SURVEY PROTOCOL FOR FRUIT FLIES

1. OBSERVATION SEASON

  - Fruit fly observation throughout the year by means of different traps

- **Pheromone trap**: Methyl Eugenol (ME) and Cue lure(Cue L) (ready to use dispenser); 2 lit capacity plastic bottle trap; Malathion for knockdown; replace lure in every 15 days; weekly collection interval; handle ME and Cue L separately; dispose used lures by burrowing in soil
  - Fruit fly species concerned
    - *Bactrocera dorsalis* – ME
    - *Bactrocera cucurbitae*– Cue L
    - *Bactrocera zonata*– ME
    - *Bactrocera correcta*– ME

- **Protein bait trap**: MacPhail trap; Spinosad for knockdown; bait solution up to 1 cm at the bottom of trap; replace bait in every 15 days; weekly collection interval; attention should be made not to spill bait solution in the ground
  - Fruit fly species concerned
    - *Bactrocera dorsalis* (Hendel, 1912)
    - *Bactrocera cucurbitae* (Coquilett, 1899)
    - *Bactrocera zonata* (Saunders, 1841)
    - *Bactrocera correcta* (Bezzi, 1913)
    - *Bactrocera tsuneonis* (Miyake)

    - **Protein bait composition**
      Ammonium carbonate – 1.6 gm
      Borax powder – 40 gm
      Sodium hydroxide – 2gm
      Protein hydrolasate (Flavex) – 12.5 ml
      Warm water – 2lit

    - Trapping density: 1 trap per hectare in each trapping mode depending upon the field topography.
    - Trap placement: Optimum height for placing pheromone and protein bait traps should be 1.5 to 2.0 m above the ground; distance between two traps should be at least 50 m apart.

2. SAMPLE TREE SELECTION FOR OBSERVATION

- Fruit bearing trees at the orchard should be selected.

3. NUMBER OF SAMPLE TREE FOR OBSERVATION

- Randomly select 2 fruit bearing trees in 10 orchards from each district; maintain weekly observation interval.

Use exclusion technique to collect soil emerged fruit flies within MacPhail protein trap-net (2.5-m length x 2.5-m breadth x 1.5-m height) from fruit drop area; place trap-net for 3 weeks at one spot;after that shift trap-net to another nearby location within the tree canopy to collect fruit flies.

4. PLANT PARTS USED FOR OBSERVATION

- Fruits

5. FREQUENCY OF OBSERVATION

- Pheromone trap: weekly collection interval
- Protein bait:weekly collection interval
- Trap-net: weekly collection interval

6. WAYS TO COLLECT FRUIT-FLY SPECIMENS

Fruit fly specimen collection from:

- Pheromone trap
- Protein bait
- Trap-net

7. WAYS TO PRESERVATION OF FRUIT FLY SPECIMENS

- Dry preservation of fruit fly samples
- Wet preservation of fruit fly samples
- Wet preservation of maggots with special warm water treatment

8. WAYS TO PACKING FRUIT FLY SPECIMENS

- Field to laboratory:
  Collect fruit fly in inflated polythene bag (of 1.0 kg capacity) and knock down them in killing jar/ ethyl acetate/ CTC/ chloroform fume; pack the fruit fly specimens in plastic/ tin box along with collection data (collector's name, host name, location and date of collection, source of specimens as pheromone/ protein bait/ trap-net with respective code numbers).
- Laboratory to expert (national/ international):
  - **Insect preparation:**
    - Insect separation based on insect taxonomy (eg. Diptera, Tephritidae, *Bactrocera*,);
    - Record of local insect museum code (eg. ED, Dip, Tephri, KTM, No.,).
  - **Insect packing based on nature of insect preservation:**
    For dry preserved insects: dry preserved insects should be placed inside the stout cardboard box with thermocol platform with deep placement of insect pin inside the thermocol; minute pouch filed with silica gel should be placed in one corner of the box without disturbing insect specimen;packing box cover must have sender and receiver's addresses; the box should be wrapped with suitable and durable material until it reaches to addressee; for scientific communication with legal approach, the insect packing box should go along with official permission paper from country of destination.

    For wet preserved insects: wet preserved insects should be placed inside the screw capped 70% alcohol contained vials with collection data printed with pencil; wrap each vials with tissue paper to ensure their physical damage during transportation;for ensuring extra safety, the left over internal space inside the box should be filled up with thermocol specks; packing box cover must have sender and receiver's addresses; the box should be wrapped with suitable and durable material until it reaches to addressee; for scientific communication with legal approach, the insect packing box should go along with official permission paper from country of destination.

9. METHODS OF FRUIT FLY MONITORING IN FIELD

- Monitoring of fruit fly in field should be performed by pheromone and protein bait traps, as mentioned earlier.

10. PLACE AND PERSON FOR SPECIMEN DIAGNOSIS

- National: Entomology Division, NARI, NARC, Khumaltar, Lalitpur;
  Natural History Musuem, Tribhuvan University, Swayambhu, Kathmandu;
- International: British Museum (Natural History), London, UK;
  CSIRO, Canberra, Australia;
  East West University, Hawaii, USA;
  Department of Entomology, Indian Agriculture Research Institute, New Delhi;
  Indian Institute of Horticulture Research, Hassergatta, Banglore, India;
  Central Institute for Sub-Tropical Horticulture Research, Lucknow.

ANNEX

Table 1: Field Record sheet for Fruit flies

<table>
<tr><td colspan="4">Name of Fruit fly Monitoring Area</td><td colspan="4">Week/Month:
From: To:</td></tr>
<tr><td>Trap No.</td><td>Location of trap</td><td>Date Insp.</td><td>Host</td><td>Lure Type</td><td>No of flies/ trap</td><td>Species identified</td><td>Date recharge</td></tr>
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Table 2: General Pest Record

Reference Number	
Scientific name of pest • Common Name • Species Name: • Family • Order:	
Life stage of pest	[ ] Egg; [ ] Larvae(maggot) ; [ ] Pupae; [ ] Adult
Scientific Name of host • Variety • Common Name: • Species Name • Family	
Plant parts affected:	[ ] Leaves; [ ] Stem; [ ] Roots; [ ] Buds/Flowers; [ ] Fruits; [ ] Seed ; and [ ] Whole plant
Stage of crop:	[ ] Seedling stage; [ ] Vegetative Growth stage; [ ] Flowering stage; and [ ] Fruiting stage
Locality • Village • District	
Date of Collection	
Name of the Collector	
Date of Identification	
Name of the Identifier	
Date of Verification	
Name of the Verifier	

Table 3: Specimen Identification Report

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<tr><td colspan="4">To
………………………….
…………………………
………………………….
(Name & Address of Field Inspector)</td></tr>
<tr><td>Trap</td><td>Location</td><td>Name of fruit fly species identified</td><td>No of flies</td></tr>
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Signature & Date:

Name of Reference Entomologist

Address for Communication:

Tel.:

Fax:

E-mail:

Table 4: Fruit fly Surveillance & Monitoring Report

1. Area involved:
2. Period of Reporting
3. No of traps inspected:
4. No of traps recorded with fruit flies:
5. Details of fruit flies detected

S.N.	Location	Fruit fly species detected	No of flies detected	Life stage detected

S.N.	Location	Fruit fly species detected	No of flies detected	Life stage detected

6. Action taken on detection of fruit lies:

7. Signature & Date

8. Name

9. Designation of Officer