

COVER PAGE

OLERICULTURE -II (763)

Marking Scheme

Class XII - 2018-19

Time: 3Hours

Total Marks: 60

General Instructions:

1. *Marking Scheme is divided into two sections: Section-A and Section- B.*
2. **Section–A:**
 - i. *Multiple choice question/Fill in the blanks/Direct Questions of 1 mark each. Answer any 10 questions out of the given 12 questions.*
 - ii. *Very Short Answer of 2 marks each. Answer any 5 questions from the given 7 questions.*
 - iii. *Short Answer of 3 marks each. Answer any 5 questions from the given 7 questions.*
3. **Section–B:** *Long/Essay type questions of 5 marks each. Answer any 5 questions from the given 7 questions.*
4. *All questions of a particular section must be attempted in the correct order.*
5. *Please check that this question paper contains 33 questions out of which 25 questions are to be attempted.*
6. *The maximum time allowed is 3 hrs.*
7. *The marking scheme carries only suggested value points for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct, the marks be awarded accordingly.*

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Marking Scheme

Class -XII, 2018-19

Time Duration: 3 Hours

Marks: 60

SECTION –A

Answer any 10 questions out of the given 12 questions:

10 x 1 = 10

1. b. Brinjal
2. d. Pusa Meghna
3. d. Cabbage
4. c. 1000m
5. d. *Brassica oleracea var. botrytis*
6. c. Bottle gourd
7. d. Brinjal
8. c. 18 – 21 °C
9. c. Chow Chow
10. a. *Luffa cylindrica*
11. d. Fruit borer
12. a. Cabbage

Very Short Questions: (2 marks each). Answer any 5 questions out of the given 7 questions: 5 x 2 = 10

13. Cauliflower: Early: 45 × 30 cm **Main:** 60 × 45 cm
Cabbage: Early: 45 × 30 cm **Main:** 60 × 45 cm

14. Major diseases of potato

- Late blight of potato
- Early blight of potato
- Scab of potato
- Leaf curl/roll
- Bacterial wilt

15. Vegetables rich in vitamin A

1. Carrot
2. Kale
3. Amaranth

16. Radish: *Raphanus sativus*
Potato: *Solanum tuberosum*

17. Major diseases of tomato

- Leaf curl of tomato
- Leaf Blight of tomato
- Damping off in seedlings

18. Major disorders of cauliflower

1. Browning in curd
2. Whiptail in leaves
3. Buttoning

19. Cucurbitaceous vegetables

- Cucumber
- Muskmelon
- Watermelon
- Bottle gourd

Short answer type questions (20-26, 3 marks each). Attempt any five questions

5 x 3 = 15

Q. No. 20. Plant hormones

Plant hormones (also known as phytohormones) are signal molecules produced within plants that occur in extremely low concentrations. Plant hormones control all aspects of growth and development, from embryogenesis, the regulation of organ size, pathogen defense, stress tolerance and through to reproductive development. These hormones are very important as they determine many different attributes of a plant. Plant hormones can be natural or synthetic. The five major plant hormones are auxins, gibberellins, cytokinins, abscisic acid, and ethylene.

Q. No. 21. Role of F1 hybrids in cabbage

Hybrid varieties in cabbage have several advantages such as high yield, earliness, improved quality, uniformity, vigorous development and also resistance to diseases and pests. Hybrid varieties account for a significant proportion of cabbage production in Turkey; however, all hybrids are foreign and are very expensive. In India IARI developed first public sector high yielding hybrid Pusa Cabbage Hybrid-1.

Q. No. 22. Role of F1 hybrids in tomato

Hybrid varieties can play a vital role in increasing total production and productivity due to their high yield potential, early maturing, superior quality, disease and pest resistance. The rapid increase in productivity per unit area can be achieved by the use of quality seeds with built in inbred and hybrid vigour along with the application of improved vegetable cultivation technologies and government policies. Hybrid tomato varieties have many advantages compared to open-pollinated varieties. Many hybrids have better fruit quality and disease resistance. With all of these advantages, many farmers prefer to grow hybrid seeds inspite of the higher input costs. India's first triple disease resistant tomato F1 hybrid Arka Rakshak established great popularity among farmers.

Q. No. 23. Sprouting broccoli

Broccoli is an edible green plant in the cabbage family whose large flowering head is eaten as a vegetable. There are three commonly grown types of broccoli. The most familiar is Calabrese broccoli, often referred to simply as "broccoli", named after Calabria in Italy. It has large (10 to 20 cm) green heads and thick stalks. It is a cool season annual crop. Sprouting broccoli has a larger number of heads with many thin stalks. There are some varieties related to sprouting broccoli like Pusa KTS-1, Palam Samridhi, Palam Haritika, Punjab Broccoli-1.

Q. No. 24. Nursery management

Nursery is a place where seedlings, cuttings and grafts are raised with care before transplanting. Advantage of raising seedlings in nursery. It is very convenient to look after the tender seedlings. It is easy to protect the seedlings from pests and diseases. Some of them specialize in one phase of the process: propagation, growing out, or retail sale; or in one type of plant: e.g., groundcovers, shade plants, or rock garden plants.

Q. No. 25. Job opportunities in vegetable science

i. After post-graduation in vegetable science the student becomes eligible to be appropriate for employment offered by seed companies, sales and marketing, R&D unit etc.

ii. Different agricultural universities also employ horticultural postgraduates for distinct posts from the concerned field of their specialization as SRF's (Senior Research Fellow), RA (Research Associates), TA (Technical Assistant) etc.

iii. However, for the posts of Assistant Professor/Scientist and other teaching and research and development posts

iv. Administrative or marketing positions with organizations involved in the processing and marketing of vegetables, they also get recruited in the companies as horticulturists, gardeners, supervisors, farm or estate managers, handling large-scale production of certain varieties of vegetables in various private seed companies etc.

v. Many fertilizer and pesticide companies engage agricultural/ horticultural students in their firms.

In addition, at the International level, the Food and Agriculture Organization (FAO) of the United Nation and some other agencies also appoints horticultural consultant.

Q. No. 26. Major problems of Cole crops

The major problems of Cole crops are:

- Insect pests: Diamond back moth, aphids and cabbage butterfly
- Diseases: Black rot
- Disorder: Riceyness, whiptail and buttoning.

(SECTION –B)

Long/Essay type questions (5 marks each). Answer any 5 questions out of the given 7 questions: 5 x 5 = 25

Q. No. 27.

1. Rich source of vitamins

Vitamin A: Fenugreek leaves, amaranth, carrot etc.

Vit. B-1: Beans, peas, bittergourd

Vit. B-2: Red chillies, bathua, palak

Vit B-3: Peas, beans, capsicum, carrot

Vit B-5: Cow pea

Vit B6: muskmelon, watermelon

Vit B-7: knol-khol

Vit B-9: spinach, parsley, asparagus, peas, beans

Vit B-12: Spinach

Vitamin D: Bittergourd

Vit E: spinach, broccoli, zuchni

Vit K: spinach, broccoli, parsley, knol-khol

2. Rich source of minerals

Ca : amaranth, palak, green onion P: cowpea, peas, Iodine: okra, beans K: melons, celery Fe: carrot, bittergourd, amaranth, Zn: Beans, pumpkins,

3. Polyphenolic compounds

Anthocyanin: red cabbage, purple broccoli, brinjal, black carrot, Flavanoides: onion

4. Glucosinolates: cauliflower, broccoli

5. Dietary fiber

6. Proteins : leguminous vegetables

7. Carbohydrate: potato, sweet potato

Q. No. 28. Climatic Requirements:

Proper climatic conditions are almost essential according to the variety of the cauliflower. Cauliflower thrives best in a cool and moist climate.

Soil and its Preparation:

Sandy loam soil are preferred. pH 6.0 to 7.0. soil must be thoroughly prepared.

Seed rate and Time of Sowing:

In cauliflower seed rate for early crop is 600 to 750 gm and for late crop 400 to 500 gm /Ha

Layout and Spacing:

Spacing for early crop is 45 X 30 cm and late crop it is 60X 45 cm.

Cultivars or Varieties

Pusa Meghna, Pusa Deepali, Pusa Sharad, Snowball etc.

Manures and Fertilizer:

For best results 15 to 20 tons of FYM or compost should be incorporated into the soil about 4 weeks before transplanting. In cauliflower 100 kg N, 50 kg P₂O₅ /ha, should be given.

Harvesting:

Cauliflower should be harvested when the head has developed the proper size and is at right stage of maturity.

Q. No. 29. Write the importance of fertigation and the method of its adoption.**Fertigation**

Fertigation is a method of fertilizer application in which fertilizer is incorporated within the irrigation water by the drip system.

Importance of fertigation

- Nutrients and water are supplied near the active root zone through fertigation which results in greater absorption by the crops.
- As water and fertilizer are supplied evenly to all the crops through fertigation there is possibility for getting 25-50 per cent higher yield.
- Fertilizer use efficiency through fertigation ranges between 80-90 per cent, which helps to save a minimum of 25 per cent of nutrients.
- By this way, along with less amount of water and saving of fertilizer, time, labour and energy use is also reduced substantially.

Methods for adoption**N fertigation**

Urea is well suited for injection in micro irrigation system. It is highly soluble and dissolves in non-ionic form, so that it does not react with other substances in the water. Urea, ammonium nitrate, ammonium sulphate, calcium ammonium sulphate, calcium ammonium nitrate are used as nitrogenous fertilizers in drip fertigation.

P fertigation

Application of phosphorus to irrigation water may cause precipitation of phosphate salts. Phosphoric acid and mono ammonium phosphate appears to be more suitable for fertigation.

K fertigation

Application of K fertilizer does not cause any precipitation of salts. Potassium nitrate, Potassium chloride, Potassium sulphate and mono potassium phosphate are used in drip fertigation.

Micro nutrients

Fe, Mn, Zn, Cu, B, Mo could be used as micro nutrients in drip fertigation.

Fertigation equipment

Three main groups of equipments used in drip system are :

Ventury

Construction in the main water flow pipe causes a pressure difference (Vacuum) which is sufficient to suck fertilizer solution from an open container into the water flow.

Fertilizer tank

A tank containing fertilizer solution is connected to the irrigation pipe at the supply point.

Fertilizer pump

The fertilizer pump is a standard component of the control head.

Q. No. 30. Write the causes and control measures of different physiological disorders of cauliflower

Browning: Browning is caused due to boron deficiency. In early stage, the water soaked areas appear on the stem and curd surface. As the plant grows, the stem becomes hollow with water soaked tissue covering the internal walls of the cavity. In advanced stage of deficiency, brown or pink coloured areas are seen on curd surface and therefore, it is also called brown rot or red rot or browning of the curd.

Control: The deficiency of boron may be corrected by applying borax. The quantity of borax depends on soil type, soil pH and the extent of deficiency. In acid soil, 10- 15 kg borax/ha is sufficient.

Whiptail: Whiptail disorder is caused due to deficiency of molybdenum. In young plants the deficiency symptoms are chlorosis of leaf margins and the whole leaves may turn white. The leaf blades do not develop properly. This condition is commonly known as 'Whiptail'. The deficiency of molybdenum generally occurs in acid soils when the soil pH is below 5.5.

Control: Lime application in acidic soils is done to increase the availability of molybdenum. The quantity of lime is determined by initially measuring the pH of the soil. Alternately, soil application of Sodium Molybdate (10-15 kg/ha) effectively controls the deficiency symptoms.

Buttoning: The development of small premature curds or buttons while the plants are young is known as buttoning. Several factors like poor nitrogen supply, planting of over-age seedlings, unfavorable climatic conditions and improper time of planting are reported to cause buttoning.

Control: Adequate supply of nitrogen and moisture for rapid vegetative growth of plant is considered important for preventing the occurrence of button plants.

Q. No. 31. How are genetic mechanisms available in cauliflower, cabbage and solanaceous crops used for hybrid seed production?

Genetic mechanisms available in cauliflower, and cabbage

Use of self-incompatible lines: The sporophytic system of self-incompatibility is used for hybrid seed production of cauliflower and cabbage. In general 3:1 self-incompatible and 1 self-compatible (pollinator) is followed to get sufficient amount of hybrid seeds.

Cytoplasmic Male Sterility:

In recent times use of male sterility (CMS system) is getting more attention as an alternative to SI system due to its inherent advantage in the hybrid seed production of all cole crops.. Single cross hybrids are more uniform, while cost of the double cross hybrids is much cheaper than single cross hybrids.

Mechanism in solanaceous vegetables:

Male sterility

Tomato: In hybrid seed production, male sterile lines can be used to cut down the expenditure incurred for emasculation operation. Stamenless and closed anther mutants can be used in hybrid seed production with success.

Chilli: Emasculation and hand pollination is most expensive method of hybrid seed production in chilli because of high labour cost and very low fruit set percentage. Therefore, genetic male sterility mechanism is more economical and can be exploited for hybrid seed production.

Sweet pepper: Both genic and cytoplasmic male sterility have been reported in Functional male sterility can be utilised in hybrid seed production.

Q. No. 32. Discuss major insect-pests and diseases of Solanaceous vegetables and their control measures.

Tomato:

Insect pest: Thrips; Aphids; Mites; Whitefly; Beetles; Fruit fly; Cluster caterpillars; Looper caterpillars; Potato moth; Heliothis (Helicoverpa).

Diseases: Tomato spotted wilt virus (TSWV); Tobacco mosaic virus (TMV) Bacterial spot; Damping-off; Powdery mildew; Tomato yellow leaf curl virus; Early blight; Bacterial wilt; Anthracnose; Fusarium wilt; Nematodes.

Brinjal:

Insect pest: Aphids; Thrips; Leafhoppers; Two-spotted mite; Beetles; Whitefly; Fruit and shoot borer

Diseases: Damping-off; Tomato spotted wilt virus; Root rots; Tobacco mosaic virus; Tobamoviruses; Bacterial wilt; Nematodes.

Capsicum and Chilli

Insect pest: Aphids; Thrips; Whitefly; Mites.

Diseases: Bacterial spot; Bacterial wilt; Anthracnose; Cercospora spot; Powdery mildew; Tobacco mosaic virus (TMV); Nematodes.

Potato

Thrips (thrips, Onion thrips); Aphids; Potato moth; Whitefly; Beetles; Looper caterpillars; Leafhoppers; Bugs; Potato moth.

Diseases:

Bacterial wilt; Black leg; Soft rot; Potato cyst nematode; Root-knot nematode; Late blight; Potato leaf roll virus; Potato virus Y; Common scab of potatoes; Rhizoctonia; Powdery mildew; Fusarium wilt

Control measures

1. Pre-sowing operations

1. Deep summer ploughing: Helicoverpa, Spodoptera, Thrips, serpentine leaf miner and pinworm
2. Soil solarization (with polythene sheet of 45 gauge (0.45 mm) thickness for three weeks before sowing): Helicoverpa, Spodoptera, Thrips, serpentine leaf miner and pinworm
3. Apply Neem cake 250 kg/ha at the time of land preparation: Thrips and nematodes

2. During nursery development: Raise Marigold (Tall African variety golden age bearing yellow and orange flowers) nursery 15-20 days before tomato nursery (as trap crop for Helicoverpa): Use nylon net of 40 gauge mesh to protect seedlings against whitefly infestation for leaf curl management.

3. Management in the main field: Transplant 20-25 days old tomato and 45-50 days old marigold simultaneously in the ratio of 16:1. Simultaneous flowering of both the crops ensures attraction of fruit borers to marigold flowers. A. Cultural methods B. Mechanical methods: Collection and destruction of eggs and early stages of larvae (Spodoptera): Handpick the older larvae during early stages of plant (Helicoverpa)

4. Physical methods

Use yellow/blue pan water / sticky traps @ 4-5 trap/acre Leaf miner, Thrips, Aphids 2 Use light trap @ 1/acre and operate between 6 pm and 10 pm Pinworm, Helicoverpa 3 Install pheromone traps @ 4-5/acre for monitoring Helicoverpa and 10-12 traps/acre for mass trapping of pinworm (replace the lures with fresh lures after every 2-3 weeks) Helicoverpa, Pinworm

5. Chemical control

1. Fifteen days after planting spray imidacloprid 200 SL @ 0.4ml/l Whitefly, thrips, aphids
2. Spray dicofol 18.5 EC (1.5 ml/l) Red spider mite
- 3 Cyantraniliprole 10.26% OD @ 360 ml in 200 litre water/acre Thrips
- 4 Spray indoxacarb 14.5% SC @ 0.8 ml/l of water Helicoverpa, Spodoptera and pin worm

Q. No. 33. Discuss the cultivation of potato under the following heads:

Soil and climate

Soil fertile, sandy lo clay loams with good water retention capacity. Aeration of the soil has a great effect on the set and development of tubers. It is a cool season crop and is moderately frost – tolerant. Plants grow best at a temperature of 24°C; later growth is favored at 18°C. Tuber production reaches a maximum at 20°C, decreases with rise in temperature, and at about 30°C tuber production stops entirely. Short days are beneficial for tuber production.

Planting and seed rate

Potatoes are propagated by tubers, planted either whole or cut into pieces. To obtain maximum yields, healthy, disease-free tubers, free from mixture of other varieties, should be used. Seed rate depends on tuber size; 800-1000 kg/ha is generally recommended. Hilly areas, potatoes are spaced at 60 x 30 cm and the tubers are planted in furrows. In the plains, however, they are planted on ridges spaced 30 cm apart; the distance between ridges is kept at 45-60 cm.

Major diseases and their management.

Bacterial wilt

- Disinfect the cutting knife using 1% sodium hypochlorite solution.
- Apply lime (dolomite) in the soil as acidic or alkaline soil is not conducive to the bacterial wilt pathogen.
- Apply neem cake @ 80 Kg/acre
- Two to three sprays of (streptomycin sulphate 9% + tetracylinhydrochloride 1%) SP @ 40 to 50 ppm solution at an interval of 20 days. First spray 30 days after planting.

Early Blight

- Fungicidal sprays, preferably with copper fungicides or Zineb given at 15 day intervals effectively control the disease.
- Since the same spray schedule controls late blight also, it has become a regular practice among potato growers in many tracts to spray the crop with copper fungicides at least three or four times, starting from about six weeks after planting.

Late blight

- They should be examined carefully before planting and also should be pre-treated by dipping in 1 per cent Bordeaux mixture or other fungicides.
- The plants must be sprayed with copper fungicides., zineb or phenyl compound at 15 day intervals, starting from about a month after planting until the crop matures.
- Ridomil at 7 kg/ha in combination with Dithane M-45 has given encouraging results.
- The Central Potato Research Station, Simla, has released three varieties, ie., Kufri Kishan, Kufri Sindhuri and KufriKuber, which are resistant to late blight

Leaf curl diseases

Follow common cultural, mechanical and biological practices

Cultural control:

- Use peppermint repellent plant for whitefly (vector).
- Show attractant plant like French bean to attract predatory thrips