

**SEMESTER END THEORY EXAMINATION**

**B. Sc. (Hons.) Agriculture**

**MODEL ANSWERS**

<b>Semester</b>	: IV (New)	<b>Term</b>	: II	<b>Academic Year</b>	: 2022-23
<b>Course No.</b>	: ENTO-243	<b>Title</b>	: Pest of Horticultural Crops and their Management		
<b>Credits</b>	: 2(1+1)				
<b>Daty &amp; Date</b>	:	<b>Time (hrs.)</b>	: 2hrs	<b>Total marks</b>	: 40

**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. Describe the nature of damage and management practices for banana pseudostem borer and sapota bud borer.**

**Banana pseudostem borer**

**Nature of damage:**

**1mark**

After hatching of eggs grubs bores into the pseudostem and make tunnels and feed on internal content of pseudostem. The early symptoms are the jelly exudation on the banana stem which indicate the weevil and grub activity inside the stem. Ooze of resinous substance from pseudostem. Yellowing and drying of leaf. Sequential pin holes on pseudostem in a line. The Pseudostem becomes hallow and break at the apical region due to gush of wind.

**Management:**

**1mark**

Earthing up at 45 days interval from planting. Maintain healthy plantation by periodical removal of dry leaves and suckers. Prune the side suckers every month. Do not dump infested materials into manure pit. In case of severe infestation uproot and burn the plants. Monitor the banana weevil activity in a garden by keeping banana stem traps. If infestation is noticed after 7 months of planting, stem injection is the only way to control. Inject pseudostem with monocrotophos 36 WSC (50 ml + 350 ml water) @ 2 ml at 45 cm height and another at 150 cm height from ground level at monthly intervals from 5th - 8th month. Beyond 8 months (after flowering), this should not be done.

**Sapota bud borer**

**Nature of damage :**

**1mark**

The larvae on hatching enter into the unopened flowers and flower buds by boring through the petals and feed on ovary remaining inside. Third instar onwards, larvae are found boring into the ovaries and damaging them. The infested flowers and flower buds drop down prematurely. There are two peaks in a year, first in the month of January and second in month of April.

**Management :**

**1mark**

Collection and destruction of infested flower buds. Spray insecticides like Azadirachtin 1% @ 30 ml / 10 lit of water or Deltamethrin 2.8 EC @10ml/10 lit or Lambdacyhalothrin 5EC @10ml/10 Lit or Profenofos 50 EC @10ml/10 lit water or Emamectin benzoate 5SG @ 5 gm per 10 lit water.

Q.2.	<p><b>Write scientific name, host plants, nature of damage and management practices of diamond back moth.</b></p> <p><b>Diamond back moth:</b></p> <p><b>S.N:</b> <i>Plutella xylostella</i> <span style="float: right;">0.5 mark</span></p> <p><b>Host plant:</b> Cauliflower, cabbage, broccoli and Knolkol <span style="float: right;">0.5 mark</span></p> <p><b>Nature of damage :</b> <span style="float: right;">1.5mark</span></p> <p>The newly hatched larvae feed on the epidermal tissues of the leaves producing typical whitish patches. The advanced stage larvae feed on the leaf lamina by biting small holes in the leaf lamina. These larvae also bore into the heads of cabbage and cauliflower. In case of severe infestation, plant may be completely skeletonized.</p> <p><b>Control measures :</b> <span style="float: right;">1.5mark</span></p> <p>Collect and destroy affected plant part. Release of egg parasitoid <i>Trichogramma sp.</i> Pest can be controlled effectively by spraying Azadirachtin 1% or NSKE 4% or quinalphos 25 EC @ 0.05 per cent or Bt @ 1 kg / ha or deltamethrin 2.8EC or Fenvalerate or Lambda cyhalothrin 5EC.</p>
Q.3.	<p><b>Give the site of oviposition and management strategies of the following pests.</b></p> <p><b>1) Coconut black headed caterpillar</b></p> <p><b>Site of Oviposition:</b> Near the tip of leaflets of the older leaves <span style="float: right;">0.5 mark</span></p> <p><b>Management:</b> <span style="float: right;">1.5mark</span></p> <p>Cut and burn the leaves showing presence of larval galleries. This should be done in the beginning of the summer season.</p> <p>Destroy the moths by setting up light trap in the field.</p> <p>Spray affected palms with quinalphos 25 EC or 0.05 per cent malathion.</p> <p>Biological control-</p> <p style="padding-left: 40px;">Larval parasite : a) <i>Goniozus nephantidis</i> @ 3500 adults/ha b) <i>Bracon brevicornis</i> c) <i>Elasmus nephantidis</i></p> <p><b>2) Pomogranate fruit borer:</b></p> <p><b>Site of Oviposition:</b> Calyx of flower and Fruits <span style="float: right;">0.5mark</span></p> <p><b>Management :</b> <span style="float: right;">1.5mark</span></p> <ol style="list-style-type: none"> <li>1. Remove and destroy all infested and fallen fruits.</li> <li>2. Bagging of fruits with paper bag or plastic bag or cloth bag is effective but it cannot be practiced on large scale as it is expensive and tedious.</li> <li>3. Spraying with deltamethrin 2.8 EC-0.002 per cent or Emamectin benzoate 5 SG or Spinosad 45 SC at 3 weeks interval starting from appearance of bud or fruit set.</li> </ol> <p><b>Schedule of application:</b></p> <ol style="list-style-type: none"> <li>i) 1<sup>st</sup> spray : When buds appear or fruits set.</li> <li>ii) 2<sup>nd</sup> application: 3 weeks after 1<sup>st</sup> spray.</li> <li>iii) 3<sup>rd</sup> application: 3 weeks after 2<sup>nd</sup> spray.</li> <li>iv) 4<sup>th</sup> application : 3 weeks after 3<sup>rd</sup> spray.</li> </ol>

<p><b>Q.4.</b></p>	<p><b>Explain nature of damage and management strategies for Tomato fruit borer and Pumpkin beetle.</b></p> <p><b>Tomato fruit borer</b></p> <p><b>Nature of damage-</b> <span style="float: right;"><b>1 mark</b></span></p> <p>The caterpillar causes damage initially by feeding on the foliage for couple of days and subsequently boring into fruits and feeding on the internal tissues by introducing its head and anterior half part of the body alone within. Larva is migratory in habit. It moves from one fruit to another damaging as many as 2 to 8 fruits in its life time. Young larvae feed on tender foliage while advanced stage larvae (4<sup>th</sup> instar onwards) attack the fruits.</p> <p><b>Management strategies-</b> <span style="float: right;"><b>1 mark</b></span></p> <p>Hand picking of caterpillars and their mechanical destruction in the early stage of infestation can keep the population of this pest under check. Deep ploughing after the harvest of crop helps to destroy hibernated pupae. Infested fruits should be collected and destroyed promptly. Mass release <i>Trichogramma pretiosum</i> egg parasite 50,000 adults/ha five times at weekly interval from initiation of flowering or Give five sprays of HaNPV 250 LE (larval equivalent) @ 500 ml/ha at weekly interval after initiation of 50 per cent flowering or Spray 5 per cent Neem Seed Extract (NSE) @ 500 gm / 500 litres of water. Trap crops like "Marigold" may be planted around the border of main crop.</p> <p><b>Pumpkin beetle</b></p> <p><b>Nature of damage-</b> <span style="float: right;"><b>1mark</b></span></p> <p>On hatching, grubs feed on the roots and underground portion of host plants and also fruits touching the soil. The damaged roots and infested underground portion of the stems start rotting due to secondary infection by saprophytic fungi and the unripe fruits of such vines dry up. Infested fruits become unfit for human consumption. Adult beetles are mainly responsible for the damage of the plant above ground attacking on the flowers, leaves and fruits. Adult beetles feed voraciously on leaf lamina making irregular holes. They prefer young seedlings and tender leaves. Damage at that stage may even kill the seedlings.</p> <p><b>Management strategies -</b> <span style="float: right;"><b>1 mark</b></span></p> <p>Preventive measures like burning of old creepers, ploughing and harrowing of field after harvest of crops are recommended for the destruction of adults, grubs and pupae. Collection and destruction of beetles in early stage of infestation. Dusting with 5 per cent carbaryl or 5 per cent malathion is effective and safe to use. Spraying with 0.05 per cent Malathion has also been suggested.</p>
<p><b>Q.5.</b></p>	<p><b>Write short notes on</b></p> <p><b>1) Pollu beetle    2) Coffee berry borer- Scientific name, Family, Order, their nature of damage and Management</b></p> <p><b>1)Pollu beetle: <i>Longitarsus nigripennis</i></b> <span style="float: right;"><b>2marks</b></span>  <b>Coleoptera: Chrysomelidae</b></p> <p><b>Nature of Damage:</b></p> <p>This is a most important pest of pepper in India occurring regularly in the plantations. Damage is caused by both adults and grubs. Adult causes damage by feeding on the leaves, the growing shoot tip and on the surface tissues of the tender spikes. Feeding on the spikes leads to their partial damage. The grubs damage by boring into the growing tips, into spikes and into the berries. The shoot tip dies and dries up together. The spikes infested by the grubs also die and dry up and may drop. The attacked berries appear dark in colour, are hollow inside and</p>

	<p>crumbled when pressed. Such berries are known locally as “pollu berries”. Upto 35 per cent of the berries are lost in this way by the attack of the grubs. Single grub destroys around 3-4 or even more berries during its life time.</p> <p><b>Management:</b></p> <p>Spraying of Azadirachtin 1500 PPM @ 3ml/lit or quinalphos 25 EC @ 0.05 per cent or deltamethrin 208 EC or lambda cyhalothrin 5EC, first at the time of spike initiation and then a month when the berries are still tender can control the pest effectively.</p> <p><b>2) Coffee berry borer:</b> <i>Hypotehne mus hampei</i> <span style="float: right;"><b>2marks</b></span> Coleoptera: Scolytidae</p> <p><b>Nature of Damage:</b></p> <p>Adults and grubs are the damaging stages. Grub feed on beans whereas female adult tunnel in berries. Damage to endosperm is caused by making small galleries near the main tunnel. This results in dropping of tender berries; presence of small, round hole in the naval region of developed berry is the indication of the pest. The damage caused by the pest makes the coffee beans unfit for marketing.</p> <p><b>Management:</b></p> <p>Carry out timely and thorough harvest. Remove off-season berries to save main crop. Avoid excessive shade to the plants. Prune plants properly to facilitate better ventilation and sunlight. Spray application lambda cyhalothrin 5 EC or quinalphos 25EC. While processing dry coffee berries to the prescribed moisture level <i>arabica robust</i> 10.0%, <i>arabica</i> cherry 10.5% and <i>robusta</i> cherry 11 %.</p>
<b>Q.6.</b>	<p><b>Explain nature of damage and management practices for okra leaf hopper and whitefly.</b></p> <p><b>Okra leaf hopper :</b></p> <p><b>Nature of damage :</b> <span style="float: right;"><b>1mark</b></span></p> <p>Both nymphs and adults of leaf hopper cause damage by sucking the cell sap from the lower surface of leaves. The margins of infested leaves curl upward, turn yellow and subsequently become reddish brown.</p> <p><b>Management :</b> <span style="float: right;"><b>1mark</b></span></p> <p>Erect yellow sticky trap for monitoring and mass trapping the adult leaf hopper population. Spray application Imidacloprid 17.8 SL @ 3ml per 10 lit water or Acetamiprid 20SP @ 4 gm per 10 lit water or Dimethoate 30EC or Thiomethoxam 25WG etc.</p> <p><b>Okra whitefly:</b></p> <p><b>Nature of Damage:</b> <span style="float: right;"><b>1mark</b></span></p> <p>Both nymphs and adults suck the cell sap from ventral surface of leaves. As a result, infested leaves become yellowish, wrinkled, curled and are ultimately shed. The vitality of the crop is reduced. Consequently, the growth of the plant is adversely affected and when the attack appears late in the season, the yield is lowered considerably. Pest also acts as a vector transmitting “leaf curl” virus disease.</p> <p><b>Management :</b> <span style="float: right;"><b>1mark</b></span></p> <p>Erect yellow sticky trap for monitoring and mass trapping the adult pest population. Spray application Acetamiprid 20SP or Dimethoate 30EC or Thiomethoxam 25WG etc.</p>
<b>Q.7.</b>	<p><b>Write scientific name and nature of damage of the following pests</b></p> <p><b>1) Fig jassid : <i>Velu caricae</i></b> <span style="float: right;"><b>0.5mark</b></span></p> <p><b>Nature of damage:</b> <span style="float: right;"><b>1.5mark</b></span></p>

	<p>Both nymphs as well as adults suck the cell sap from the tender leaves, shoot and even young fruits as well. As a result of excessive feeding, leaf margin turns yellow, curl and ultimately becomes reddish brown producing typical symptom of "hopper burn". Infested shoots wither and fruits drop down prematurely. The pest activity coincides with the period when young foliage is produced and reaches its peak in the middle of November.</p> <p><b>2) Grape stem girdler: <i>Sthenias grisator</i></b> <span style="float: right;"><b>0.5mark</b></span></p> <p><b>Nature of damage:</b> <span style="float: right;"><b>1.5mark</b></span></p> <p>During day time, adults hide on lower side of leaves or under the forkings of branches. The girdling of green branches is an essential event before egg laying. The bark and wood are cut right upto the centre and at times even branches are cut into bits. The portion above the girdle dries up. Girdling is done at any place. Branches of 1.25 to 2.5 cm diameter are preferred for attack. Girdling is done at the height of 15 cm to 3 m above the ground. Adults avoid light and are active at night.</p>																		
<b>Q.8.</b>	<p><b>Enlist any four important insect pests of citrus along with scientific name and describe nature of damage and management practices of citrus psylla.</b></p> <p><b>Enlist any four important insect pests of citrus along with scientific name.</b> <span style="float: right;"><b>2marks</b></span></p> <table><tr><td>1.</td><td>Lemon butterfly</td><td><i>Papilio demoleus</i></td></tr><tr><td>2.</td><td>Citrus fruit sucking moth</td><td><i>Eudocima fullonica</i>, <i>E. materna</i>, <i>E. ancilla</i>, <i>E. conjuncta</i> and <i>Achaea janata</i></td></tr><tr><td>3.</td><td>Citrus leaf miner</td><td><i>Phyllocnistis citrella</i></td></tr><tr><td>4.</td><td>Citrus psylla</td><td><i>Diaphorina citri</i></td></tr><tr><td>5.</td><td>Citrus whitefly</td><td><i>Dialeurodes citri</i></td></tr><tr><td>6.</td><td>Citrus blackfly</td><td><i>Aleurocanthus woglumi</i></td></tr></table> <p><b>Citrus psylla -</b></p> <p><b>Nature of damage :</b> <span style="float: right;"><b>1mark</b></span></p> <p>Damage to the plant is caused by both nymphs and adults, sucking cell sap from tender leaves, terminal shoots and flower buds. As a result, curling of leaves, defoliation and even death of shoots may result. The infested fruits remain undersized, poor in juice content and insipid in taste. Pest is responsible for transmitting <b>greening virus</b> of citrus.</p> <p><b>Management:</b> <span style="float: right;"><b>1mark</b></span></p> <p>i) 1<sup>st</sup> spray as soon as new sprouts appear in June/January with monocrotophos 0.05 per cent or malathion 0.05 per cent or lambdacyhalothrin or dimethoate 0.025 per cent or oxydemeton methyl 0.025 per cent or fenthion 0.05 per cent or fenvalerate 0.01 per cent.</p> <p>ii) 2<sup>nd</sup> spray may be given two weeks after first application.</p>	1.	Lemon butterfly	<i>Papilio demoleus</i>	2.	Citrus fruit sucking moth	<i>Eudocima fullonica</i> , <i>E. materna</i> , <i>E. ancilla</i> , <i>E. conjuncta</i> and <i>Achaea janata</i>	3.	Citrus leaf miner	<i>Phyllocnistis citrella</i>	4.	Citrus psylla	<i>Diaphorina citri</i>	5.	Citrus whitefly	<i>Dialeurodes citri</i>	6.	Citrus blackfly	<i>Aleurocanthus woglumi</i>
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Q.9.	<b>Enlist four major pests of mango with scientific name and describe nature of damage and management practices for mango hopper.</b>																												
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	<b>Nature of damage:</b> <span style="float: right;"><b>1 mark</b></span>																												
	<p>Both nymphs and adults suck the cell sap from tender leaves of mango during non- flowering season. The over-wintering hoppers become active with the advent of flowering season and suck the cell sap clustering together in large number on flowers and flower buds. Due to continuous draining of sap from the inflorescence, the flowers and flower buds drop down and adversely affect fruit setting. Even if few fruits are set on plant, they remain undersized and drop down prematurely in due course.</p>																												
	<p>The hoppers excrete large amount of sugary substance on leaves and inflorescence which adversely affects it's fertilization. The saprophytic fungi <i>Capnodium mangiferum</i> and <i>Meliola mangiferae</i> develops on the sugary secretion giving complete blackish appearance to the plant. This symptom is locally called 'Khar'. The photosynthetic activity of plant is hampered because of thick coating of black sooty mould on the leaves.</p>																												
	<b>Management:</b> <span style="float: right;"><b>1mark</b></span>																												
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Q.10.	<b>Describe the nature of damage and suggest management practices for turmeric rhizomefly and rose bud borer.</b>																												
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	<b>Nature of damage-</b> <span style="float: right;"><b>1mark</b></span>																												
	<p>The maggots bore into the rhizomes of ginger and turmeric and damage them. The yellowing of plants and rotting of rhizomes takes place due to severe infestation of pest.</p>																												

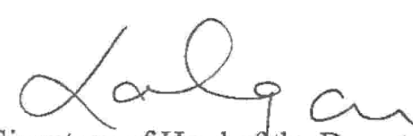


	<p><b>Management- 1mark</b></p> <p>Select healthy rhizomes for planting. Treat the rhizome sets by dipping in dimethoate 30EC @ 2ml/lit water suspension for 10 minutes before planting. Remove and destroy the rotten rhizomes from the field along with maggots after harvest of crop to check the breeding of the pest. Destroy stray plants in off season.</p> <p><b>Rose bud borer:</b></p> <p><b>Nature of Damage: 1mark</b></p> <p>Caterpillar bore in to buds by making holes and feed on growing petals. Caterpillar also damage flowers by eating petals and leaving excreta.</p> <p><b>Management: 1mark.</b></p> <p>Collection and destruction infested buds. Application of biopesticides HaNPV @ 250 L.E./ha or <i>Bacillus thuringensis</i> @ 1.5 g/lit water. Release of parasitoids <i>Trichogramma</i> sp, <i>Microbracon</i> <i>bravicornis</i>, <i>Chelonomus</i> sp, <i>Tetrastichus israelae</i>.. Release <i>Trichogramma chilonis</i> @ 75,000 adults/ha. Summer ploughing of soil will expose the pupae to sunlight and predators. Spraying with 4 % NSKE or ethofenprox 0.01 % controls the pest effectively.</p>
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### SECTION 'B'

<b>Q.11</b>	<b>Give the site of pupation of the following pests</b>	
	1	Hadda beetle- <b>On leaves</b>
	2	Brinjal shoot and fruit borer - <b>Pupate in cocoons either on shoots, fruits or in soil</b>
	3	Ber fruit fly – <b>Soil</b>
	4	Potato tuber moth-Silken cocoon <b>outside the tuber</b>
<b>Q.12</b>	<b>Fill in the banks/ Do as directed.</b>	
	1	The predator, <i>Cryptolaemus montrouzieri</i> is used to control <b>Mealy bugs</b> .
	2	<i>Helopeltis antoni</i> is a pest of <b>Cashewnut/and Tea</b>
	3	Which plant parasitic nematode is responsible for galls on root? <b>Root knot nematode</b>
	4	Chilli leaf curl, an important disease of chilli peppers is caused by <b>thrips, <i>Scirtothrips dorsalis</i> Hood/and yellow mite, <i>Polyphagoraronemus latus</i> (Banks).</b>

  
 Signature of Course Instructor  
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Head,  
 Dept. Of Agril.Entomology  
 D.B.S.K.K.V., Dapoli