Final Report 2011 to the NYS Dry Bean Industry

Title: Determining the magnitude and geographic distribution of Western Bean Cutworm- a new pest of dry beans in New York.

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Abstract: Western bean cutworm (WBC) is a new pest in NY that poses risk to dry bean production. Pheromone trapping in 2010 and 2011 indicates that numbers are on the rise. Scouting for damage in dry beans is quite difficult, so pheromone traps can provide a good basis for initiation of scouting to determine need for treatment. The 2011 pheromone trapping network included twelve dry bean production sites in western NY to provide better local information on WBC occurrence to enhance dry bean insect management decisions. WBC moths were detected 11 of those locations. Timing of peak occurrence for traps located near dry bean fields coincided with peak WBC flight activity detected in other locations across the state. No reports of WBC damage have been reported for dry beans this season.

Introduction: Western bean cutworm (WBC) is an emerging pest in NY, with the capacity for substantial damage to dry beans. Native to North America, WBC has historically been a pest of corn and dry beans in the high plains region of the western US. However, in the last decade, infestations have steadily been moving eastward. Western bean cutworm was only sporadically found in western Iowa before 2000 (Keaster et al. 1999), and the first economic damage in Iowa cornfields was reported in 2000 (Rice 2000). From 2000-2009, the eastward expansion accelerated (Figure 1B). Western bean cutworm adults have now been collected in 11 additional states and provinces since 1999, spreading from western Iowa into eastern Pennsylvania and southern Québec. Economic damage has been reported in Iowa, Minnesota, Wisconsin, Illinois, Indiana, and Michigan (Michel et al). In 2006, WBC was detected in Michigan. In 2008, moths were collected in Ontario Canada and in 2009 WBC was confirmed in Pennsylvania, New York and Quebec, Canada. Pheromone trapping in 2010 showed that the pest was broadly distributed in NY. In 2010, 54 of the 55 traps caught WBC moths, and 28 out of 29 counties had WBC confirmed. An average of 13.4 WBC moths were collected per trap per week.

WBC is a late season pest of dry beans, and up to 8 to 10 percent yield losses due to WBC feeding have been reported. Michigan researchers found "growers who treated for WBC, when populations reached threshold, did not have damaged beans at harvest, while those who did not treat had 1-3% damage. They estimated in 2009 over half a million dollars in yield was protected by the spray recommendation (25,000 acres in central MI x $24 per acre loss with 2% damage = $600,000 potential loss averted). (C. Difonzo, pers. com.) Damage is often patchy in dry bean fields. It begins as leaf feeding and once the larvae mature to the 3rd stage, they begin feeding on

pods and then directly feeding on the developing beans. Entry holes allow the introduction of fungi and bacteria, which compromise bean quality. Direct feeding on beans can cause yield loss by reducing pounds harvested, and quality is affected because of the presence of partially-chewed beans that are large enough to make it through the combine. These damaged beans are often shriveled and moldy, and time and money must be expended to separate them from healthy, whole beans. As few as 2% culls ("pick") caused by direct feeding can cause downgrading of the beans, and heavy damage can cause rejected loads (Michel et al).

WBC thresholds for dry beans have not yet been established. However, in the western US, researchers found a relationship between trap numbers and the risk of pod and bean damage. Thus, pheromone traps are used to determine the number of moths present and time of peak moth flight. Pod feeding typically takes place 10 to 21 days after peak moth flight so having a trap at the field location helps determine when moth peak occurs. The trap counts provide information to help determine when to begin scouting for WBC damage and to determine a need for treatment.

Scouting for egg masses and larvae in dry beans is extremely difficult. Egg masses are laid deep in the canopy on the underside of the leaves, and larger larvae hide in the soil during the day. One recommendation suggests insecticide treatments are recommended when one or more larvae are found per row foot (Michel et al). Another, easier method comes from Michigan State University (MSU) and Ontario (OMAFRA) researchers who suggest if a corn field directly adjacent to the dry bean field has reached threshold of 4 - 8% of plants with WBC egg masses the dry bean field should be considered at risk and the dry bean field should be scouted for leaf and pod feeding and sprayed if damage is seen.

To contend with this new pest, it's important to identify the current range and timing of WBC activity in NY. This season's WBC monitoring network expanded to include and document WBC activity in dry bean production areas of western NY. Data from dry bean sites was integrated with the existing Sweet Corn IPM Monitoring Network. Ultimately, the goal of the WBC monitoring network is to provide a better estimation of the extent and immediacy of the problem, and will help to evaluate management in dry beans including the need, timing and effectiveness of insecticides or other control measures.

Objective:
Develop and expand the pheromone trapping network to determine the magnitude and timing of the Western bean cutworm problem in dry bean production areas of NY.

Procedures: Western Bean Cutworm pheromone traps were installed at twelve dry bean production field sites in Genesee (1), Livingston (5), Monroe (3), Ontario (1), and Wyoming (2) counties, the region in NY with the majority of the dry bean acreage (Figure 1). The sites were planted to either cranberry, black bean or kidney bean varieties. A wet spring delayed planting dates with many fields planted later than usual.

CCE Regional Vegetable Program personnel in conjunction with grower and shipper collaborators selected dry bean trap locations. Traps were placed in strategic locations beginning early June and maintained throughout the season. Male WBC moth activity was monitored using

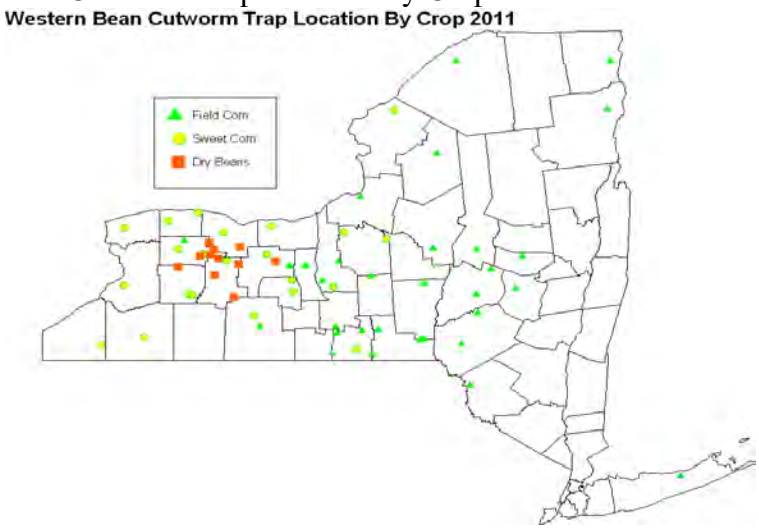
universal bucket traps loaded with Suterra or Scentry WBC pheromone lures. The methods used followed the protocol outlined by the Pennsylvania State University and the Pennsylvania Department of Agriculture WBC survey. (John Tooker and Shelby Fleischer, Western bean cutworm trapping protocol – Summer 2009). Traps were hung approx. 4 feet from the ground the along the edges of corn and bean fields where possible. A summer assistant, consultants and a shipper visited the traps weekly, counting and recording number of WBC moths, sharing data with CCE and IPM program personnel. Pheromone lures were replaced every 14 days, and traps remained operative from late June thru August.

Dry bean WBC trapping data were integrated into the Western NY Sweet Corn IPM Monitoring Network coordinated by Abby Seaman (NYS IPM Program) and efforts by Cornell Entomology (Jeffrey Gardner) and contributors from other locations across the state. A total of sixty-seven WBC traps were monitored statewide this season in collaboration with Cornell Entomology, the NYS Integrated Pest Management Program, Cornell Cooperative Extension (CCE) field staff, and grower and agribusiness cooperators.

Trap information was posted on "Pest Watch", the NY and PSU sweet corn monitoring network (http://www.pestwatch.psu.edu/sweetcorn/tool/tool.html), and field crop (http://www.nysipm.cornell.edu/fieldcrops/tag/pestrpt/default.asp) and vegetable (http://www.nysipm.cornell.edu/scouting/scnetwork/default.asp) IPM websites. Information was disseminated to Cooperative Extension personnel for inclusion in extension newsletters and outreach programs.

Results:
Dry bean sampling site locations are shown in Figure 1. Dry bean sampling locations and accumulated WBC trap captures are shown in Figure 2.

Figure 1. Western Bean Cutworm Trap Location by Crop.



Average WBC captures per week during 2011 are shown in Table 1.
WBC moths were collected at eleven of twelve dry bean locations.

Western Bean Cutworm Monitoring traps and accumulated WBC captures in western NY dry bean fields.

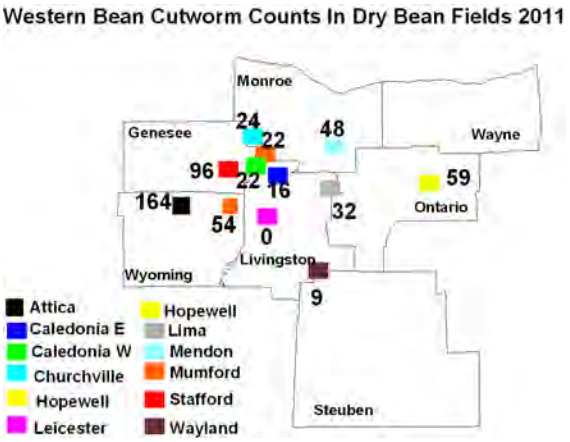


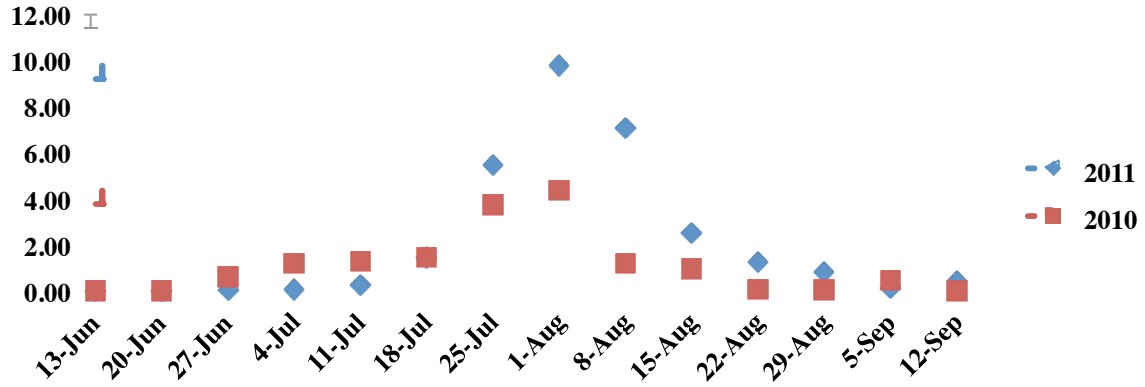
Table 1. Total WBC moths collected from Dry Bean Fields in Western NY.

County	**Town**	Total WBC	Avg/Trap/Wk
Genesee	Stafford	96	8.7
Livingston	Caledonia E	19	1.7
Livingston	Caledonia W	22	2
Livingston	Leicester	0	0
Livingston	Lima	33	3
Livingston	Wayland	9	0.9
Monroe	Churchville	24	2.4
Monroe	Mendon	49	4.5
Monroe	Mumford	24	2.7
Ontario	Hopewell	59	6.6
Wyoming	Attica	164	16.4
Wyoming	Pavilion	56	5.1
		555	4.5

The highest WBC counts of 2011 statewide were collected at Attica (164) and Stafford (96), NY from dry bean fields. Using the MSU guideline for detecting risk of WBC injury, corn fields adjacent to dry bean monitoring sites in Attica and Stafford were scouted for egg masses and dry bean fields checked for pod injury. No egg masses or pod injury were detected. As of the time of this report, no dry bean yield impacts have been attributed to WBC this season. (John McCreedy, pers. com.), though kidney bean damage may have occurred in a couple of cases (Steve Blowers, pers. com.).

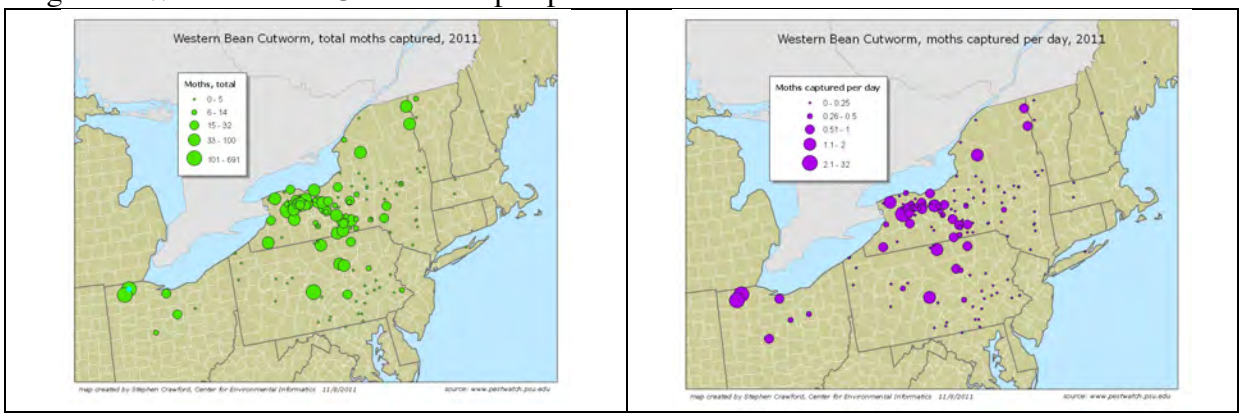
Peak WBC flight in dry bean areas was in synch with that observed in other areas of the state with peak captures about the week of August 2, 2011. Peak WBC flight in 2010 was also determined to be about the first week of August (Figure 3).

Figure 3. WBC trap catches per trap per week 2010 and 2011.



WBC moths were widely distributed in NY as shown by the total numbers of WBC moths collected per trap and the average number of moths collected per day (Figure 4). The higher amount of current WBC activity in NY is occurring in the western part of the state, although sites near Lake Champlain also had relatively large WBC numbers.

Figure 4. Western Bean Cutworm trap captures 2011



Comparisons of 2010 and 2011 trapping data (all NY locations and crops) are shown in Table 2.

Table 2. NYS WBC Trap Count Comparison: 2010 - 2011

	2010	**2011**
No. Counties	29	37
No. Traps	54	67
Avg. No. WBC / Location	13	23.3
Range in Totals	0 - 99	0 – 164
Peak Flight	Aug 2	Aug 2

Discussion:
Numbers of WBC moths collected at dry bean locations at Attica and Stafford approached the MSU monitoring guideline of 100 moths / trap, however, threshold numbers of egg masses in adjacent corn fields or dry bean pod damage were not detected. Early indications are that WBC

did not have an economic impact on dry bean production this season even in the two fields with the highest number of WBC moths collected. It is possible that dry weather conditions during the time of peak moth activity may have caused mortality to WBC egg masses. The Attica field, received a fungicide + Potato leafhopper insecticide application in early August. If WBC eggs or larvae were present they would have been killed.

Economic damage to corn or dry beans has not yet been documented in NY. There were reports in 2011 of field corn with as much as 50% of ears infested with WBC larvae in the Malone and Chazy, NY areas. Unfortunately, no WBC traps were in those areas this year. Yield impacts, if any, are not yet known. Although not observed this season, as WBC populations increase there is the potential to observe more "pick" or damage in harvested beans especially in the large seeded classes like Light/Dark Red Kidney than in small beans like navy and black. When beans are threshed, the combine may be better able to separate out damaged beans in the small classes. If the combine separates it out in the field the damaged beans would not be seen at the elevator. (Fred Springborn, MSU, pers. com.).

Many of the WBC moths captured have been in excellent condition suggesting the insect is overwintering locally. The relative increase in average number of WBC caught per trap from 2010 and 2011 indicates the potential that WBC will continue to establish and become a chronic risk in NY. For states/provinces to our west, the influx of WBC has been relatively rapid with economic injury to host crops occurring within about six years of introduction. For the moment we have not had economic losses in NY attributed to WBC. However, some researchers suggest several factors may contribute to risk of WBC establishing economically significant populations in the Great Lakes region (including the northeast): soils – many areas with sandy / light soils (increase overwintering survival), high % of acres in reduced and no-till (increase overwintering survival), lake effect – mild fall, deep snow cover along lakes (increase overwintering survival), high humidity (increase the survival rate of eggs and young larvae), multiple host crops field/sweet corn & dry beans(increase in overall population).

It is clear from this seasons studies that: WBC populations are currently below economically damaging levels, however, they are slowly increasing, WBC moths are well distributed in western NY counties, peak flights of WBC moths can be expected towards the end of July and the first of August, the physical appearance of captured WBC moths suggest they are overwintering locally and could be expected to increase risk of economic impact to NY dry bean and corn production in the future.

Literature Cited.

Michel AP, Krupke CH, Baute TS and Difonzo CD. 2010. Ecology and management of the western bean cutworm (Lepidoptera: Noctuidae) in corn and dry beans. *J Integrated Pest Manag* **1**: A1–A10 (2010).

Acknowledgement:
This study was funded by a grant from the **NYS Dry Bean Industry.** Thanks to John McCreedy, the WNY Crop Management Assoc, and Don Sweet for their assistance.