MODEL ANSWER

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE

SEMESTER END EXAMINATION

B.Sc. (Hort.)

Semester	: III (New)	**Academic Year:**	2016-17
Course No.	: H VS-231	**Title:**	Tropical and Subtropical Vegetables
Credits	: 3 (2+1)	**Total Marks:**	80
Day & Date	:	**Time**	: 3.00 hrs.

Note: 1. Solve **ANY EIGHT** questions from **SECTION "A"**
2. All questions from **SECTION "B"** are compulsory
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Discuss in brief the importance and scope of growing tropical and sub-tropical vegetables in India.

Ans: Importance : (4 Marks)

1) Nutritional importance of vegetables.
2) More yield per unit area.
3) More net returns per unit area.
4) Role in Agro forestry.
5) Employment generation.
6) Aesthetic value of vegetables.
7) Industrial importance.
8) Export potential.

Scope: (4 Marks)

1) To meet the need of balanced diet.
2) Expand area under vegetable crops.
3) To take higher yield from vegetables.
4) Present Agricultural policies.
5) To meet the increasing demand of vegetables.
6) New irrigation project.
7) Increase in fertilizer industries.
8) Availability of cold storage facilities.
9) Production of improved and hybrid seed of vegetable crops.
10) Vegetable processing and preservation industry.

Q.2 Enlist the different types of vegetable farming and describe any one in detail.

Ans: Enlisting types of vegetable garden (4 Marks)

I. Home or Kitchen Nutrition garden:

a) Home garden having fruits and vegetables
b) Home garden having only vegetables

II. Commercial vegetable gardening:

i) Market gardening
ii) Truck gardening
iii) Vegetable forcing
iv) Vegetable growing for processing
v) Vegetable seed production garden

III. Floating vegetable garden

Description (4 Marks)

Q.3 Describe the cultivation of Tomato with respect to following points

1. Soil and Climate
2. Improved Varieties
3. Transplanting
4. Harvesting and Yield

Ans: 1. Soil and Climate- (2 Marks each)

Well drained fairly fertile rich in O.M. Tomato is a day neutral warm season crop, can't tolerate frost, optimum temp. 21°-28°C during day and 15-20 C during night.

2.Improved Varieties

Parbhani Yashashree	ATH-1
Deogiri	Bhagyashree
Siox	Roma
Marglobe	Pusa Ruby
Punjab Chhuhara	Arka Gaurav

3. Transplanting

- The seedlings are ready for transplanting 4-5 weeks after seeding.
- Seedlings should be hardened before transplanting them.
- This is done by withholding watering for 4-5 days so as reduce the available moisture.
- Seedlings are transplanted on raised beds or on sides of ridges.
- Spacing depends on growth habit of variety, generally seedlings are transplanted at 60x60, 90x60 and 60x45 cm in the month of June – October.
- Usually closer spacing results in early and higher yield, but it may affect size of fruits.

4. Harvesting and Yield

Mature green stage: Harvested for long distance market.
Pink stage: 3/4th of whole fruit surface turns pink and harvested for local market.
Light Red stage: Entire fruit surface is red but flesh is firm and harvested for local market.
Fully ripe stage: Fully ripened harvested for processing & for seed production.
Yield- 20 to 25 t/ha (Open pollinated vars) and 50 t/ha (F1 hybrid)

Q.4 Write the cultivation of Okra on following points

1. Soil and Climate
2. Improved Varieties
3. Seed rate and Spacing
4. Pests and Diseases

Ans: 1. Soil and Climate- (2 Marks each)

The crop is basically adapted to tropical climate and vigorous warm humid weather for best growth and production. It is susceptible to drought and low night temperatures. For seed germination optimum soil moisture and a temperature range between 25 and 35°C is required, with fast germination observed at 35°C. Seeds fail to germinate below 17°C. At temperature above 42°C flower buds in most of the cultivars may desiccate and drop causing yield losses. The optimum temperature range for growth is 20-30°C. High yields can be obtained in loose friable, well manured loamy soils having better drainage. The ideal pH is 6-6.8.

2. Improved Varieties –

- Introduction: Perkins long green, Clemson's spineless.
- Selection: Pusa Makhmali , Co 1, Gujrat bhendi 1.
- Hybridization: Pusa Sawani, Sel 2-2.
- Interspecific hybridization by back cross: Parbhani Kranti, Punjab 7, Arka Anamika, Arka Abhay.
- Intervarietal crosses using pedigree sel: Varsha Uphar, Phule Utkarsh, Hissar Unnat.
- Mutation: MDU 1, Punjab 8.
- F1 Hybrid: Phule kirti.

3. Seed rate and spacing- 10-15 kg/ha is enough for sowing in Kharif season. Seed should be sown at a distance-60x30 cm.

4. Pests and Diseases

Insect Pests- Jassids, Shoot & fruit borer, Red spider mites.

Diseases- Damping off, Powdery mildew, Yellow vein mosaic, Cercospora leaf spot, wilt and Leaf blight

Q.5 Enlist the various cucurbitaceous crops. Give the information on following aspects of Watermelon.

1. Botanical name
2. Improved Varieties
3. Method of Sowing
4. Maturity Standards and Yield

Ans: Enlisting and botanical name of watermelon. (2 Marks)

Cucumber, watermelon, muskmelon, pumpkin and all gourds.

1. **Botanical name-** *Citrullus lanatus* Thunb.

2. Improved varieties- (2 Marks)

Arka Jyoti	Asahi Yamato
Durgapura Kesar	Durgapura Meetha
New Hampshire Midget	Improved shipper
Pusa Bedana	Sugar baby

3. Method of sowing- (2 Marks)

- ***Furrow Method***-Seeds are sown on furrows at 2-2.5 X 1-1.20 mt apart.
- ***Pit Method***-
  - Generally followed in case of river bed cultivation.
  - Circular pits of 60 cm diameter & 1-1.5 mt deep are prepared.
  - Filled it with 20 kg FYM, 30g urea, 40g SSP, 80g K per pit.
  - After filling the pits circular basins are made.
  - Sow 4-6 seeds/hill at 2.0-2.5 cm depth.
  - After establishment of vines remove 2-3 seedlings.

4. Maturity Standards and Yield (2 Marks)

- A dull sound when ripe fruits are thumped.
- Withering of tendril at fruit axil.
- Color of fruit rest on ground changes from white to yellowish tinge.
- Yield is 35-50 t/ha (Open pollinated) and upto 75 t/ha for hybrids.

Q.6 Write in brief about the production techniques of Amaranthus. (8 Marks)

Ans: Botanical Name- *Amaranthus tricolor*: Family- Amarylidaceae

Mode of pollination- Self pollination

Climate and soil

- It requires warm season, hot & humid climate. Red amaranth require bright sunlight for color development. It is grown throughout the year. It requires well drained loamy soil rich in organic matter. Ideal pH is 5.5-7.5.

Varieties-

Co-1	Co-2
Co-3	Co-4
Co-5	Pusa Chhoti chauli
Pusa Badi chauli	Pusa kirti
Pusa kiran	Pusa Lal chaulai
Arka Saguna	Arka Arunima

Sowing time- February- March and May-June

Method of sowing- .

- Amaranth seeds are very small & hence mixed fine sand/soil for even distribution.
- Seed should be sown in 25-30 cm apart in rows.

Seed rate- 1.5-2.5 kg/ha

Spacing- 20 x 10 cm

Manures and Fertilizer-

- 200-250 qt/ha FYM
- 50:25:20 kg NPK/ha.
- Ammonium sulphate @ 100 kg/ha should be top dressed just before irrigation.

Intercultural Operations-

- Weeding and 2-3 hoeing is necessary.
- Frequent irrigations.

Diseases

- Leaf blight and white rust are major problem in amaranth cultivation.

Harvesting

- Harvest manually, early in the morning.
- Grown up plants are pulled out at 30,45 & 55 DAS.

Yield- Seed yield is 2-3 qt/ha.

Q.7 Give the information in tabular form. (4 Marks for each crop)

Sr. No.	Name of the Crop	Botanical name	Spacing	Seed rate/ha	Varieties
1	Ridge Gourd	*Luffa acutangula* Roxb.	1.5x0.5 mt	3-4 kg/ha	Pusa nasdar, Phule Sucheta, Konkan Harita, Satputiya
2	Cluster bean	*Cyamopsis tetragonoloba* T.	60x30 cm	10-12 kg/ha	Pusa Navbahar, Pusa sadabahar, Pusa Mausami, Durgabahar

Q.8 Describe the cultivation of Tapioca with following points.

1. Soil and climate
2. Varieties
3. Manuring and fertilizer
4. Harvesting and yield

(2 Marks each)

Ans:-

1. Soil and climate

The most favorable soils for tapioca cultivation are loose textured and well-drained soils. In poorly drained soils, such as clayey or heavy textured soils, the tubers are deformed, subject to growth cracks and often not attractive in appearance. The best quality tubers and yield is obtained in sandy loam, silt loam and peat soils. Field should be prepared by one deep ploughing followed by five to six harrowing. It can be grown from sea-level to an elevation of about 900 meters and can withstand drought extremely well but does not tolerate stagnant water. It thrives best in tropical warm humid climate with well distrusted rainfall of over 900 per annum.

2. Varieties

H-97, H-165, Sree Sahya, Sree Vaisakham, Sree Prakash, Sree Harsha, Sree Jaya, Sree Vijaya, Nidhi, Sree Prabha, Sree Rekha, CO-1, CO-2 and CO-3.

3. Manuring and fertilizer

It is a long duration crop and requires much more nutrients than other seasonal crops. It requires on an average 150 kg nitrogen, 100 kg phosphorus and 250 kg potash in addition to 150 to 200 quintals of farmyard manure per hectare. Full quantity of farmyard manure should be mixed in the soil one month before planting while half dose of nitrogen and full does of phosphours and potash should be given as basal dressing at the time of planting. Remaining half dose of nitrogen should be given in two split doses. First, after 75 days of planting and second after 150 days of planting.

4. Harvesting and yield

The crop takes 9 to 12 months for maturity. Yellowing and shedding of leaves are the main indications of maturity. The root tubers become fibrous, woody and poor in quality when harvesting of the crop is delayed. On reaching maturity, the plants should be pulled out along with tubers by hand or the stems should be cut first and then the roots dug out. A tapioca plant carries one to ten roots weighing one to two and half kilograms each. The average yield is about 200 to 250 quintal per hectare.

Q.9 Write in brief the cultivation of Colocasia on following points.

1. Varieties
2. Propagation and Planting
3. Manures and fertilizers
4. Harvesting and yield

1. Varieties (2 Marks each)

Sree Rashmi, Sree Pallavi, Sree Kiran

2. Propagation and Planting

- Mother corm and cormels of 20-25 g are used as planting.
- Planting is done after May-June.
- Plant tubers at 60x45 cm on ridges.

3. Manures and fertilizers

- Apply 12 t/ha FYM.
- 80:25:100 kg NPK/ha.
- 1/3rd dose of N and full dose of P and K applied at 2 weeks after sprouting.
- Remaining dose of N should be applied 1 month after first dose.

4. Harvesting and yield

- Crop will be ready to harvest in 6-8 months after planting.
- Harvest by carefully uprooting the plants.
- Mother corms and cormels are later separated.
- Average yield 15-20 t/ha.

Q.10 Write short notes on (Any two)

1. Importance and uses of drumstick.
2. Physiological disorders in tomato.
3. Turning of vines in sweet potato.

Ans: 1. Importance and uses of drumstick (4 Marks each)

- Drumstick is one of the most popular vegetables in the south Indian households.
- The fruits, leaves and flowers are used in culinary preparation.
- Immature fruits are cut into pieces and used in several culinary dishes.
- The roots of the plant are used for seasoning pickles.
- It is highly valued for the distinct and appealing flavour for its tender fruits.
- They are rich source of protein, minerals and vitamins.

- Seeds contain an oil called ben or behen oil which has been much used for illumination, soap industry. Seeds contain 38-40% of nondrying oil which is clear and odourless. It is edible and useful in the manufacture of perfumes and hair dressing.
- Wood yields blue dye and coarse fibre.

2. Physiological disorders in tomato-

Fruit cracking

- It is caused due to genetic and environmental factors.
- Fluctuations in irrigation water cause cracking.
- High pectin content resistant as compare to low.

A. Radial cracking
B. Concentric cracking
C. Cuticular cracking
D. Burst

i) Blossom end rot

- Water soaked spots of 1cm appear at point of attachment of petals. It is due to reduced soil moisture, high rate of respiration during fruit development and Ca deficiency. For control spray of 0.5% CaCl is advocated.

ii) Sun scald

- It is due to extreme heat and affected fruit becomes yellow color.

iii) Puffiness

- It is caused due to high or low temperature and low soil moisture. Fruits may be hollow, light weight without seed. It happens due to non fertilization of ovule, embryo abortion after fertilization.

iv) Cat face

- Distortion, furrows and blotches on fruits and later on it turns black & form leathery blotches at the end of fruit.

3. Turning of vines in sweet potato.

Sweet potato vine has tendency to form roots from the nodes which results in diversion of food energy for the development of roots. To save the nutrient loss, it is essential to turn the vines. This operation helps in better tuber growth and is to be followed during early stage of vine growth.

SECTION "B"

1 mark each

Q.11 Fill in the following blanks.

1. Curry leaf belongs to family **Rutaceae.**
2. Cowpea pods are rich in vitamin **B.**
3. Botanical name of sponge gourd is ***Luffa cylindrica* Roem.**
4. California wonder is the variety of **Capsicum.**
5. In brinjal the maximum fruit setting occurs in **long** styled flowers.
6. Pumpkin is propagated by **seed.**
7. Floating garden is famous in **Kashmir.**
8. Bitter gourd fruits are rich in **Iron.**

Q.12 State True or False 1 mark each

1. Konkan Haritparni is a variety of Xanthosoma. - **True**
2. Dasara and Deepali are the varieties of french bean. - **False**
3. Cucumber has both monoecious and gynoecious sex form. - **True**
4. Hara Madhu is a variety of water melon. - **False**
5. Drumstick is annual vegetable crop. - **False**
6. India ranks second in vegetable production. - **True**
7. Carotene is a precursor of vit. A. - **True**
8. Konkan Tara is the variety of sponge gourd. - **False**

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