

European Corn Borer Monitoring Protocol for All Host Crops

Use this hardcopy to write down observations taken in the field and submit observations online to the ECB survey here: <https://arcg.is/0TLWmS>. Alternatively, you can submit observations directly to the Survey123 using your mobile device while in the field.

Objectives:

- 1) To collect data on the presence, stage(s) and damage of European corn borer on various host plants.
- 2) By standardizing scouting protocols across host plants, we can identify those host plants and crops that are more attractive or at higher risk of injury by ECB and;
- 3) Gain a better understanding of ECB presence across the Canadian agricultural landscape.

Choose one of the following assessment options:

A) Scouting for Detecting Presence and Level in a Crop - Table 1

Assess a minimum of 10 plants (3 adjacent plants in 3 areas plus 1 additional plant in one of these 3 areas. Distance these 3 areas equally apart, relative to the size of the field/plot; a minimum of 20 m apart). Avoid assessing plants within 10 m of fields' edge.

B) Detailed Assessment for Research Purposes - Table 2

Assess up to 30 plants (10 adjacent plants from 3 areas of the field. Distance these 3 areas equally apart, relative to the size of the field/plot; a minimum of 20 m apart). Avoid assessing plants within 10 m of fields' edge.

Scouting Method for These Assessments:

1. Turn over every leaf on the plant, looking for egg masses on the underside of the leaves. For corn plants, if ears are present, concentrate scouting efforts on the three leaves above and below the ear zone.
2. Look for larvae and damage throughout the plant and any holes/tunneling along the mid-rib of the leaves or on the stem/stalk where the leaf axil connects. Frass on the stem is a good indicator of larval tunneling.
3. Record all observations in the following questions. Destructively sample plants with frass and tunneling into the stem/stalk by slicing the plant lengthwise from tip to base with a sharp knife.
4. Submit representative photos of ECB stages and damage as you find them.

A) Scouting for Detecting Presence and Level in a Crop

Expected Observations to Include in Table and in Survey123

1. Host Crop – see host crop list provided on Page 7

2. Plant Stage Options:

- Vegetative stages,
- Fluorescent stages,
- Pod/Fruit/Seed Stages, or
- Enter BBCH Scale Code (<https://www.julius-kuehn.de/en/jki-publication-series/bbch-scale/>)

3. Instar stages found (record all that apply):

- 1st instars (1-2 mm in length)
- 2nd instars (3-4 mm in length)
- 3rd instars (5-10 mm in length)
- 4th instars (12-16 mm in length)
- 5th instars (19-25 mm in length)

4. Damage by ECB found on (record all that apply):

- Leaves
- Holes into stem or stalk
- Tassel or fluorescence
- Fruit/Pod/Ear
- None

5. Leaf Feeding Injury Rating (If ECB is causing leaf damage)

- 0 = No feeding damage
- 1 = **Pinhole size holes** only
- 2 = **Shotgun holes (no elongated lesions)** on **2 or fewer** leaves
- 3 = **Shotgun holes (no elongated lesions)** on **3 or more** leaves
- 4 = **Elongated lesions of 2.5 cm or smaller** on **2 or fewer** leaves
- 5 = **Elongated lesions of 2.5 cm or smaller** on **3 or more** leaves
- 6 = **Lesions longer than 2.5 cm** on up to **1/3 of the plant**
- 7 = **Lesions longer than 2.5 cm** on up to **1/2 of the plant**
- 8 = **Lesions longer than 2.5 cm** on **2/3 of the plant**
- 9 = **Lesions longer than 2.5 cm** on **most of the plant**

6. Fruit/Ear/Pod Damage Type:

- Surface grazing and wounds or
- Entry hole into the fruit

Table 1. Scouting for Detecting Presence and Level in a Crop

Date of Assessment: _____

Name: _____

Email: _____

Province: _____

Field Location GPS Coordinates: Lat (eg. 41.44231): _____

Long (eg. 78.92311): _____

Host Crop¹: _____

Average Crop/Plant Stage²: _____

Nearest Town: _____

Plant #	ECB Counts		Instar Stages Found ³ (eg, 1 st , 2 nd)	Damage by ECB Found on ⁴	Leaf Damage Rating ⁵	# of Larvae Found Inside Plant	Fruit/Pod/Ear Damage Type ⁶	Other Feeding Patterns (describe and take photos)
	# of Egg Masses	# of Larvae Outside of Plant						
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Enter all data above into the Survey123 Online: <https://arcg.is/0TLWmS>

B) Detailed Assessment for Research Purposes

Expected Observations to Include in Table and in Survey123

1. **Host Crop** – see host crop list provided at end of document
2. **Plant Stage Options:**
 - Vegetative stages,
 - Fluorescent stages,
 - Pod/Fruit/Seed Stages, or
 - enter BBCH Scale Code (<https://www.julius-kuehn.de/en/jki-publication-series/bbch-scale/>)
3. **Instar stages found (record all that apply):**
 - 1st instars (1-2 mm in length)
 - 2nd instars (3-4 mm in length)
 - 3rd instars (5-10 mm in length)
 - 4th instars (12-16 mm in length)
 - 5th instars (19-25 mm in length)
4. **Where is the feeding distributed on the plant (record all that apply):**
 - Top 1/3
 - Middle 1/3
 - Bottom 1/3
 - Evenly distributed throughout the plant
 - Other (and explain)
5. **Damage by ECB found on which plant parts (record all that apply):**
 - Leaves
 - Holes into Stem or Stalk
 - Tassel or fluorescence
 - Fruit/Pod/Ear
 - None
6. **Leaf Feeding Injury Rating (If ECB is causing leaf damage)**
 - 0 = No feeding damage
 - 1 = **Pinhole size holes** only
 - 2 = **Shotgun holes (no elongated lesions)** on **2 or fewer** leaves
 - 3 = **Shotgun holes (no elongated lesions)** on **3 or more** leaves
 - 4 = **Elongated lesions of 2.5 cm or smaller** on **2 or fewer** leaves
 - 5 = **Elongated lesions of 2.5 cm or smaller** on **3 or more** leaves
 - 6 = **Lesions longer than 2.5 cm** on up to **1/3 of the plant**
 - 7 = **Lesions longer than 2.5 cm** on up to **1/2 of the plant**
 - 8 = **Lesions longer than 2.5 cm** on **2/3 of the plant**
 - 9 = **Lesions longer than 2.5 cm** on **most of the plant**
7. **Fruit/Ear/Pod Damage Type:**
 - Surface grazing and wounds or
 - Entry hole into the fruit

Table 2. Detailed Assessment for Research Purposes

Date of Assessment: _____

Name: _____ Email: _____

Province: _____

Field Location GPS Coordinates: Lat (eg. 41.44231): _____

Long (eg. 78.92311): _____

Host Crop¹: _____ Average Crop/Plant Stage²: _____ Nearest Town: _____

Enter all data below into the Survey123 Online: <https://arcg.is/0TLWmS>

Plant #	# of Egg Masses	# of Larvae		Instars Found ³	Location of Feeding on the Plant ⁴	ECB Damage Found on Which Plant Parts ⁵	Leaf Injury Rating ⁶	# of Tunnels Found Inside	Avg Tunnel Length (cm)	Fruit/Pod/Ear Damage Type ⁷
		Outside	Inside							
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

Table 2 – Detailed ECB Assessment for Research Purposes

Plants 16 – 30

Date of Assessment: _____

Plant #	# of Egg Masses	# of Larvae		Instars Found ³	Location of Feeding on the Plant ⁴	ECB Damage Found on Which Plant Parts ⁵	Leaf Injury Rating ⁶	# of Tunnels Found Inside	Avg Tunnel Length (cm)	Fruit/Pod/Ear Damage Type ⁷
		Outside	Inside							
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

¹ Potential Hosts of ECB:

Known to Cause Economic Damage on:

apples
beans, dry edible
beans, snap or green
cannabis/hemp
corn, grain (non-Bt)
corn, seed (non-Bt)
corn, silage (non-Bt)
corn, sweet (non-Bt)
corn, speciality (eg popcorn, white corn)
hops
millet
miscanthus spp
peppers (bell) field, greenhouse
potato
quinoa
sorghum/broomcorn
tomato
wheat, spring
wheat, winter

Known to Potentially Feed on:

amaranthus spp	spinach
aster	sunflower
Barley	white sweet clover
beet	zinnia
buckwheat	
canna	
cauliflower	
celery	
chard	
cocklebur	
common burdock	
cowpea	
dahlia	
eggplant	
gladiolus	
globe artichoke	
jimsonweed	
marigold	
mugwort	
oats	
okra	
onions	
pansy	
peach	
poplar	
rhubarb	
sage	
salvia	
soybean	