

LABORATORY MANUAL & WORK BOOK

Pests of Crops and Stored Grain and Their Management (BSAC-503)

For B.Sc.(Hons.) Agriculture Semester-V



Dr.Hitendra Kumar
Associate Professor & Head

DEPARTMENT OF ENTOMOLOGY
School of Agricultural Sciences
Shri Guru Ram Rai University,

Dehradun 248001 (Uttarakhand)



SHRI GURU RAM RAI UNIVERSITY

(Estd. By Govt. of Uttarakhand, vide Shri Guru Ram Rai University Act No. 03 of 2017)

New Campus Pathri bagh, Dehradun-248001, Uttarakhand

Certificate

This is to certify that the practical work recorded herein is a bona fide account of the work carried out by Mr./Ms. _____ (Enrollment No. _____) as part of the B.Sc. (Hons.) Agriculture degree programme, Course No. BSAC-503, titled “Pests of Crops and Stored Grain and Their Management,” during the 5th Semester of the Academic Year _____.

The work documented in this work book cum manual has been performed sincerely and diligently, in accordance with the prescribed syllabus and under proper guidance and supervision.

Date: _____

Faculty In-charge: _____

Department of Entomology

School of Agricultural Sciences

Shri Guru Ram Rai University, Pathribagh

Dehradun 248 001 (Uttarakhand)

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B.Sc.(Hons.)Agriculture Semester-II
Subject: Pests of Crops and Stored Grain and Their Management
(BSAC-503)

Objective: To identify different types of damage done by phytophagous insects

Methodology: Visit the field, collect damaged plants/plant parts from different crops and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

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Signature of Teacher

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Department of Entomology

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B.Sc.(Hons.)Agriculture Semester-II

Subject: Pests of Crops and Stored Grain and Their Management

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LAB EXERCISE NUMBER -02

Title: To identify different insect pests of vegetable crops

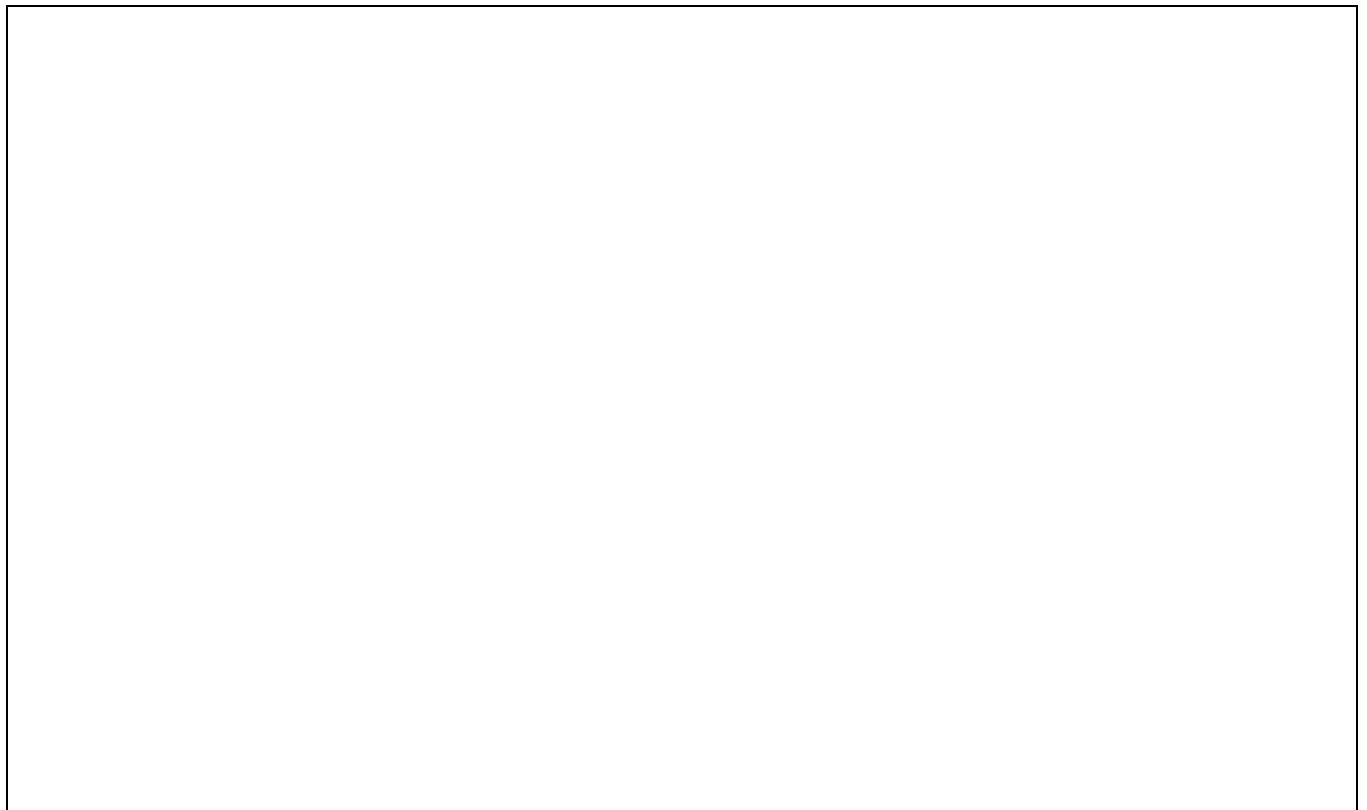
Methodology: Visit the field, collect different insects and damaged plants/plant parts from different vegetable crops and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

S.N.	Name of crop & damaging Insect	Morphological description of Insect pest	Nature of damage
1.			
2.			
3.			
4.			
5.			
6.			

7.			
8.			
9.			
10.			

Lab Work: Draw paste pictures of different insect pests of vegetable crops you have studied



Signature of Teacher

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Subject: Pests of Crops and Stored Grain and Their Management

(BSAC-503)

LAB EXERCISE NUMBER -03

Objective: To study life cycle of brinjal shoot and fruit borer.

Methodology: To study the life cycle of the Brinjal Shoot and Fruit Borer (*Leucinodes orbonalis*), follow these steps:

1. Collection of Insect Samples

- **Field Collection:** Collect infested brinjal plants and fruits from the field. Ensure to gather specimens from different stages (eggs, larvae, pupae, adults).

2. Rearing the Insects

- **Egg Stage:** Place the collected eggs on moistened filter paper in Petri dishes. Observe the incubation period and hatching process.
- **Larval Stage:** Transfer newly hatched larvae to fresh brinjal shoots and fruits in a rearing container. Maintain suitable environmental conditions (temperature: 25-30°C, relative humidity: 70-80%). Observe moulting, feeding behaviour, and larval duration.
- **Pupal Stage:** Once larvae pupate, transfer them to a separate container with soil or sand for pupation. Monitor the pupal duration and emergence of adults.
- **Adult Stage:** After emergence, place adults in a mating cage with brinjal plants for egg-laying. Record adult lifespan and reproductive behaviour.

3. Observation and Data Recording

- **Daily Monitoring:** Record observations daily, noting the duration of each life stage, survival rate, and any abnormalities.

Table 1 . Duration of different life stages of Brinjal Shoot and Fruit Borer.

Life stage	Duration in days				Average	Remarks
	R1	R2	R3	R4		
Egg						
Larva 1						
Larva 2						
Larva 3						
Larva 4						
Larva 5						
Pre-pupa						
Pupa						
Adult						
Total						

Activity 1 .Draw well labelled life cycle diagram of Brinjal Shoot and Fruit Borer.

This image shows a blank sheet of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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LAB EXERCISE NUMBER -04

Objective: To identify different Insect Pests of Rice Crop

Methodology: Visit the rice field, collect different insects and damaged plants/plant parts from different rice fields and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

S.N.	Name of crop & damaging Insect	Morphological description of Insect pest	Nature of damage
1.			
2.			
3.			
4.			
5.			
6.			
7.			

8.			
9.			
10.			

Activity : Draw coloured diagram or paste picture of insect pests studied by you

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LAB EXERCISE NUMBER -05

Objective: To identify different insect pests of pulse crops

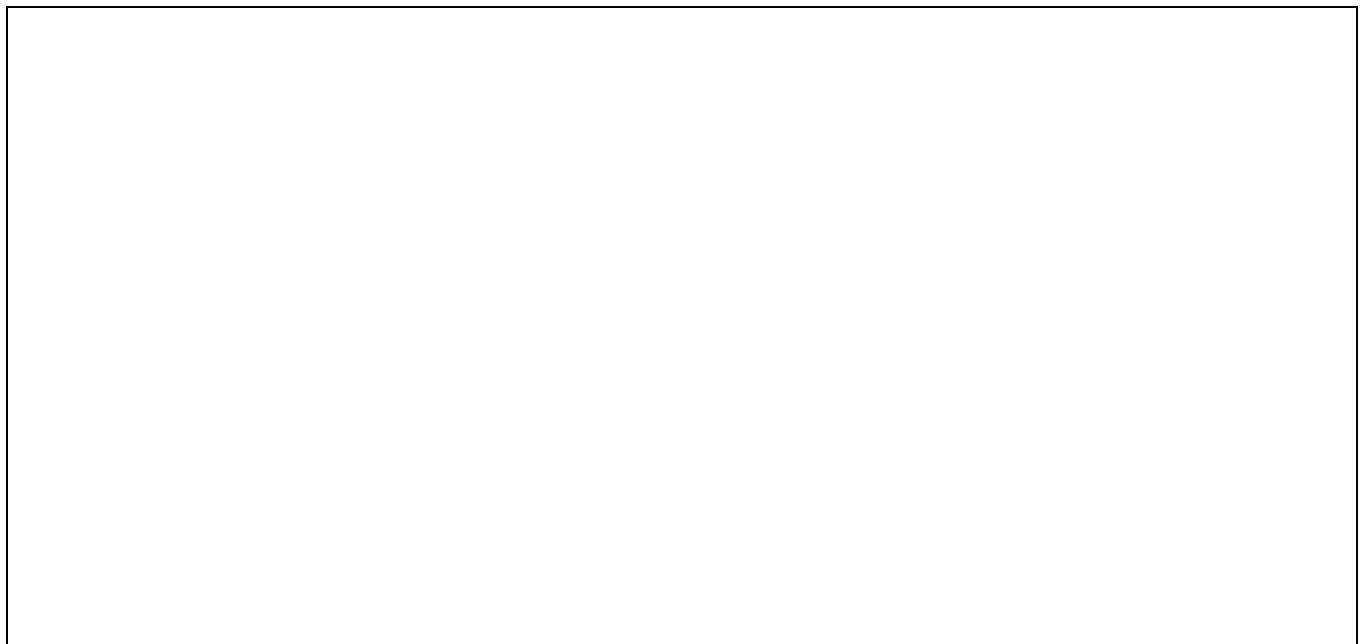
Methodology: Visit the field, collect different insects and damaged plants/plant parts from different fields having pulse crops and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

S.N.	Name of crop & damaging Insect	Morphological description of Insect pest	Nature of damage
1.			
2.			
3.			

4.			
5.			
6.			
7.			
8.			
9.			
10.			

Activity : Draw coloured diagram or paste picture of insect pests observed by you



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LAB EXERCISE NUMBER -06

Objective: To study life cycle of Bihar hairy caterpillar (*Spilosoma obliqua*)

Methodology: To study the life cycle of the yellow stem borer, follow these steps:

1. Field Collection of Eggs or Larvae

- **Site Selection:** Identify locations where the Bihar hairy caterpillar is commonly found, such as agricultural fields (soybean, groundnut, Mung bean, etc.).
- **Collection:**
 - Collect egg masses or early instar larvae from host plants using fine brushes or forceps.
 - Ensure to take samples from different locations for genetic and environmental variation.
- **Transportation:** Place the collected eggs or larvae in ventilated containers with host plant leaves to avoid suffocation.

2. Laboratory Rearing

- **Setup:** Transfer the eggs or larvae into rearing cages or transparent plastic containers with ample ventilation.
- **Environmental Control:** Maintain optimal conditions (temperature: 25-28°C, relative humidity: 60-80%, and light cycle: 12 hours light/dark).
- **Feeding:** Provide fresh leaves from the host plant daily to feed the larvae.
- **Hygiene:** Regularly clean the containers to avoid fungal or bacterial infections.

4. Observation of Life Stages

- **Egg Stage:**
 - Observe and record the incubation period of the eggs until hatching.
 - Take notes on the egg color, shape, and size.
- **Larval Stage:**
 - Document the larval instars by measuring the larval length, width, and morphological changes.
 - Monitor the feeding behavior and time between successive molts.
- **Pupal Stage:**
 - Observe pupation behavior and the formation of the cocoon.
 - Measure the pupal size, weight, and color changes.
- **Adult Emergence:**
 - Record the time taken for adult moths to emerge from the pupae.
 - Document the wing patterns, body size, and other adult characteristics.

5. Recording Developmental Time

- **Egg to Adult Period:**
 - Record the duration of each developmental stage (egg, larval instars, pupae, and adult).

- Take daily observations and note any variations in development.

Table 1 . Duration of different life stages of Bihar hairy caterpillar

Life stage	Duration in days				Average	Remarks
	R1	R2	R3	R4		
Egg						
Larva 1						
Larva 2						
Larva 3						
Larva 4						
Larva 5						
Pre-pupa						
Pupa						
Adult						
Total						

Activity 1 .Draw well labelled life cycle diagram of Bihar hairy caterpillar

[illegible]

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LAB EXERCISE NUMBER -07

Objective: To study life cycle of tobacco caterpillar, *Spodoptera litura*

Methodology: To study the life cycle of the tobacco caterpillar, *Spodoptera litura*, follow these steps:

1. Collection of Insect Samples

- **Field Collection:** Collect infested brinjal plants and fruits from the field. Ensure to gather specimens from different stages (eggs, larvae, pupae, adults).

2. Rearing the Insects

- **Egg Stage:** Place the collected eggs on moistened filter paper in Petri dishes. Observe the incubation period and hatching process.
- **Larval Stage:** Transfer newly hatched larvae to fresh tobacco caterpillar in a rearing container. Maintain suitable environmental conditions (temperature: 25-30°C, relative humidity: 70-80%). Observe moulting, feeding behaviour, and larval duration.
- **Pupal Stage:** Once larvae pupate, transfer them to a separate container with soil or sand for pupation. Monitor the pupal duration and emergence of adults.
- **Adult Stage:** After emergence, place adults in a mating cage with host plants for egg-laying. Record adult lifespan and reproductive behaviour.

3. Observation and Data Recording

- **Daily Monitoring:** Record observations daily, noting the duration of each life stage, survival rate, and any abnormalities.

Table 1 . Duration of different life stages of tobacco caterpillar, (*Spodoptera litura*).

Life stage	Duration in days				Average	Remarks
	R1	R2	R3	R4		
Egg						
Larva 1						
Larva 2						
Larva 3						
Larva 4						
Larva 5						
Pre-pupa						
Pupa						
Adult						
Total						

Activity 1 .Draw well labelled life cycle diagram of tobacco caterpillar, (*Spodoptera litura*)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

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LAB EXERCISE NUMBER -08

Objective: To identify different insect pests of Mango

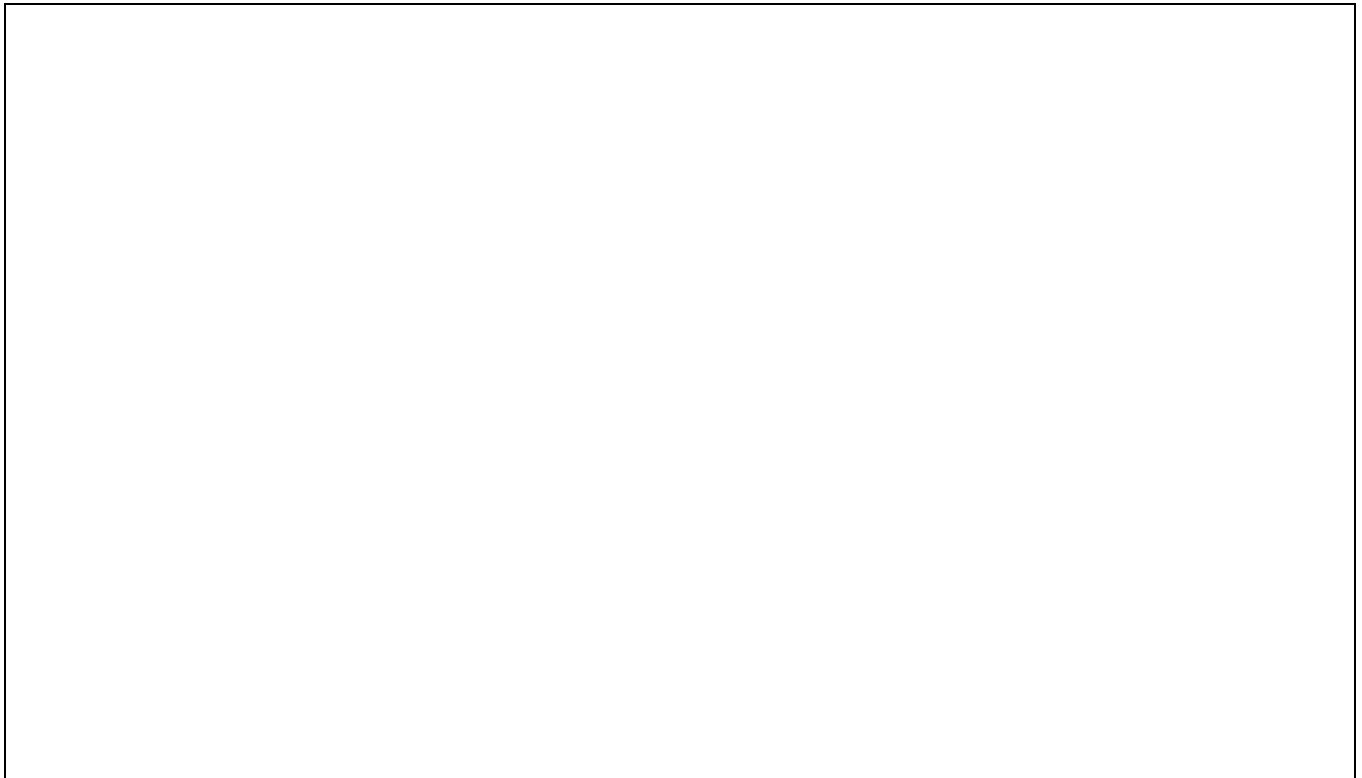
Methodology: Visit the field, collect different insects and damaged plants/plant parts from different fields having pulse crops and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

S.N.	Name of crop & damaging Insect	Morphological description of Insect pest	Nature of damage
1.			
2.			
3.			
4.			
5.			
6.			
7.			

8.			
9.			
10.			

Activity : Draw coloured diagram or paste picture of insect pests observed by you



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LAB EXERCISE NUMBER -09

Objective: To identify different insect pests of sugarcane

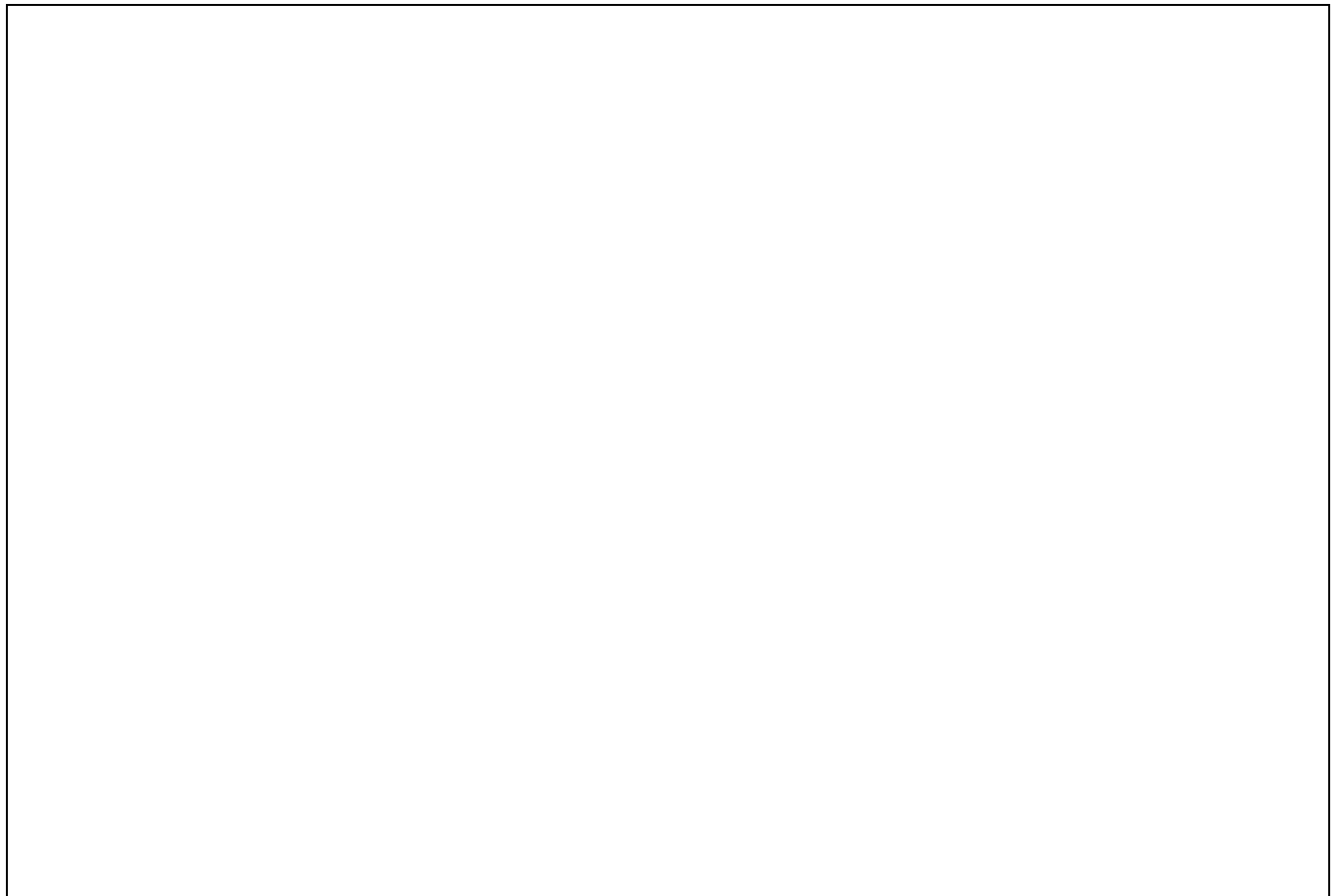
Methodology: Visit the field, collect different insects and damaged plants/plant parts from different fields having pulse crops and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

S.N.	Name of crop & damaging Insect	Morphological description of Insect pest	Nature of damage
1.			
2.			
3.			
4.			
5.			
6.			

7.			
8.			
9.			
10.			

Activity : Draw coloured diagram or paste picture of insect pests observed by you



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LAB EXERCISE NUMBER -10

Objective: To identify different insect pests of stored grains

Methodology: Visit the field, collect different insects and damaged plants/plant parts from different fields having pulse crops and record the observations in the space given below

OBSERVATIONS TO BE RECORDED:

S.N.	Name of crop & damaging Insect	Morphological description of Insect pest	Nature of damage
1.			
2.			
3.			
4.			
5.			
6.			

7.			
8.			
9.			
10.			

Activity : Draw coloured diagram or paste picture of insect pests observed by you



Signature of Teacher