



## **IPM Threshold Guide**

### **Vegetable Crops**

#### **ECONOMIC THRESHOLD –**

Level of pest activity when control action is suggested to prevent economic injury

## **COLE CROP INSECTS**

### ***Plant Emergence (or Transplanting) to Beginning of Heading or Reproductive Development***

#### **CABBAGE ROOT MAGGOT**

Control when planting

#### **FLEA BEETLES**

> **50%** of newly emerged plants infested and "shothole injury" is present.

Treatment thresholds for leafy cultivars not available

#### **CABBAGE APHIDS AND OTHER APHID SPECIES**

Broccoli and Cauliflower - infestations of all species combined reach nearly **100%**

Brussel Sprouts > **15%** of plants are aphid infested from transplanting till **3** weeks before harvest

Cabbage **2%** of plants are infested with **5** or more aphids on leaves

#### **THRIPS**

Fresh market cabbage > **20%** of plants infested

#### **IMPORTED CABBAGEWRM, CABBAGE LOOPERS & DIAMONDBACK MOTH**

#### **CATERPILLARS**

Sample 50 plants - treat when count is > **0.5** larval units per plant

#### **Weighting factor for larval unit determination:**

**Cabbage Looper:** large=**1.0** small=**0.7**

**Imported Cabbageworm:** large=**0.07** small=**0.1**

**Diamondback Caterpillar:** any size=**0.1**

#### **Heading or Sprout Development**

#### **CABBAGE APHIDS AND OTHER APHID SPECIES**

Treat when **2%** of plants are infested with > **5** aphids

#### **IMPORTED CABBAGEWRM, CABBAGE LOOPERS & DIAMONDBACK MOTH**

#### **CATERPILLARS**

Cabbage – treat when count is > **0.5** larval units per plant

Broccoli, Cauliflower and Brussel Sprouts – treat when > **1** caterpillar per **25** plants

## **CUCURBIT INSECTS**

### ***Plant Emergence to Three Leaf Stage***

#### **SPOTTED AND STRIPED CUCUMBER BEETLES**

For wilt susceptible cucumbers and muskmelons – use systemic insecticide treatment at planting time

Provisional threshold for pickling cucumbers – foliar insecticide when **20%** of plants are infested with cucumber beetles

### ***Three Leaf Stage to Harvest Maturity***

#### **MELON APHID**

Provisional threshold > **20%** of runners have > **5** aphids on leaves

#### **THRIPS**

Heavy infestation, leaf injury, plants not actively growing

#### **SPIDER MITES**

> **50%** of runners show early leaf injury on crown leaves and live mites present

### ***Three Leaf Stage to Harvest Maturity***

#### **SPOTTED AND STRIPED CUCUMBER BEETLES**

Thresholds not available

Treat moderate to high CB infestations levels on wilt susceptible varieties

Treat all cucurbits when high CB infestations cause excessive fruit damage

#### **LEAFHOPPERS**

Severe leaf injury expected to retard fruit maturity and affect yield

#### **SQUASH VINE BORER**

As soon as moths are trapped

## **LIMA BEAN INSECTS**

### ***Bloom to Harvest***

#### **PLANT BUGS (LYGUS) –**

Early bloom to harvest >**6-10** adult/nymphs per **20** sweeps

After mature bud set >**20-40** adults/nymphs per **20** sweeps

#### **CORN EARWORM**

> **50%** of larvae are > **1/2"**

#### **Fordhook Lima Beans:**

Up to **4** weeks from harvest > **1** larvae per **6'** of row  
Less than **4** weeks from harvest **3** larvae per **6'** of row

#### **Baby Lima Beans:**

> **1** larvae per **6'** of row, from late flat pod stage to harvest

## **PEA INSECTS**

**PEA APHID** - 50 aphids per sweep or 5-10 per plant

## **PEPPER INSECTS**

Early Fruit Set to Harvest

### **GREEN PEACH APHID**

Before fruit formation > 2 aphids per leaf

Once fruit is present 4 aphids per leaf

### **PEPPER MAGGOT**

As soon as flies are caught on sticky traps

### **EUROPEAN CORN BORER**

When fruits are forming on plants > 25 moths trapped per 5 days, average

Shorten treatment schedules if > 100 moths trapped per 5 days

### **CORN EARWORM**

When fruits are forming on plants, >100 moths trapped per 5 days (see sweet corn section for MDA Pest Survey website link)

## **POTATO INSECTS**

Plant Emergence to 12" Shoots

### **POTATO FLEA BEETLE**

>20% leaf loss

### **COLORADO POTATO BEETLE**

Overwintered >5 adults per 10 plant clusters and > 10% shoots chewed off at ground level

All stages

**Chemical treatments:**

Defoliation 20% and density per 10 plant clusters > 5 adults or > 40 small larvae or 15 large larvae or combination of any 2 stages, at 1/2 above levels

**Bt treatment:**

10% plant infestation, > 30% eggs hatched (trigger date)

Greater Than 12" Shoots to Bloom

### **GREEN PEACH APHID, POTATO APHID**

Prior to bloom - 2 per leaf

During bloom - 4 per leaf

Within 2 weeks of vine kill - 10 per leaf

Greater Than 12" Shoots to Bloom

### **MELON APHID**

Prior to bloom >1 per leaf

During bloom > 2 per leaf

Within 2 weeks of vine kill > 5 per leaf

### **POTATO LEAFHOPPER**

> 3 adults per sweep or > 1 nymph per 10 leaves

## **EUROPEAN CORN BORER**

100 moths trapped per 5 days (reduce if host plants unavailable) or 5% of leaves are infested with egg masses

Bloom to 50% Leaf Yellowing or Vine Kill

### **COLORADO POTATO BEETLE**

Defoliation > 30% and potential for further damage

## **SNAP BEAN INSECTS**

Plant Emergence to 3<sup>rd</sup> Trifoliolate Stage

### **SEEDCORN MAGGOT**

5 to 10 maggots per seed

### **THRIPS**

> 6 per leaflet with leaf injury

### **SPIDER MITES**

> 20 live mites per leaflet

### **BEAN LEAF BEETLE AND MEXICAN BEAN BEETLE**

Pre trifoliolate stage 6 or more per row foot

Post-trifoliolate stage 20% leaf loss, > 2 per plant

Prebloom Stage (3<sup>rd</sup> Trifoliolate to Bud)

### **POTATO LEAF HOPPER**

> 5 adults+nymphs per sweep

### **MEXICAN BEAN BEETLE**

> 20% defoliation

### **BEAN APHID**

50% or more have 5 or more aphids per terminal, distributed throughout

### **GREEN CLOVERWORM**

>20% defoliation and >15 larvae < 1" per sweep

Bloom to Harvest

### **LEAFHOPPERS**

During podset >25 per adults/nymphs per sweep

During bloom >12 adults/nymphs per sweep

### **MEXICAN BEAN BEETLE**

Defoliation > 10% during podding and population present

## **EUROPEAN CORN BORER**

>25 moths trapped per 5 days

### **CORN EARWORM**

> 100 moths per 5 days

## **SWEET CORN INSECTS**

### **CUTWORM**

1-2 leaf - 10% damaged plants

3-4 leaf - 5% damaged & 4 larvae per 100 plants

### **WHITE GRUB**

Heavy soils - 2 per sq. ft.

Sandy soils - 1 per sq. ft.

### **WIREWORM**

1 per bait station

### **SLUG**

Spike to 3 leaf - 5 per plant

## STALKBORER

4%, 6% or 10% damaged at the 2, 3 or 4leaf stage

## ARMYWORM

35% of plants > 50% defoliated & larvae < 3/4"

## EUROPEAN CORN BORER

Not irrigated - 80% infested with live larvae

Irrigated - 50% infested with live larvae

## CORN ROOTWORM

1 Western or 2 Northern per plant

## FLEA BEETLE

For Stewart's wilt susceptible varieties from spike stage to silking >5% of plants infested

## CORN EARWORM

At tassel emergence >15% tassel infestation

From tasseling to harvest -1st spray at 30% silk and apply subsequent sprays according to 5-day trap catch

## CEW & ECB MDA Pest Survey On-Line at:

[http://www.mda.state.md.us/plants-pests/plant\\_protection\\_weed\\_mgmt/plant\\_pest\\_survey\\_detection/index.php](http://www.mda.state.md.us/plants-pests/plant_protection_weed_mgmt/plant_pest_survey_detection/index.php)

## TOMATO INSECTS

### Plant Emergence or Transplant to 10" Plants

#### COLORADO POTATO BEETLE

##### Overwintered CPB:

At plant emergence - adults reducing plant densities below recommended levels for maximum yield

Actively growing > 15 adults per 10 plants

##### 10" Plants to Early Fruit Set

#### COLORADO POTATO BEETLE

##### All stages

##### Chemical Treatments:

Defoliation 20% throughout and > 20 adults and/or larvae per 10 plants

##### Bt Treatment:

10% plant infestation with egg masses and > 30% eggs hatched (trigger date)

##### 10" Plants to Early Fruit Set

#### POTATO APHID, GREEN PEACH APHID

Natural controls not present and > 20% of terminals are infested

#### SPIDER MITES

No specific threshold - treat during hot dry weather when damage is noticed due to heavy infestations

#### HORNWORMS

20 % defoliation and further damage potential

##### Early Fruit Set to Fruit Maturity or Vine Kill

#### COLORADO POTATO BEETLE

Defoliation potential > 10% or > 2% of plants have at least 1 freshly-injured fruit

#### TOMATO PINWORM

Active leaf mines > 0.7 per trifoliate leaf

## TOMATO FRUITWORM

> 5 damaged fruit in sample of 200 (2.5% damage)

## WEEDS OF FIELD CROPS

### ANNUAL WEEDS

# per 25 sq. ft. to cause 10% loss:

Cocklebur ----- 3

Jimsonweed or Velvetleaf ----- 3

Pigweed, Lambsquarters

or Morningglory ----- 5

Annual grasses ----- 20

### PERENNIAL WEEDS

% of field infested:

Light <5% Heavy <30%

Moderate <10% Severe >30%

**NOXIOUS WEEDS** -- no threshold, eliminate all

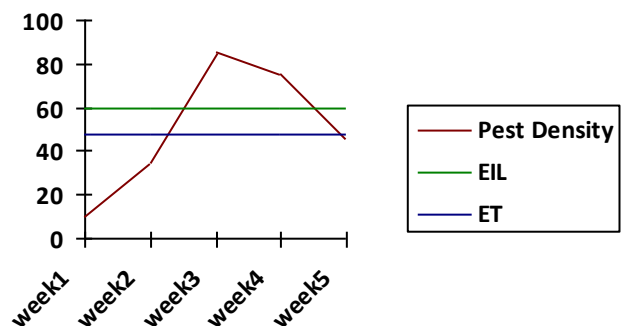
## IPM DEFINITIONS

### Economic Injury Level - EIL

"The lowest pest population density that will cause economic damage. At the EIL the Cost of Control equals the Benefit of Control."

### Economic Threshold (Action or Treatment Threshold) - ET

"The density of a pest at which control measures should be implemented to prevent an increasing pest population from reaching the EIL - ET is generally 80% of the EIL."



### EIL = Pest Density (P)

$$P = \frac{C}{V \times D}$$

C = Cost of Control

V = Value of Crop

D = Damage

Note: At EIL Benefit = Cost; B=C

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This reference was adapted from the University of Maryland and Delaware Cooperative Extension Filed Crop and Vegetable IPM Pest Management Manuals

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