TRAP CROPPING FOR MANAGEMENT OF HARLEQUIN BUG IN COLE CROPS

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INTRODUCTION

Harlequin bug (HB), *Murgantia histrionica* (Hahn) (Hemiptera: Pentatomidae), is a pest of cole crops (Brassicaceae). Both adults and nymphs are piercing-sucking feeders on leaves and stems. Feeding results in blotching of leaf tissue, which reduces the marketability of crops sold as greens, and as feeding continues, wilting and browning of leaves may occur eventually leading to the death of the plant.

There are several broad-spectrum insecticides that provide effective control of HB; however, in the interest of human and environmental safety, as well as integrated pest management, there has been a major shift toward the use of narrow-spectrum, reduced-risk insecticides in cole crops for control of the lepidopteran pests, which historically have been the primary pest concern in most regions. Most of these newer chemicals have little to no toxicity to other species, including HB.

There is potential for management of HB using a trap crop to divert pest feeding from the protected crop to a nearby preferred "trap crop." A double perimeter row of mustard or rape surrounding a broccoli field has been found to reduce feeding of HB on broccoli; however, this management practice alone was not found to be effective for control under high pest densities. This method of companion planting has potential in both conventional integrated pest management as well as in organic vegetable systems. This can result in an elimination of chemical sprays targeted at this pest, or in a dramatic reduction in pesticide, as any necessary sprays would be applied to the trap crop alone. By identifying preferred host plant species/variety, the information gained by this project will aid managers in selecting appropriate trap crop species/variety as a companion planting to the crop needing protection.

CHOICE TESTS JUNE/JULY 2009

To determine what species/variety of plant are preferred by HB for habitation, feeding and/or oviposition, HB adults were offered the choice of six types of plants in lab and field choice tests: bean (a non-Brassicaceae to act as negative control), arugula (Brassicaceae: Eruca sativa) collard (*Brassica oleracea*), mustard (*B. juncea*), rape (*B. napus*), rapini (*B. rapa*).

For field cage choice tests, 30 field collected HB adults were isolated to each of five cages (4 x 4 x 2 m) containing six of each of the test species/varieties (10-12 weeks old), and plants were observed every 1-2 days for adults and egg masses. All adults and egg masses were removed and this procedure was repeated with 50 field collected adults per cage (plants were 12-14 weeks old).

In M.S. Reiter (ed.) A multidisciplinary approach to conservation. Proc. 31st Southern Conservation Agric. Systems Conf., Melfa, VA. 20-23 July 2009. Extension Publ. 2910-1417. Dep. Crop and Soil Environ. Sci., Eastern Shore Agric. Res. Ext. Cntr., Virginia Polytechnic Inst. and State Univ., Painter, VA. Available at: http://pubs.ext.vt.edu/2910/2910-1417/2910-1407.html.

For lab choice tests, 30 field collected HB adults were released into growth chambers (T = 25^{o}C, Day length = 16D, 8N) with a leaf each of each of the test plants, and leaves were observed for choice four times over 24 hours.

Mustard is clearly preferred by HB adults in both lab and field tests. In the first round of the field cage test significantly more HB adults were observed on mustard than any other variety offered ($p < 0.0001$). In round two of the field cage tests significantly more HB adults were observed on mustard than any other plant variety and significantly more adults were observed on rapini than the other varieties ($p < 0.0001$). Nearly all the rapini plants reached maturity between round one and two of this trial and presence of flowering tissues is likely the reason for the increase in attraction of HB, although mustard was still more attractive. In lab choice tests, rape is shown to be equally attractive to HB adults as mustard.

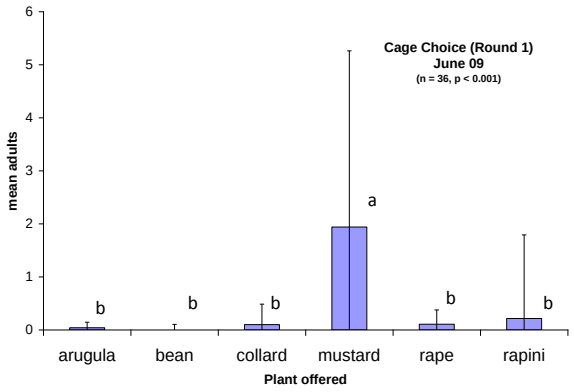

Figure 1: Mean HB adults observed on 10-12 week old plants in field cages (n = 36, $p < 0.001$).

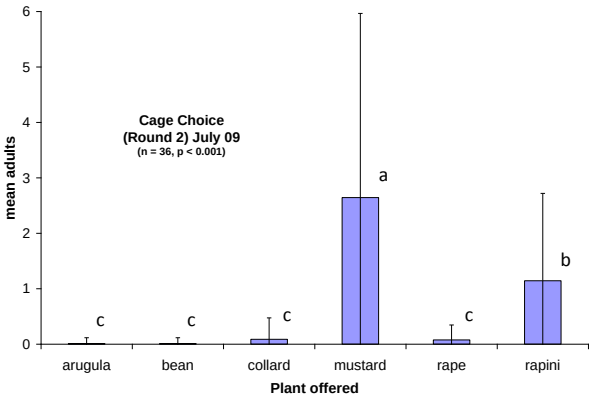

Figure 2: Mean HB adults observed on 12-14 week old plants in field cages (n = 36, $p < 0.001$).

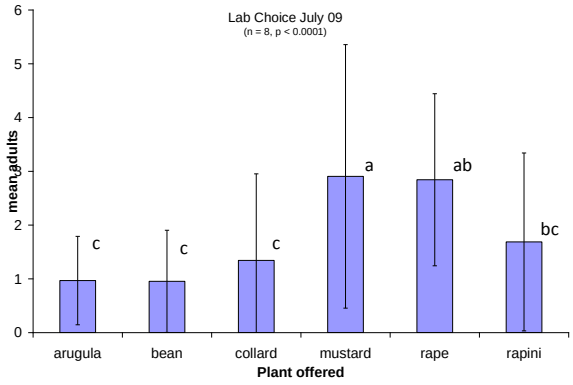

Figure 3: Mean adult HB observed plant leaves in lab choice test (n = 8, $p< 0.001$).

Future work: New assays will be conducted on host plant preference of HB in other varieties.
Roles of plant volatiles in host plant finding will be investigated.
Improvements on trap cropping system by augmenting with other IPM tactics will be investigated.