6-1-1996

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Recommended Citation

McLeod, Murdick, "Economic Thresholds for First-Generation European Corn Borers" (1996). *Extension Extra.* Paper 321.
http://openprairie.sdstate.edu/extension_extra/321

Economic Thresholds for First-Generation European Corn Borers

by Murdick McLeod, Extension entomologist

Economic thresholds for European corn borer are based on the following factors:

- **Cash value of the crop** -- Yield in bushels per acre x price in dollars per bushel

- **Cost of treatment** -- Cost of insecticide + cost of application

- **Average number of live corn borer larvae per plant**

Scouting for First-Generation European Corn Borer

Begin scouting for first-generation corn borer when corn is approximately 17 inches extended leaf height. Corn shorter than this has fairly high levels of a chemical compound called DIMBOA which prevents injury from corn borer. As the corn plant increases in height, concentrations of DIMBOA decrease and larvae begin to feed.

To scout a 40 acre corn field, visit at least five locations throughout the field. Examine 20 consecutive plants at each location for a total of 100 plants per 40 acres. Record the percentage of plants that have whorl feeding or shotholing damage. This damage typically appears as small, circular holes in the leaves.

In addition, dissect the whorl of at least 2 plants per location and record the number of live larvae in the whorl. The more plants dissected, the more accurate the assessment of the population. Multiply the percentage of plants with shotholing by the average number of larvae per plant to arrive at the number of borers per plant.

Example: A field is scouted in which 60 percent of the plants have shotholing. Twenty plants are dissected and 40 live larvae are found for an average of 2 larvae per plant.

.60 x 2 larvae = 1.20 larvae per plant average

Choose locations within the field that are representative of the over-all field (random). Do not take samples within 100 feet of the field margin. Scout fields at least weekly, but when eggs are hatching and a control decision is approaching, scout fields on a 3- to 5-day interval.

Compare the estimated borer population in the field from scouting with the economic thresholds in Table 1 using the value of the crop (expected bushels per acre x expected price per bushel) and the cost of treatment (insecticide + application). If the number of corn borers per plant in the field is equal to or greater than the corresponding number in the table, an insecticide application would be cost effective.

Example: Value of the crop is estimated at $350 (100 bushel corn at $3.50 per bushel).

Cost of control is $14 per acre.

The economic threshold from the table using these two values is 1.00 borer per plant. In the example above, there were 1.2 borers per plant, which is higher than the threshold of 1.00. Therefore, an insecticide application would be cost effective.

If the economic threshold is not reached, resample the field in 3 to 5 days until either the field is treated or no new larvae are found.

If a field is to be treated, it should be treated before many larvae are as long as a dime is wide. At this stage larvae will begin to tunnel into the stalk where they will not be killed by an insecticide.

Control

Historically, granular formulations have outperformed liquid formulations for first-generation European corn borer control. However, recent research indicates that liquids also can be very effective in controlling first-generation corn borers. Table 2 lists compounds registered for first-generation corn borer control.

Table 1. Economic thresholds[1] (borers/plants) for first-generation European corn borer.

	Crop Value[2] ($/acre)															
Control Costs[3] ($/acre)	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525
6	1.00	0.90	0.80	0.70	0.60	0.50	0.50	0.46	0.43	0.40	0.38	0.35	0.33	0.32	0.30	0.29
7	1.20	1.00	0.90	0.80	0.70	0.60	0.58	0.54	0.50	0.47	0.44	0.41	0.39	0.37	0.35	0.33
8	1.30	1.10	1.00	0.90	0.80	0.70	0.67	0.62	0.57	0.53	0.50	0.47	0.44	0.42	0.40	0.38
9	1.50	1.30	1.10	1.00	0.90	0.80	0.75	0.69	0.64	0.60	0.56	0.53	0.50	0.47	0.45	0.43
10	1.70	1.40	1.30	1.10	1.00	0.90	0.83	0.77	0.71	0.67	0.63	0.59	0.56	0.53	0.50	0.48
11	1.80	1.60	1.40	1.20	1.10	1.00	0.92	0.85	0.79	0.73	0.69	0.65	0.61	0.58	0.55	0.52
12	2.00	1.70	1.50	1.30	1.20	1.10	1.00	0.92	0.86	0.80	0.75	0.71	0.67	0.63	0.60	0.57
13	2.20	1.90	1.60	1.40	1.30	1.20	1.08	1.00	0.93	0.87	0.81	0.76	0.72	0.68	0.65	0.62
14	2.30	2.00	1.80	1.60	1.40	1.30	1.17	1.08	1.00	0.93	0.88	0.82	0.78	0.74	0.70	0.67
15	2.50	2.10	1.90	1.70	1.50	1.40	1.25	1.15	1.07	1.00	0.94	0.88	0.83	0.79	0.75	0.71
16	2.70	2.30	2.00	1.80	1.60	1.50	1.33	1.23	1.14	1.07	1.00	0.94	0.89	0.84	0.80	0.76
17	2.80	2.40	2.10	1.90	1.70	1.60	1.42	1.31	1.21	1.13	1.06	1.00	0.94	0.89	0.85	0.81
18	3.00	2.60	2.30	2.00	1.80	1.60	1.50	1.38	1.29	1.20	1.13	1.06	1.00	0.95	0.90	0.86

[1] Calculation makes four assumptions:
   1) scouting is 100% efficient,
   2) each scouted larva will produce one tunnel (=100% survival),
   3) each tunnel will cause 5% yield loss, and
   4) an insecticide application will control 80% of the larvae.

[2] Crop value = expected yield (bu/acre) X projected price ($/bu)

[3] Control costs = insecticide price ($/acre) + application costs ($/acre)

Table 2. Insecticides for European corn borer control.

Insecticide	Formulation	Product Per Acre		Remarks, Preharvest Interval
		Broadcast	Ground Application over the row per 1000 row ft	
Bacillus thuringiensis	various	See label.	See label.	Use against early instar larvae for best control. 0 day phi
carbaryl (Sevin)	XLR	1.5 - 2.0 qt		0 day phi
carbofuran (Furadan)	4 F	1.5 - 2 pt		30 day phi. No more than 2 applications.
chlorpyrifos (Lorsban)	4 E 15 G	1.5 - 2.0 pt 5.0 - 6.5 lb	6 - 8 oz	35 days for livestock fodder or grain. 14 days for grazing or silage.
esfenvalerate (Asana)	0.66 EC	5.8 - 9.6 oz		21 day phi
fonofos (Dyfonate)	15 G 20 G	6.75 lb 5.0 lb	8 oz 6 oz	30 day harvest or grazing.
lambda cyhalothrin (Warrior)	1.0 EC	2.56 - 3.84 oz		21 day phi. Apply in a minimum of 2 gal water by air.
methyl parathion (Penncap-M)	2 FM	3 - 4 pt	2 pt/acre	12 day phi. To avoid injury to bees do not apply during pollen shed if bees are visiting the areas to be treated during their normal foraging hours.
permethrin (Ambush) (Pounce) (Pounce)	2.0 EC 3.2 EC 1.5 G	6.4 - 12.8 oz 4 - 8 oz 6.7 - 13.3 lb	8 oz	Do not apply after brown silk.

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