New York Western Bean Cutworm Monitoring Program
Progress Report (2010-2013)

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The Pest Problem
Western bean cutworm (*Striacosta albicosta* [Smith]) attacks corn (*Zea mays* L.; including field, sweet and popcorn) and dry beans (*Phaseolus vulgaris* L.), feeding on developing kernels or beans inside husks and pods, respectively. Western bean cutworm (WBC) infestations can cause significant yield losses and may facilitate subsequent colonization by pathogens, furthering damage and impacts. WBC moth, egg mass and larva images are shown below (Fig 1, 2 and 3).


Figure 1. WBC Moth


Figure 2. WBC egg mass


Figure 3. WBC Larva in corn ear

Western bean cutworm (WBC) is native to North America, but has historically been restricted to the Great Plains and westward. Over the past decade, WBC has expanded its range through the Midwest into the northeastern United States and Canada. As WBC has moved eastward, its caterpillars have caused economic damage, particularly in Michigan and Ontario, where growers have reported 8-10% losses in dry beans and 40% losses in field corn. WBC moths were first discovered in Pennsylvania and New York in 2009 and Vermont in 2011. Pheromone trapping was initiated in NY and PA in 2010 and in VT in 2011 in collaboration with scientists from Penn State University and University of Vermont to gain knowledge about WBC populations and better assess their potential risk to corn and dry bean acres in the Northeast. The trapping network has revealed western bean cutworms are becoming more widely distributed and populations are increasing, posing a potential risk to dry beans and the over 3.5 million acres of corn grown in NY, PA, and VT. Thus far, only non-economic larval infestations have been found in the Northeast, but damaging populations may potentially develop soon.

Monitoring Procedure
WBC male moths are trapped using a green or yellow and white bucket trap hung on posts at the edge of corn or dry bean field sites (Fig. 4). The traps contain a WBC pheromone lure to mimic a female and attract male moths. In addition, an insecticidal strip is placed in the traps to kill the moths once they enter the trap. WBC trapping was initiated the second week of June and continued until early September. Traps were checked weekly with number of moths collected per week recorded and a record of accumulated moths over time kept. Moth capture data was entered in PestWatch (www.pestwatch.psu.edu) and shared with the local and regional agricultural community through timely newsletters.


Figure 4. Bucket trap used to collect WBC moths

2010-2013 Results

A New York volunteer-based WBC pheromone trap monitoring network has been in place since 2010. This report summarizes WBC collection data from several sources including Cornell Cooperative Extension coordinated field corn, sweet corn and dry bean pheromone monitoring networks and data provided by private agricultural consultants and agribusinesses. Contributors for the 2013 season are listed in Table 2.

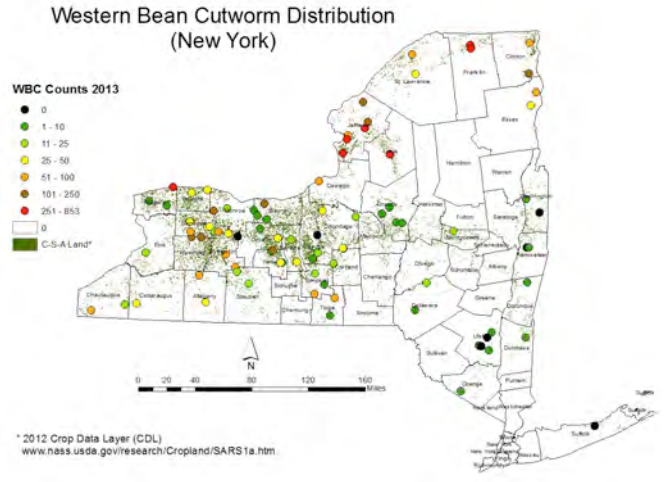
NY WBC populations have increased annually since 2010 as indicated by the average and maximum range in number of WBC moths captured per location (Table 1). Relative moth counts for 2013 locations are shown in Figure 5. On average, relatively higher WBC counts have been observed in northern and western counties with the majority of captures occurring in locations north of the NYS thruway (Interstate 90). Moth wings are covered with fine scales that can rub off over time with use. The relatively undamaged condition of wings of many WBC moths captured over the last two years indicate WBC populations are becoming locally established.

Table 1. New York Western Bean Cutworm 2010 – 2013 Collection Data Summary*

	2010	2011	2012	2013
No. Counties	29	37	44	39
No. Traps	54	67	88	90
Avg. No. WBC / Location	13	23.3	42.4	66.1
Range in Totals	0 - 99	0 - 165	0 - 344	0 – 853
Peak Flight	2-Aug	2-Aug	25-Jul	21-28-Jul

*Data compiled from WBC trap catch information provided by field corn, sweet corn, and dry bean monitoring networks across NY.

Figure 5. Western Bean Cutworm trap location and relative accumulated moth capture for 2013.

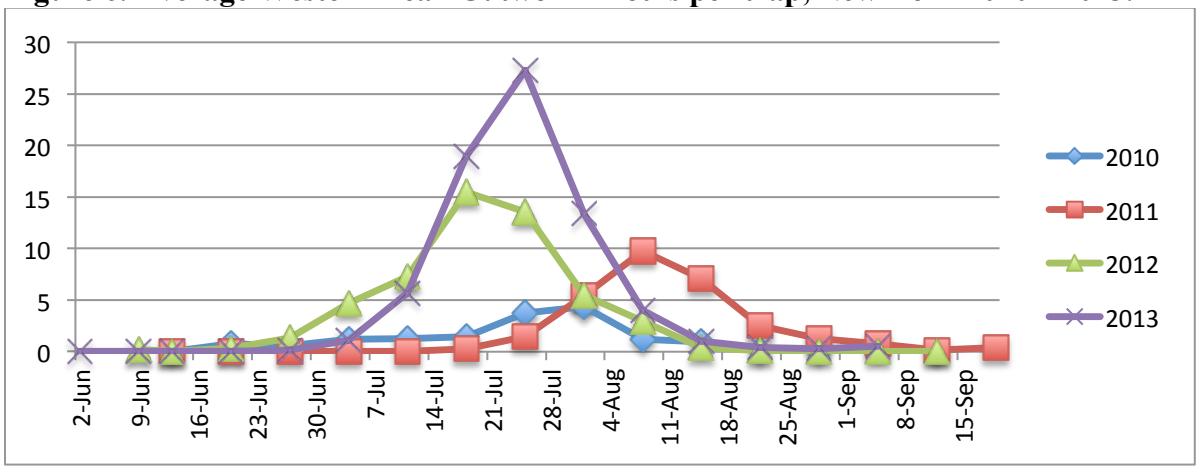


Pheromone trap data has documented WBC moth activity, time of peak flight and need to monitor fields for egg masses and larvae. Peak WBC moth flights have occurred the last week of July thru the first week of August (Figure 6). Trapping data is being used to evaluate accuracy of a WBC moth emergence prediction model developed in the midwest US for its application in the northeast.

WBC moths prefer to lay their eggs on the upper leaf surface of pre-tassel corn. WBC larvae quickly move to corn ears where they can be found feeding on silks or kernels. By contrast, in dry beans WBC egg masses are laid on the undersurface of leaves, larvae feed on pods at night and hide in the soil during the day making them very difficult to detect. Midwestern experience suggests crops at risk be monitored closely for WBC activity when accumulated trap catches approach 100 moths or more. Midwestern and Ontario WBC corn monitoring guidelines recommend carefully searching for egg masses on 10 corn plants in a row in 10 areas of the field. Pre-tassel corn is preferred egg laying site and egg masses may be found at or near the tassel whorl. Our experience with WBC in NY is limited at this time, so our management guidelines reflect what is recommended in Midwestern states and Ontario. Bt corn hybrids containing the Agrisure Viptera and the Cry 1F trait found in SmartStax, Herculex and Optimum AcreMax hybrids have efficacy against western bean cutworm. Midwestern and Ontario entomologists suggest an insecticide foliar spray is warranted if 5% of non-Bt corn or transgenic corn that does not provide any protection against WBC have WBC egg masses on them. Ontario recommends timing an insecticide foliar spray application for just after egg hatch when small larvae are present at the top of the plant. Egg hatch occurs a day or two after the egg masses turn purple (typically 5-7 days after being freshly laid). (See more at: http://fieldcropnews.com/2013/07/western-bean-cutworm-thresholds-for-high-risk-fields-in-ontario/#sthash.crBkKtBo.dpuf). If in doubt as to whether your Bt hybrid expresses WBC resistance, check the seed bag label, consult with your seed supplier or refer to the Handy Bt Trait Table (http://labs.russell.wisc.edu/cullenlab/files/2013/11/Handy_Bt_Trait_Table.pdf)

Thresholds are not currently available for WBC in dry beans. Dry bean fields adjacent to corn fields that have reached WBC threshold should be considered at risk and monitored closely for signs of foliar or pod feeding by WBC larvae. If bean pods are present and fresh signs of pod feeding are easily found, Michigan and Ontario entomologists recommend spray application is necessary. Note: Soybeans are not a host for western bean cutworm.

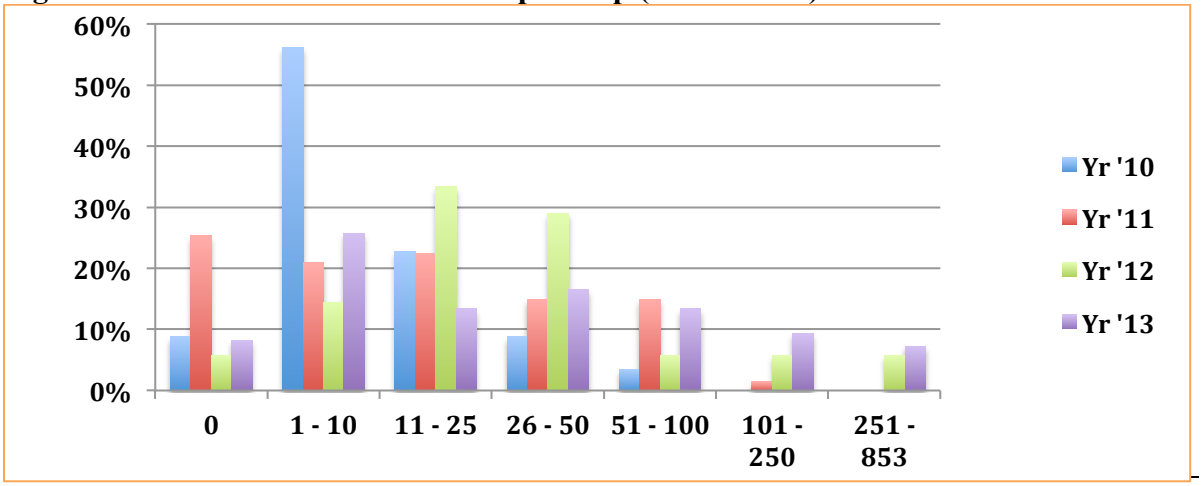
Figure 6. Average Western Bean Cutworm moths per trap, New York 2010 – 2013.



The range of accumulated WBC moths captured per trap in New York by year (2010 – 2013) are shown in figure 7. The majority of accumulated trap catches in 2010 were less than 25 per trap. WBC trap catches have increased every year since. While there were some WBC "hotspot" locations observed among the 90 New York locations monitored in 2013, eight sites did not

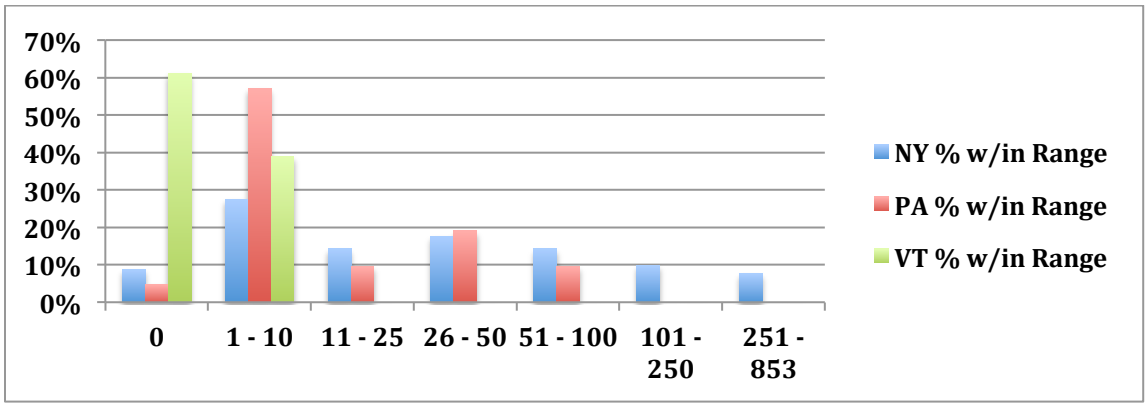
catch any WBC moths, 50% of traps caught less than 25 moths, and only 18% of traps caught more than 100 moths per trap. Accumulated New York WBC trap catch data by 2013 location are shown in Table 2.

Figure 7. New York WBC total catch per trap (2010 – 2013)



Pennsylvania and Vermont WBC populations have fluctuated annually, but remain less than New York (Figure 8, J. Tooker (PSU) and M. Skinner (UVM) personal communication).

Figure 8. 2013 WBC trap captures for New York, Pennsylvania and Vermont.



Relative moth counts for 2013 New York, Pennsylvania and Vermont WBC trap locations are shown in Figure 9.

Summary:

Western Bean cutworm populations are widespread and have continued to increase annually in New York. On average, relatively higher WBC counts have been observed in northern and western NY counties. The relatively undamaged wing condition of most moths captured indicates WBC populations are becoming locally established, while others continue to be migrants from other sources. To date there have been no reports from New York of economic damage caused by WBC to corn (sweet or field) or dry beans. WBC pheromone trap monitoring efforts are planned for summer 2014.

Acknowledgements:
2013 New York WBC Pheromone Trap Monitoring Network: Thanks to cooperating growers for allowing us to use their fields for sample sites. Special thanks to the following individuals for their enthusiasm, dedication, excellent data collection and maintenance of WBC trap network: Pete Barney, Chuck Bornt, Paul Cerosaletti, Mike Davis, Janice Degni, Dale Dewing, Harry Fefee, Jennifer Fimbel, Abby Foster, Aaron Gabriel, Kevin Ganoe, Jeffrey Gardner, Don Gasiewicz, John Gibbons, Henry Grimsland, Mike Hunter, Amy Ivy, Peter Jentsch, Keith Jones, Joe Lawrence, Catherine May, Laura McDermott, Carol MacNeil, Stephanie Melancher, Sandy Menasha, Jeff Miller, Dan Mongeau, Eric Nixon, Justin O'Dea, Kitty O'Neil, Ashley Pierce, Ray Range, Teresa Rusinek, Aaron Santangelo, JJ Schell, Abby Seaman, Keith Severson, Paul Stackowski, Mike Stanyard, Dan Steward, Crystal Stewart, Bill Verbeten, Keith Waldron, Marion Zuefle, McClelland's Agronomics, WNYCMA, DuPont Pioneer.

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Pennsylvania and Vermont Western Bean Cutworm Data courtesy of Dr. John Tooker, Pennsylvania State University, University Park, PA and Dr. Margaret Skinner, University of Vermont, Burlington, VT.

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For more information on WBC catches and distribution, please visit:
NYS IPM:

- **Weekly Field Crop Pest Report: http://blogs.cornell.edu/ipmwpr/#**
- **Sweet Corn Pheromone Trap Network: http://sweetcorn.nysipm.cornell.edu/**

Eastern NY Sweet Corn monitoring Program: http://blogs.cornell.edu/jentsch/sweet-corn/

Pestwatch*:* Sweetcorn *IPM Visualization Tool*:
www.pest**watch.psu.edu/**sweetcorn/**tool/tool.html**

Penn State Field Crop News: http://extension.psu.edu/plants/crops/news

THANK YOU VERY MUCH FOR YOUR COOPERATION WITH THIS PROJECT!
SEE YOU NEXT SUMMER!

If you have questions, contact:
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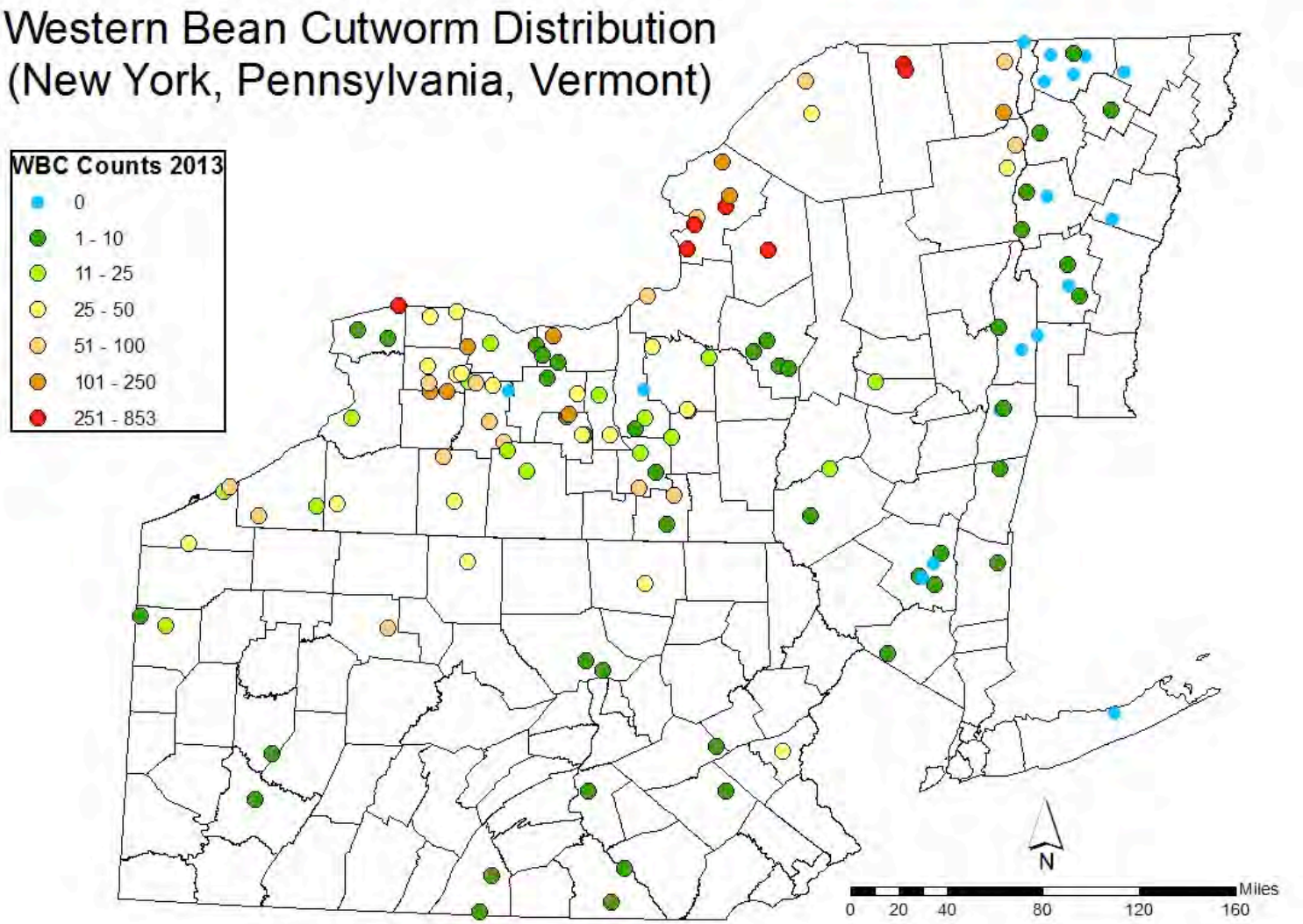
Table 2. Accumulated WBC trap catch data by New York 2013 location.

County	Location	WBC Count	County	Location	WBC Count	County	Location	WBC Count	County	Location	WBC Count
Allegany	Belmont	33	Genesee	Batavia	30	Oneida	Clinton	9	Suffolk	Riverhead	0
Allegany	Fillmore	63	Genesee	LeRoy	49	Oneida	Rome	2	Tioga	Owego	6
Cattaraugus	Randolph	26	Genesee	Stafford	32	Oneida	Rome	4	Tompkins	Varna	59
Cayuga	Auburn	0	Jefferson	Calcium	592	Oneida	Verona	10	Ulster	Accord	0
Cayuga	Aurora	26	Jefferson	Ellisburg	253	Onondaga	Baldwinsville	34	Ulster	Accord	0
Cayuga	King Ferry	1	Jefferson	Evans Mills	138	Onondaga	Tully	3	Ulster	Hurley	1
Cayuga	King Ferry	8	Jefferson	Hounsfield	83	Ontario	Farmington	5	Ulster	New Paltz	2
Chautauqua	Clymer	58	Jefferson	Plessis	166	Ontario	Geneva	39	Ulster	New Paltz	5
Chautauqua	Kennedy	19	Jefferson	Sacketts Harbor	853	Orange	Florida	9	Ulster	Stone Ridge	0
Clinton	Chazy	67	Lewis	Martinsburg	309	Orleans	Waterport	26	Washington	Hudson Falls	7
Clinton	Peru	136	Livingston	Avon	40	Oswego	Oswego	57	Washington	Salem	0
Columbia	Valatie	9	Livingston	Groveland	53	Oswego		28	Wayne	Macedon	8
Cortland	Homer	13	Livingston	Lima	0	Rensselaer	Brunswick	0	Wayne	Macedon	10
Cortland	Preble	11	Livingston	S Caledonia	64	Rensselaer	Troy	3	Wayne	Penfield	2
Delaware	Walton	6	Livingston	SW Caledonia	13	Schuyler	Valois	64	Wayne	Williamson	116
Delaware	W. Davenport	18	Madison	Kirkville	12	Seneca	Interlaken	47	Wyoming	Attica	181
Dutchess	Millbrook	4	Monroe	Hamlin	27	Seneca	Seneca	11	Wyoming	Wyoming	109
Erie	Eden Z	16	Monroe	Spencerport	109	Seneca	Waterloo	13	Yates	Bellona	127
Essex	Westport	29	Monroe	Spencerport	13	St. Lawrence	Canton	41	Yates	Benton	10
Essex	Willsboro	68	Montgomery	Palatine Bridge	17	St. Lawrence	Madrid	68	Yates	Penn Yan	3
Franklin	Malone	367	Niagara	Atwater	275	Steuben	Avoca	11	Yates	Penn Yan	44
Franklin	Malone	515	Niagara	Lockport	3	Steuben	Wayland	62	Yates	Penn Yan	32
Genesee	Alexander	63	Niagara	Millville	3	Steuben		19			

2013 WBC Trap Monitoring Cooperators: Pete Barney, Chuck Bornt, Paul Cerosaletti, Mike Davis, Janice Degni, Dale Dewing, Harry Fefee, Jennifer Fimbel, Abby Foster, Aaron Gabriel, Kevin Ganoe, Jeffrey Gardner, Don Gasiewicz, John Gibbons, Henry Grimsland, Mike Hunter, Amy Ivy, Peter Jentsch, Keith Jones, Joe Lawrence, Catherine May, Laura McDermott, Carol McNeil, Stephanie Melancher, Sandy Menasha, Jeff Miller, Dan Mongeau, Eric Nixon, Justin O'Dea, Kitty O'Neil, Ashley Pierce, Ray Range, Teresa Rusinek, Aaron Santangelo, JJ Schell, Abby Seaman, Keith Severson, Paul Stackowski, Mike Stanyard, Dan Steward, Crystal Stewart, Bill Verbeten, Keith Waldron, Marion Zuefle, McClelland's Agronomics, WNYCMA, DuPont Pioneer.

Figure 9. Relative moth counts for 2013 New York, Pennsylvania and Vermont WBC trap locations.



Regional Western Bean Cutworm Data: Courtesy of J. Keith Waldron, Cornell University, New York State Integrated Pest Management Program, NYSAES, Geneva, NY, Dr. John Tooker, Pennsylvania State University, University Park, PA and Dr. Margaret Skinner, University of Vermont, Burlington, VT.