

**FINAL REPORT – MICHIGAN STATE UNIVERSITY
2009 FIELD SEASON**

Western bean cutworm biology study in corn, Michigan State University

Trial Location: Michigan / Ingham County / East Lansing/ MSU Entomology Farm

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Funding: Michigan Corn Growers Association

Crop/Pest: corn/ western bean cutworm

Planting Date/Rate: 12 May 2009 / 31,700

Variety: DeKalb DKC 44 -92RR2

Experimental Layout:

100 individual pre-tassel corn plants were marked in the block and infested with a single WBC egg mass on the upper surface of a top leaf (pinned on plant). Egg masses came from an infested corn field in Oceana County. Eggs were checked daily until hatch.

Plants with egg masses hatching on 1 August were used in the experiment.

- After hatch, egg masses were recovered to count number of eggs, % hatch, and predation (under the microscope)
- Sets of infested plants were sacrificed and carefully dissected at 1, 5, 10, 14, 21, and 28 Days After Hatch (DAH)
- The plants were carefully dissected to record number and type of natural enemies (until 10 DAH), and number of larvae recovered and their distribution on the plant.
- All larvae were recovered and preserved for head capsule measurement
- Data loggers recorded temperature and humidity in the ear zone

Fertilizer Applications:

- At planting: 200 lbs/ acre of 12-12-12
- Side-dress: 22 June, 28% N at 35 gal/acre

Pesticide Applications (rate per acre)

- 4 May: 2,4 D (1 pint) + Weathermax + AMS (32 oz)
- 20 June: Weathermax + AMS (22 oz)

Weather Data: Station located MSU Hort ~ 0.5 miles. Summer 2009 was one of the coolest on record in central Michigan. By August, central Michigan was more than 200 DDs behind previous years.

Month	Inches Precip	DD50 '09	DD50 avg
April	6.5	124	137
May	4.3	272	275
June	5.0	483	537
July	2.4	498	615
August	4.1	554	576
Sept	0.9	390	395

Data Summary

Egg masses

The average number of eggs per mass was 57, with 98% hatch. This compares favorably with Hagen (1962), who reported 52 eggs per mass and 97% hatch in the west. When eggs didn't hatch, usually the entire mass was affected. In all cases, we attributed the loss to fungi.



A newly hatched egg mass and a mass destroyed by fungus.

Predators

Lacewing larvae (below left) were observed feeding on a egg masses in other fields, but not in this study. Minute pirate bugs (*Orius* spp., below center) were the most common potential predators, making up more than 90% of the natural enemies collected in the study. However, predation was not directly observed on WBC larvae. Fungus-killed WBC larvae (below right) were also found in dry bean fields in 2009, but none were observed in corn fields.



Days After Hatch	Orius		Coccinellidae	
	adults	nymphs	adults	nymphs
1 DAH	11	3	0.2	0.5
5 DAH	12	3	0.1	1
10 DAH	3	2	0	0.4

Larval distribution

Larval distribution on the plant was generally similar to that reported in the west, with newly hatched larvae accumulating in tassels just beginning to shed pollen. However, even 1 DAH, a significant percentage of first instar larvae were in the silks, if available. By 5 DAH, as the tassel dried, the number of first and second instar larvae in leaf axils increased, presumably as a result of larvae moving back down the plant towards the ear. By 10 DAH, 80% of the second and third instar larvae were in the ear zone. Tip feeding started at 14 DAH, with older third and fourth instar larvae. Damage on the side of the ear was found at 28 DAH, when 5th and 6th instar larvae were present.

Location	1 DAH	5 DAH	10 DAH	14 DAH	21 DAH	28 DAH
Tassel/ Tassel leaf	57%	47%	1%			
Leaf axils	26%	41%	19%			
Silks	17%	12%	73%	34%		
Between ear/ stalk			7%	33%	33%	
Ear tip				33%	67%	54%
Ear side						46%

Instar*	1 DAH	5 DAH	10 DAH	14 DAH	21 DAH	28 DAH
1 st	100%	33%				
2 nd		67%	89%	14%		
3 rd			11%	29%	3%	
4 th				57%	39%	
5 th					58%	64%
6 th						36%

* Based on Antonelli, 1974. PhD thesis, University of Idaho