed. As deficiency advances, the veins too become chlorotic and the leaves develop a pale colour. The purple lesions turn brown or red.
- d) Premature leaf abscission is observed in the deficient plants.
- e) In cotton, the lower leaves develop a reddish purple color, and finally necrosis occurs (Reddening of leaves).
- f) In Brassica, the lower leaves exhibit chlorosis with inter-veinal mottling. This condition is called puckering.

13. (a) Classify the various categories of food processing units according to Food Product Order (1955) of Government of India?

(b) Explain the main features of cold chain scheme of Government of India?

Ans:

(a) Categories of fruit processing units

According to the Fruit Products Order (1955) of the Government of India, the fruit processing units are categorized as under, depending on the installed capacity and the requirement of minimum area for processing (Table 1).

Table 1: Categorization of fruit processing units and the requirement of area.

Category	Annual Production (tonnes)	Minimum manufacturing area required (m ²)
Home scale(B)	25	25
Cottage scale	10-50	60
Small Scale(A)	50-100	100
Small Scale(B)	100-250	150
Large Scale	250	300

Source: www.mofpi.nic.in

(b) Cold Chain Scheme:- Launched by the Government of India to provide an integrated cold chain and preservation infrastructure facilities without any break from the farmer's field to the consumer. It covers pre-cooling facilities at production sites, reefer vans, mobile cooling units as well as value addition centres, which include infrastructural facilities like Processing, Multi-line Processing or Collection Centres, etc., for horticulture and other allied agricultural produce.

14. Value addition to food products has assumed vital importance in our country due to diversity in socio-economic conditions, industrial growth, urbanization, and globalization.

(a) List the various value additions from wheat.

(b) Describe the steps in the production of wheat flakes?

Ans:

(a) Various value additions from cereals

- 1) Milled product
 - a) Wheat powder/flour
 - b) Maida flour
 - c) Sooji/rava
- 2) Processed products
 - a) Malted wheat
 - b) Puffed wheat
 - c) Wheat flakes
- 3) Bakery products
 - a) Bread
 - b) Bun
 - c) Cakes/Pastries
 - d) Rusk/soup stick

- e) Cookies / Biscuits
- f) Pizza

(b) Steps in the production of wheat flakes

- Raw Material:
 - a) The most important raw material is grain.
 - b) Other ingredients, such as salt, yeast, sweeteners, flavoring agents, coloring agents, vitamins, minerals, and preservatives, are also used.
 - c) A wide variety of flavors, like chocolate, cinnamon, and other spices, and fruit flavors may be added.
 - d) Vitamins and minerals are often added to wheat flakes to replace those lost during cooking.
 - e) The antioxidants BHA and BHT are the preservatives most often added to prevent them from becoming stale and rancid.
- Preparing the grain: Grain is received at the factory, inspected, and thoroughly cleaned.
- Making wheat flakes: Cleaned grains are tempered in bins and subsequently steamed at atmospheric pressure until they attain a moisture of 21%. The steamed wheat is passed through steam rollers, which rupture the bran coat and flatten the whole grain, thus making the kernels more permeable to moisture during the cooking step. The flattened kernels are then cooked in rotating retorts along with malt, salt, sugar, etc. for 90 min at 20 psi steam pressure. The resulting flakes are conveyed to ovens where they are tossed in a blast of very hot air to remove remaining moisture and to toast them to a desirable color and flavor with less than 3% moisture.
- Adding coatings: After shaping, the wheat flakes may be coated with vitamins, minerals, sweeteners, flavors, food colors, or preservatives.

Packaging and storage: Prepared flakes are packed in a suitable moisture-proof container of suitable size. Later, they were stored in a cool and dry place.

15. (a) Develop a plan to set up a nursery with an area of 0.2 ha?

(b) Identify the major problem associated with the packing, handling, and marketing of plant saplings?

Ans:

Ans:

- Mother Plants: The Area fixed for mother plants is an important part of developing a nursery. The mother plants must be true to the type and true to the variety.
- Pot Nursery: is where pots are kept and stored.
- Poly bag nursery: The propagated plants are planted in nursery beds for better growth or to harden the plants. In general, this type of nursery bed is prepared under partial shade

- Ball Nursery including beds: Ball Nursery including beds of 100 m x 55 m dimension with smaller seed beds.
- Workshed: The workshed of 6 m x 4.5 m with thatch roofs and locally available materials like bamboo, wood, etc., may be constructed.
- Polyhouse: The polyhouse of 9 m x 4 m dimensions with 90 cm brick wall, 3.6 m tall rhombus netting with expanded metal, and polythene roof supported by local materials like bamboo, wood, and planks, may be constructed.
- Store-cum-office: A store-cum-office of 6.0 m x 4.5 m constructed with locally available materials may serve the purpose.

Space allotment	Sq. m.
Mother Plants	560
Pot Nursery	200
Polybag Nursery	350
Ball Nursery, including beds	550
Workshed	27
Polyhouse	36
Store cum office	27
Total	1750
15% additional for passage, drainage, etc.	260
Grand Total	2010

While packing plants, the container is neither over-packed nor loose enough, allowing the contents to move about. All space should be filled with some packing materials like straw, dried grass, etc. For long-distance destinations, the ball of the earth should be soaked in water and covered with a thick layer of wet moss. Only plants having a well-developed root system should be selected for such destinations.

Marketing of plants and planting materials is the most crucial part of the nursery business. The production of high-quality, true to the type, and attractive planting materials is necessary. They must be free from pests and diseases and vigorously growing.

10 Marks Questions

16. (a) What do you understand by the terms Field Capacity and Permanent Wilting Point?
(b) Explain irrigation scheduling using critical crop growth stages?
(c) Describe drip irrigation system with suitable diagram.

Ans:

(a)

- Field capacity: The field capacity of soil describes the maximum amount of water that a soil will retain after free drainage. This situation usually exists one to three days after the soil has been thoroughly wetted by irrigation or rain. The field capacity is the upper limit of the available moisture range in soil moisture and plant relations. The soil moisture tension at field capacity varies from soil to soil, but it generally ranges from 1/10 to 1/3 atmospheres. At field capacity, the micro pores are filled with water, and the large soil pores are filled with air.
- Permanent wilting point: The permanent wilting point is the soil water content at which plants can no longer obtain enough moisture to meet transpiration requirements and remain wilted unless water is added to the soil. At the permanent wilting point, the water film is held tightly around the soil particles so much so that the roots in contact with the soil cannot remove the water at a sufficiently rapid rate to prevent wilting of the plant leaves. It is considered equivalent to the water held by the soil against an applied pressure of 15 bars.

(b) Irrigation scheduling is defined as the frequency with which water is to be applied based on the needs of the crop and the nature of the soil. Irrigation scheduling is a decision-making process that involves when to irrigate and how much water to apply. Irrigation scheduling may also be defined as a scientific management technique of allocating irrigation water based on the individual crop water requirement under different soil and climatic conditions, to achieve maximum crop production per unit of water applied over a unit area in unit time.

The objectives of irrigation scheduling are as follows:

- High water-use efficiency
- High crop productivity
- Low irrigation cost
- Minimal damage to the soil ecosystem
- Minimal weed menace
- High fertilizer-use efficiency

Critical stage approach

The approaches to irrigation scheduling include direct and indirect approaches. The critical stage approach is an indirect approach to irrigation scheduling. Irrigation may be scheduled according to the physiological stages. The growth period of an annual crop can be divided into four growth stages.

- Initial stage: Sowing to 10% ground cover
- Crop development stage: 10 to 70% ground cover

- Mid-season stage: Flowering to grain setting stage
- Late season stage: Ripening to harvesting stage

Certain physiological stages are critical during which there should not be moisture stress. These stages are called as critical stages of crop growth. Water supply should be ensured at these stages to get a high yield. The critical crop growth stages of a few crops are as follows:

Crop	Critical stages
Wheat	Crown root initiation and flowering
Paddy	Early tillering and flowering
Maize	Tasselling and silking
Potato	Sprouting and tuberization

(c) Drip irrigation is one of the latest methods of irrigation. Drip irrigation involves the application of water near the plant roots at short intervals through a network of piping. It allows an irrigator to limit watering closely to the consumptive use of the plants. The crop yields are higher by adopting this method on account of increased water use efficiency. The water conveyance and application losses are minimized in this irrigation method. It is suitable for water scarcity and salt-affected soils. Drip irrigation is highly suitable for wide-spaced and high-value crops like coconut, grapes, lime, banana, vegetables, mango, pomegranate, etc.

Components of a drip irrigation system:

- A drip irrigation system consists of a pump or overhead tank, main line, sub-mains, laterals, and emitters. The mains, sub-mains, and laterals are usually made of black PVC (polyvinyl chloride) tubing.
- The main line delivers water to the sub-mains and the sub-mains to the laterals.
- The emitters, which are attached to the laterals, distribute water for irrigation.
- Other components include pressure regulator, filters, valves, water meter, fertilizer application components, etc..

Pump: The pump creates the pressure necessary to force water through the components of the system. Centrifugal pumps operated by engines or electric motors are commonly used.

The laterals may be designed to operate under pressures as low as 0.15 to 0.2 kg/cm² and as large as 1 to 1.75 kg/cm².

Chemical tank: A tank may be provided at the head of the drip irrigation systems for applying fertilizers, herbicides, and other chemicals in solution directly to the field along with irrigation water.

Filter: It is an essential part of a drip irrigation system. It prevents the blockage of pipes and

drippers/emitters. The filter system consists of valves and a pressure gauge for regulation and control.

Emitters: Drippers are provided at regular intervals on the laterals. The drippers allow water to trickle out at very low rates. The amount of water dripping out of each emitter in a unit time will depend on the pressure and size of the opening. The water coming out of the emitters is almost at atmospheric pressure.

17. (a) What is fruit jelly?

(b) Discuss in detail about the preparation of jelly from Guava including the raw material, ingredients, and machinery required.

(c) Give a FPO (1955) specification for fruit jelly?

Ans:

(a) A jelly is a semi-solid product prepared by boiling a clear, strained solution of pectin containing fruit extract, free from pulp, after the addition of sugar and acid.

(b) Raw material, ingredients, and machinery required

- 1. Fresh ripe guava,
- 2. Sugar, Citric acid
- 3. Guava: Sugar: Citric acid: 1kg : 750gm: 3.0 gm
- 4. Stainless steel knives, ladle utensils for cooking and mixing, wide-mouthed glass bottles, sterilization tank, juicer/basket press, bhatti/LPG stove/boiler, Thermometer, Jelmeter, or Refractometer, etc.

Preparation of guava jelly

- 1) Select sound, mature fruits, wash thoroughly, and cut them into small pieces along with the peel (peel contains maximum pectin).
- 2) Add sufficient water so that the pieces are dipped in water, and add citric acid 1.5 to 2 g/kg of fruits.
- 3) Boil the mass gently to enable the release of pectin.
- 4) Repeat the process 2-3 times for complete extraction of pectin.
- 5) Strain the mass through a muslin cloth to separate the extract. Do not squeeze; only strain all the extracts.
- 6) Collect only the supernatant.
- 7) Determination of pectin content: The pectin content of the strained extract is usually determined by one of the following two methods.
 - a) Alcohol test:
 - b) Jelmeter test. The reading of the level of extract in the Jelmeter is noted. This figure indicates how many parts of sugar are to be added to one part of juice.
- 8) If the pectin contents are poor, concentrate the extract till it gives a test of high pectin or, if required, add the pectin externally.
- 9) Cooking is carried till end point reached. The endpoint of a jelly can be judged by using any of the following methods:

- a) Cold plate test
- b) Sheet or flake test
- c) Temperature of boiling mixture: At the end point, the temperature of boiling jelly is around 105.5°C.
- 10) Pour the finished jelly into clean, dry, pre-sterilized jars.
- 11) Allow the product to cool and seal the jar air-tight with a layer of molten paraffin wax.
- 12) Label and store in a cool and dry place.

(c) FPO specifications for jelly

Fruit contents	Not less than 45%
Total soluble solids	Not less than 65% (w/w)
Preservatives	Sulphur dioxide (Not more than 40 ppm) Benzoic acid (Not more than 200 ppm)
Synthetic sweetening agents	Not permitted
Fermentation test	Negative
Organoleptic test	Retain flavour of original fruit and free from burnt or other objectionable flavour
Crystallization	Absent

18. How can you plan button mushroom production taking into account the following factors?

a) Agro-climatic requirement

b) Varieties/ strains

c) Casing

d) Harvesting and yield

e) Important pests and diseases

Ans: a) **Agro climatic requirement:** In India, button mushrooms are grown seasonally and in environment-controlled cropping houses. White button mushroom requires 20-28°C for vegetative growth (spawn run) and 12-18°C for reproductive growth; relative humidity of 80-90% and enough ventilation during cropping. Seasonally, it is grown during the winter months in the north-west plains of India and for 8-10 months in a year on the hills. However, with the advent of modern cultivation technology, it is now possible to cultivate this mushroom anywhere in India.

b) **Varieties / Strains:** The strains that are mostly cultivated in India are S-11, TM-79, Horst H3, Ooty 1, and Ooty (BM) 2.

c) **Casing:** The compost beds after a complete spawn run should be covered with a layer of soil (casing) about 3-4 cm thick to induce fruiting. The casing material should have high porosity, water holding capacity, and pH 7-7.5.

Mixtures like garden loam soil and sand (4:1); decomposed cow dung and loam soil (1:1), and spent compost (2-3 years old); sand and lime are commonly used as casing. The casing soil before application should be either pasteurized (at 66-70°C for 7-8 hours), treated with formaldehyde (2%), or steam sterilized.

The treatment needs to be done at least 15 days before the material is used for casing. After casing is done, the temperature of the room is again maintained at 23-28°C and the relative humidity of 85-90% for another 8-10 days.

d) **Harvesting:** It is done at the button stage, and caps measuring 2.5 to 4 cm across are ideal for the purpose. The first crop appears about three weeks after casing. Mushrooms need to be harvested by light twisting without disturbing the casing soil. Once the harvesting is complete, the gaps in the beds should be filled with fresh sterilized casing material and then watered. About 10-14 kg. Fresh mushrooms per 100 kg. Fresh compost can be obtained in two months' crop.

e) **Important pests and diseases:** The insect pests mostly observed are nematodes and mites. Many diseases like Dry Bubble (brown spot), Wet Bubble (White Mould), Cobweb, Green Mould, False truffle (Truffle disease), Olive green mould, and Bacterial blotch affect mushroom cultivation. Adopt appropriate and timely control measures against pests & diseases to avoid failure of the crop.

BioSmartNotes