MODEL ANSWER

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE

SEMESTER END THEORY EXAMINATION

B. Sc. (Hort.)

Semester	: III (New)	**Academic year:** 2015-16	
Course No.	: H/VS-231	**Title**	: Tropical and Sub-Tropical Vegetables
Credits	: 3 (2+1)		
Day & Date	:	**Time** :	**Total Marks** : 80

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 Write in short the importance and scope of vegetable and tuber crops.

Ans: I. Economic value of vegetables
II. Asthatic value of vegetables
III. Vegetables as a source of nutrients
IV. Balanced diet
V. Flavour compounds
VI. Vegetables in disease prevention
VII. Vegetable in economy

Q. 2 Write in brief the cultivation of french bean on following points.

Ans.: 1. Climate and soil: Most of the French bean varieties are day neutrals except some semi-pole varieties, which are short day types. It is cool weather crop but thrives well in the optimum temp ranging between 15-25^0 C. The crop is sensitive to frost, high temp and high rainfall. Plants shed their blossom or young pods in very hot or rainy weather. The pole types are generally grown in heavey rainfall areas of Chhotanagpur and UP. French bean can be grown in all types of soils ranging from light sandy loam to clay soil but it cannot withstand water logging. PH between 5.3-6.0.

2. Varieties: French bean cultivars are classified into string and string less based on the extent of fiber in the pod. Kentucky wonder, Contender, Phule Surekha, Phule Suyash, Giant stringless, Pusa Parvati, Arka Komal, Pant Anupama, IIHR 220,KKL 1, YED 1, Ooty, Arka Suvidha (IIHR 909), TKD 1, Top Crop, Tweed Wonder

3. Seed and seed inoculation: 40 kg /ha. **Seed inoculation:** In the lands where beans are grown for the first time, inoculation of seed with *Rhizobium* sp @ 250 g/10-15 kg seed facilitates quick nodulation on the roots, and help in the fixation of atmospheric nitrogen.

4. Maturity standards and yield: The various maturity parameters like seed size, percent seed, dry-matter content, AIS (Alcohol Soluble Solids) and distribution of pods according to sieve size are found to be reliable maturity standards.

-- The prevalent practice in the canning and freezing industry is to judge quality by size distribution. The crop is ready for first harvest in about 45 days after sowing.
-- It takes about 7-12 days after flowering for the pod to be ready for picking.
-- About three pickings in bush beans and five pickings in pole beans are taken.
-- The green pods are to be picked when they are immature and fully grown but still tender.
-- Sometimes fresh seeds from over mature pods can be shelled and used.

-- The yield of tender pods vary from 8-10 t/ha in bush varieties and 12-15 t/ha in pole varieties

Q. 3 Describe the cultivation of sweet potato with following points.

Ans.: **1. Soil and climate:** Sweet potato is grown in a wide variety of soils but sandy loams, reasonably high in organic matter with a permeable sub-soil. Sweet potato is known as an acid-tolerant crop and requires a pH range of 5.6-6.6. The crop cannot withstand water-logging and good drainage is essential. Sweet potatoes are moderately drought-tolerant. Short-days with a low light intensity promote root development. The ideal conditions for high yield are good rains during the period of early growth and dry sunny weather during the period of tuber bulking and maturity. A warm humid climate with reliable rainfall gives best yields. It grows best at temperature $\geq 24^0$C.

2. Varieties: Varsha, Sree Vardhini, Samrat, Konkan Ashwini, Sree Bhadra, Kalmegh

3. Nutrient management: 20 t FYM, 90:60:90 kg NPK/ha. A full dose of P and half dose of N and k at the time of planting and remaining half 30 days after planting along with weeding and earthing up.

4. Storage: Sweet potato is subjected to several forms of post-harvest losses, due to Biological process in storage, Physical damage, pathological decay, Sprouting and Weevil infestation. The traditional methods of curing and storage are spreading the roots in the sun for one week; providing suitable water-proof covering during night, and then storing in well ventilated rooms. Other methods are keeping heaps of sweet potato roots in pits, covered with paddy straw. The best way to minimize damage in storage is to store healthy roots that are free from insect damage and mechanical injury. Such roots are heaped and covered with soil or wood ash for about two months. Keeping the roots in earthen pots reeled with fine net or cloth also prevents the entry to pests and ensure storage for up to three months.

Q. 4 Describe the cultivation of chilli with following points.

Ans.: **Planting seasons: Summer season:** January- July. This is mainly for green chilli. Seed sowing in December-January and transplanting in January-February. **Kharif season:** June-October as a rainfed crop or with supplemental irrigations

Seed and nursery management: About 1.0 kg seed/ha is required. 12-15 raised nursery beds of 3.0 x 1.2 m are required. To ensure healthy seedlings it is better to cover nurseries with 40 mesh nylon nets. Seedlings in the nursery may be allowed for about 40-50 days. Clipping of seedlings about 10 days prior to transplanting help in better establishment of transplanted seedlings and also accelerates the growth of auxiliary buds resulting in better branching. Hardening of seedlings should be started a week before transplanting by regulating water to the nursery Approximately 50-60 thousand seedlings can be obtained.

Nutrient management: 20 t FYM, 100:50:50 kg NPK/ha. Half N full P and K at the time of planting and remaining half of N one month after transplanting. Under rainfed conditions fertilizers are applied two weeks after planting and one month thereafter.

Harvesting and yield: Green chilli should be harvested at full maturity stage. Green chillies are usually tight filled in gunny bags.The green chilli yield 15-20 t/ha and dry chilli yield 2-4 t/ha. The crop is harvested for either green fruits or red ripe fruits by hand picking. The picking of green fruits continues for about two months at an interval of 10-12 days. There will be 5-6 pickings for green chilli and 3-4 for red ripe fruits.

Q. 5 Enlist various types of vegetable farming. Explain in brief about truck gardening.

Ans: Thompson and Kelly (1979) suggested seven types of vegetable gardening/farming.

1. Kitchen Gardening
2. Market gardening

3. Truck gardening
4. Forcing gardening
5. Processing garden
6. Seed production gardening
7. Floating garden

Truck gardening:

- This type of garden produces vegetables in relatively large amount for distant market. Extensive method of cultivation of growing especially one or two crops is practiced. The selection of location and site for vegetable cultivation depends on availability of nice climate. The truck garden for onion and garlic are situated in Nasik and for potato in Kufri as the climate of these localities is un-matching to other locality and favours bumper production of crops. The produced vegetables are sent to distant markets using truck or rail. As the produce is sold to distant markets, involvement of middleman becomes necessary. They curtail the profit of the grower. Generally, the cost of land and availability of labour is comparatively cheap than market garden as the production site is located away from the city. The land holding is large and mechanical farming is practiced. It reduces the cost of production. Onion, garlic, potato, chillies, pumpkin, elephant foot yam, colocasia etc. are ideal.

Q. 6 Describe the cultivation of okra on following points.

Ans.: **Varieties: Introduction:** Perkin's Long Green, Clemson's Spineless, Selection: Pusa Makhmali, Co 1, Gujarat Bhendi 1. **Hybridization:** Pusa Sawani, Selection 2-2 **Inter-specific hybridization using back cross technique:** Parbhani Kranti, Punjab 7, Arka Anamika (Sel.10), Arka Abhay (Sel. 4). **Intervarietal crosses using pedigree selection:** Varsha Uphar, Kranti, Phule Utkarsha, Hissar Unnat **Mutation:** MDU 1, Punjab 8 (EMS 8) **F_1Hybrid:** Phule Kirti:

Preparation of field: Solarization during hot summer months helps to control pest population and weed. The soil made into a fine tilth. Ridges and furrows are prepared.Soil treatment with Furadan @ 2 kg a.i./ha helps to protect from nematode and root and shoot pests during initial 4-5 weeks

3. **Nutrient management:** 20 t FYM or 7.5 t vermicompost, 100 : 50 ; 50 kg NPK/ha. Half N and full P and k at the time of planting and remaining half N one month after planting. Positive effect of zinc 2 mg/l and Molybdenum 20 mg/l as foliar spray

4. **Harvesting and yield:** Harvest every alternate day. Field is divided in into blocks to ease harvesting at one or two days interval. Harvested by bending the pedicel with a jerk. Cotton cloth hand gloves should be used to protect fingers. Harvesting in morning when hairs on fruits are soft For long distance markets harvest in the late evening Yield 15-20 t/ha

Q. 7 Write short note on (Any Two)

1. Sex types in cucumber: Following main sex types are reported in cucumber.

i. Monoecious plants: Staminate and pistillate flowers.
ii. Androecious plants: Only staminate flowers.
iii. Gynoecious plants: Only pistillate flowers.
iv. Hermaphrodite plants: Only hermaphrodite flowers.
v. Andromonoecious plants: Staminate and hermaphrodite flowers.

2. Bower system of training in bottle gourd:

- In Maharashtra, bottle gourd is trained on bower system and commercially used by the growers
- After germination of seed the vine is to be trailed on bower with the help of jute string

- The maxillary buds are to be removed weekly till the vine attains bower and
- Finally the top of the vine is to be pruned 15 cm below the bower allowing two auxiliary buds to grow which are later trailed on the bower
- Two months after sowing male flower initiate following the female in the sequence of 5:5
- At the end of 5th flower of female the vines are again pruned allowing 2-3 auxiliary bud to grow on the primary vines
- When the crop attains 2.5- 3.0 months and stem of vine becomes thumb thickness remove jute string
- Older pale to yellow coloured leaves near the bottom of the vine are to be removed and destroyed
- There is no damage to the fruits by soil touch

3. Physiological disorders in tomato:

Blossom End Rot: Watersoaked spots appear at the point of attachment and enlarge rapidly. This disorder occurs due to reduced soil moisture especially at fruit development stage. This may be due to calcium deficiency. Any cultural practices which conserve soil moisture and spraying of calcium help in ~~correcting~~ controlling the disorder.

Cracking: Radial cracking is more damaging as compared to concentric cracking. Genetical factors as well as environmental factors are srsponsible for cracking. Use of resistant varieties like Sioux, Manulucie and picking fruits before full ripening reduces the incidence of cracking.

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

1. Varieties: H 165, Sree Prakash (S 856), Sree Vijaya, S-1310, Pettipuram, TC-5, CI-649, H 97, Sree Harsha, Sree Jaya, Nidhi, KMC 1, CO 1, CO 2, CO 3, H226, Sree Vishakam (H 1687), Sree Sahya (H2304)

2. Interculture: The sprouts emerging from the top buds are more vigorous than those emerging from lower nodes of the stale. Removal of excess sprouts by retaining two per plant at opposite sides is better for the production of more number of tubers per plant. Under field condition all the stakes planted may not establish due to the use of poor quality planting material and adverse weather. At the time of planting about 5% of the stakes may be planted separately at a very close spacing of 4 x 4 cm in nursery area. The settlings at 20-25 days may be uprooted and used for gap filling. Control the weeds initial stages. The first intercultuturing shall be sufficiently deep, done at 45-60 days after planting and shallow interculturing and earthing up at one month after the first.

3. Nutrient management: 10-15 t FYM, and 60 kg P (375 kg SSP) mixed in soil at preparatory tillage. 60:60:60 kg NPK/ha. At planting full P and K and N in three equal splits 30, 60 and 90 days after planting.

4. Post harvest handling: A major disadvantage of cassava is the poor post harvest life of the tubers which necessitates rapid processing to some stable products. Biochemical and physiological processes are triggered in the tuber due to mechanical injury inflicted at the time of harvest. This spoils the tubers and makes them unfit for consumption and industrial use. The primary change observed in the tuber is the appearance of blue-black lines along the periphery of the cortex. Pathogenic organisms responsible for rotting of cassava tubers. Many techniques are available for the storage of cassava tubers viz., boxes, plastic bags and moist sand and soil. Drying is one of the main modes of processing of cassava tubers to enhance post harvest storage. It can be in the form of cassava chips, flour, starch and pellets. There are

many value added products from cassava like starch, sago liquid dlucose,dextrin, macroni, parboiled cassava chips, rava, poultry/cattle feed, high fructose syrup, alcohol, itaconic acid and monosodium glutamate

Q. 9 Write the cultivation of bittergourd on following points.

1. **Planting seasons and spacing:** Kharif June-July 1st week. Summer- Jan-Feb. Spacing 1.5 x 1.0.
2. **Varieties:**
Selection: Hirakani, Phule Ujwala, Konkan Tara, Coimbatore Long White, Coimbatore Green, Pusa Do Mausmi, Pusa Vishesh, Priya (VK- 1), Preethi, Priyanka, Arka Harit
Hybridization: Phule Green Gold
Mutation: MDU 1
F_1 hybrid: Phule Priyanka
3. **Nutrient management:** 20 t FYM, 100 : 50 : 50 kg NPK/ha . Half N and full P and k at the time of planting and remaining half N one month after planting
4. **Harvesting and grading:** The flowering starts by 45-55 days. First picking from 60-70 days after planting. Immature tender fruits are harvested. The colour of tender fruit is light green, dark green or whitish green depending on variety. Regular harvesting at shorter intervals will increase the fruit number. Irregular harvesting may delay the formation of successive fruit production and affect their growth and development adversely. After harvesting remove all fruits affected with insect pests or diseases and deformed ones

Q. 10 Describe the cultivation of brinjal on following points.

1. **Planting seasons:** Kharip season: transplanting in August 1st week. Rabi season: October transplanting. Summer season: February transplanting.
2. **Hardening of seedlings:** One week before transplanting water stress is given for hardening to adopt drought condition after transplanting. Hardening is essential otherwise seedlings will grow 2-3 times more than hardened one and branching will be seen in nursery stage and it will be difficult to transplant and setting in the field is also a problem.
3. **Interculture:** Brinjal being a slow growing crop is unable to compete with fast growing weeds. Shallow inter-cultivation is given to remove the weeds. 3-4 hoeing and weeding at 15-20 days interval are normally needed for weed control, aeration and good growth of plants. Earthing up is essential when it is grown on ridges. A per planting treatment of 1.0-1.5 kg a.i./ha of fluchloralin followed by one hand weeding 30 days after transplanting is effective. Practice of mulching is not common in brinjal but it has several beneficial effects on plant. Irrigation 8-10 days interval as per requirement. Drip irrigation is beneficial for reducing water use and weed control.
4. **Harvesting and yield:** Brinjal fruits are harvested when they have developed a good colour and marketable size, are still immature, tender and have not lost culinary qualities. The attractive bright, glossy appearance having freshness and optimum size of fruit are qualities for good market price. - The fruits are harvested with stalk at joint where they are attached to the branch. Care is taken in avoiding injury to the branch. Frequency of harvesting shall depend on the size of fruit. Small size of fruits is harvested more frequently than bigger or heavier fruits.Harvested in the afternoon to avoid sun scalding. Fruits are sprinkled with water to keep them fresh. Yield of brinjal varies according to the region, cultivar and duration of crop. 40-50t/ha.

SECTION "B"

Q. 11 Fill in the blanks

1. At maturity pumpkin rind colour turns completely **Brown.**
2. 'Satamukhi' is variety of **Colocasia.**
3. Cowpea pods are rich in vitamin **B.**
4. Botanical name of watermelon is ***Citrullus lanatus.***
5. Yam tubers remain dormant for **2-2 ½** months in storage.
6. 'Satputia' is variety of **Ridge gourd.**
7. Amorphophallus belong to family **Araceae.**
8. Botanical name of agathi is ***Sesbania grandiflora.***

Q. 12 Match the pairs

A	B
1. Capsicum	e. Arka Mohini
2. Sponge gourd	d. Phule Prajakta
3. Musk melon	f. Pusa Sharbati
4. Dolichos bean	b. Phule Suruchi
5. Amranthus	h. Pusa Kirti
6. Xanthosoma	g. Konkan haritparni
7. Drumstick	a. Konkan Ruchira
8. Curry leaf	c. Suwasini

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