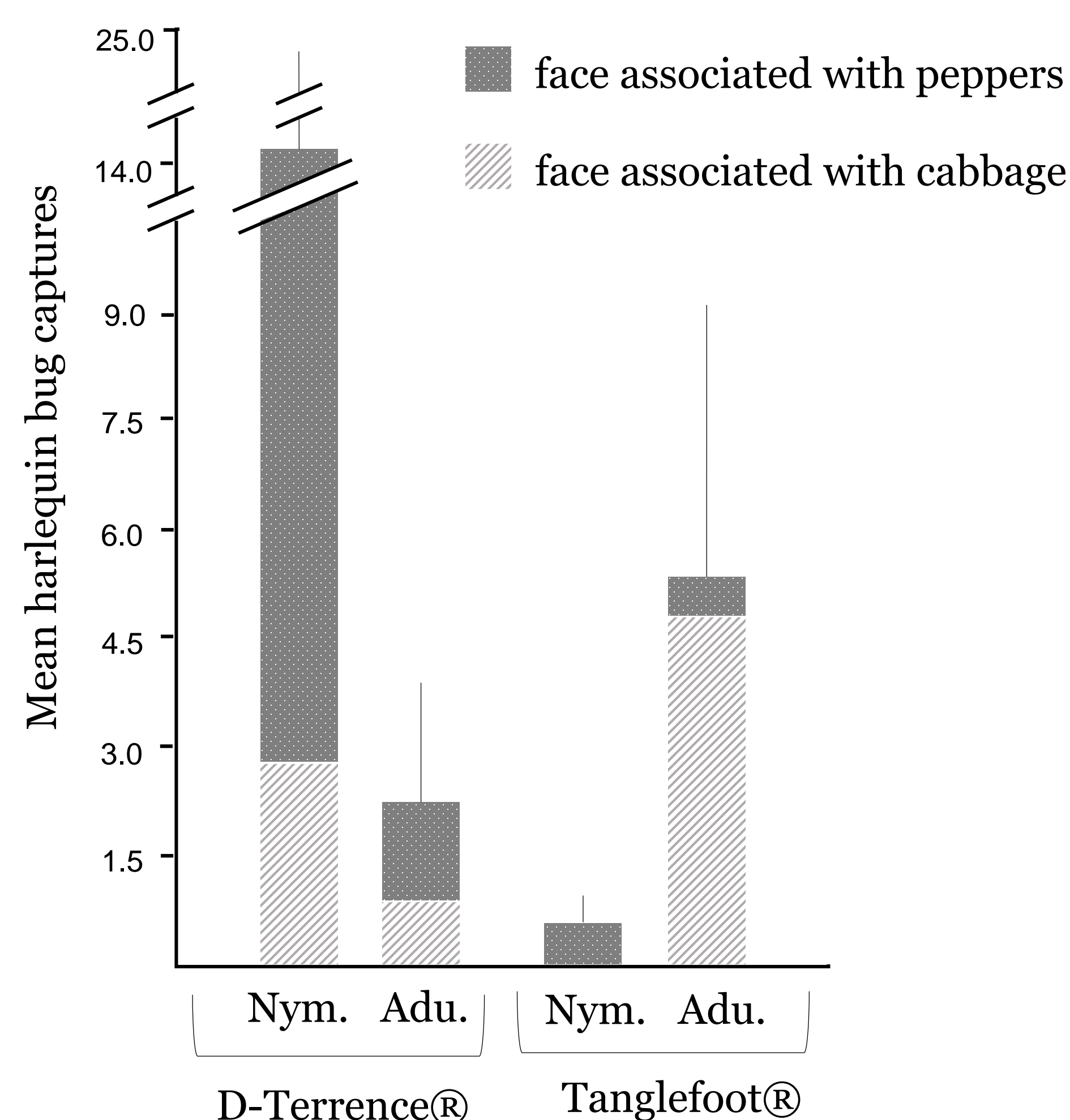
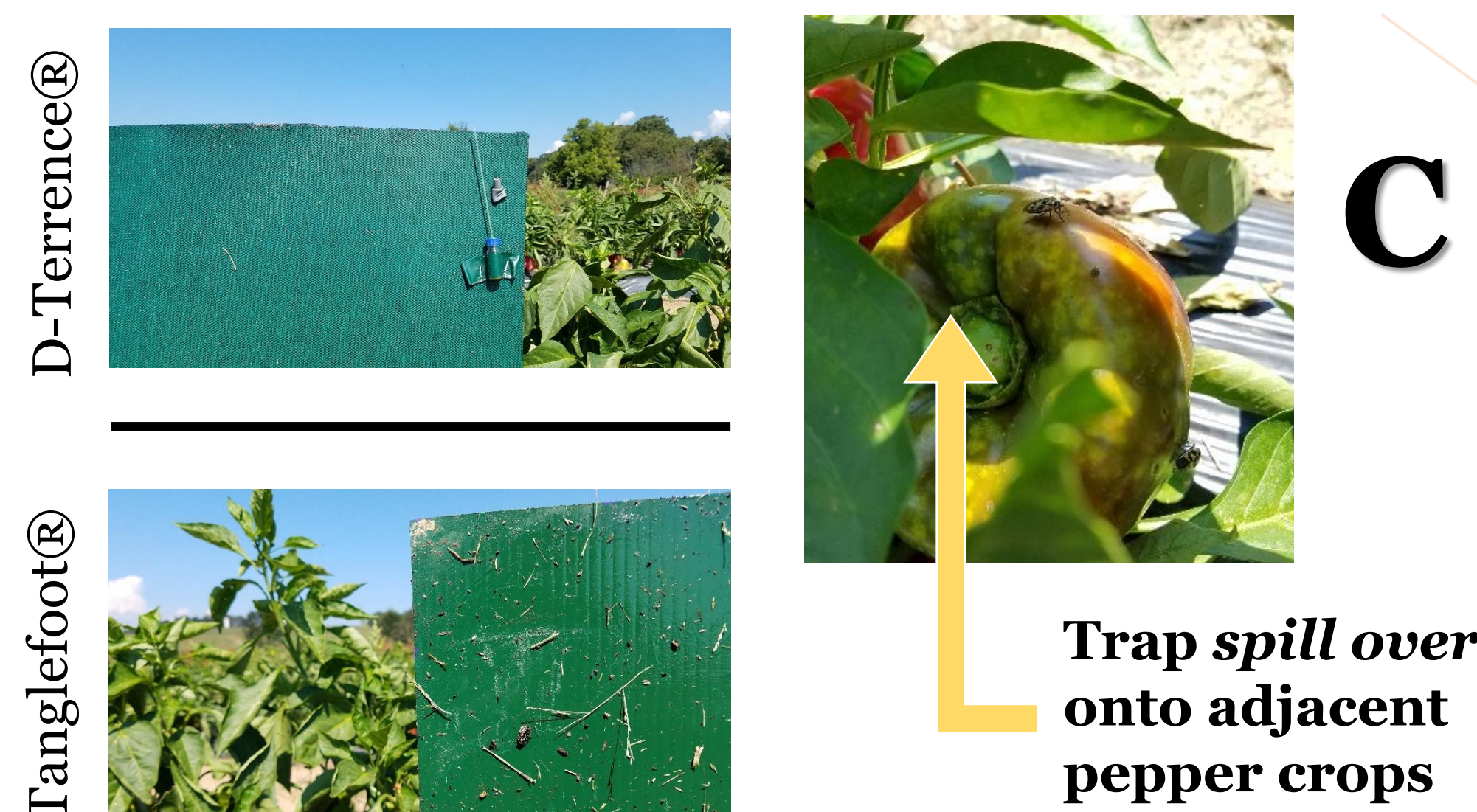


# Improved trapping strategies for managing harlequin bug: applying recent research and discovery of its aggregation pheromone as a tool for vegetable growers

**SARE PROJECT GSI5-144**

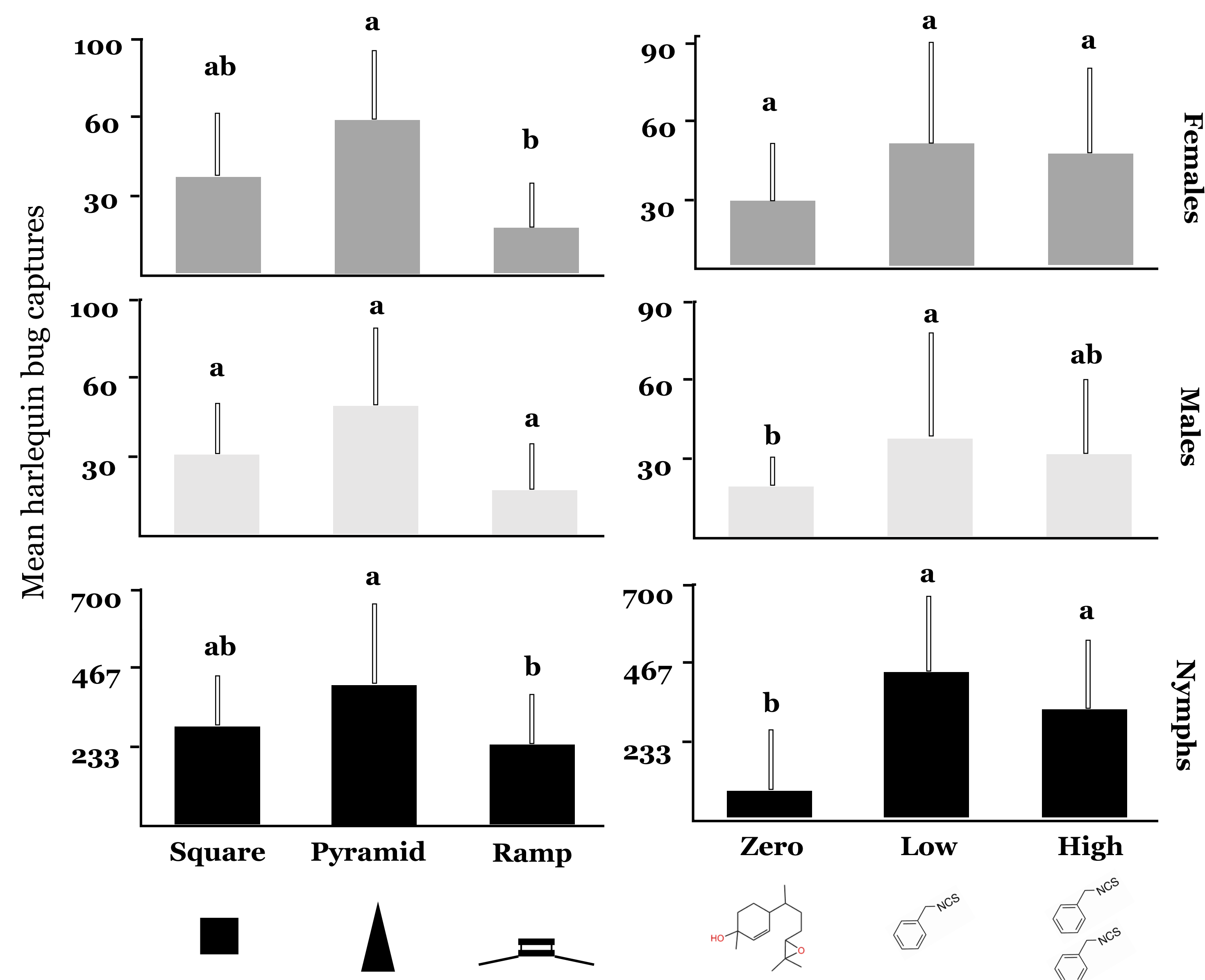
**Anthony S. DiMeglio; Tom P. Kuhar; Donald Weber; Dorothea Tholl**



**Above:** Mean (+/- sd) harlequin bug captures per treatment respective trap face (i.e. pepper vs. cabbage) in a randomized complete block experiment with six replicates conducted late summer 2016. Dark textured grey (face associated with peppers) and light grey with diagonal patterns (face associated with cabbage) communicates trap context and likely explains “spill over” from murgantiol + benzyl isothiocyanate baited trap.

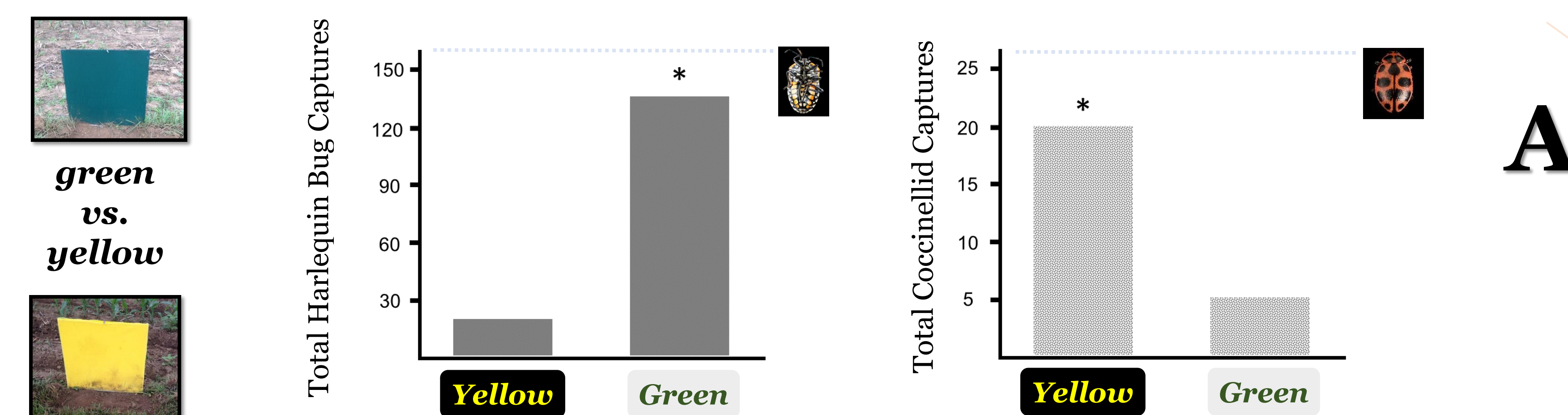
## Trap Collections 72h Post High Mow

**Below:** Mean number of harlequin bugs (+/-sd) collected at insecticide treated traps during a field experiment occurring over 72h in early-September 2016 located in Whitethorn, VA . Three trap types (square, pyramid, and ramp) and three semiochemical bait combinations ([zero = murgantiol], [low = murgantiol + single capillary tube emitting benzyl isothiocyanate], and [high = murgantiol + two capillary tubes emitting benzyl isothiocyanate]) were positioned within a randomized complete block design with a four replicate series intercepting dispersed bugs from mowed harlequin bug infested cole crops. Bars with the same letter are not significantly different (Tukey’s HSD test  $p < 0.05$ ).



## Results from trapping experiments

Harlequin bug, *Murgantia histrionica* (Hahn), is an important pest of brassica crops in the United States. To develop an effective trapping device for this pest, experiments were conducted in Virginia to assess factors to increase harlequin bug attraction to and arrestment at fixed artificial stimuli (“traps”) positioned within an agricultural landscape. In a laboratory experiment, harlequin bugs were effectively killed or severely impaired after a few minutes exposure to deltamethrin-incorporated netting (D-Terrence®, Vestergaard-frandsen), and, thereafter, the netting was used as a toxicant on the trapping devices in the field. In one experiment, square corrugated plastic panels were wrapped with the insecticide netting and baited with harlequin bug aggregation pheromone, murgantiol. Bugs were effectively drawn to the panels, with green panels having significantly more dead harlequin bugs and fewer dead ladybeetles (Coleoptera: Coccinellidae) at their base than yellow panels (A). Thus, green was chosen as the ideal trap color to use for another field experiment that evaluated three trap types – a corrugated plastic square panel, pyramidal Tedder’s trap, and ramp trap – each with three lure treatments, murgantiol alone or murgantiol plus a low or high rate of benzyl isothiocyanate. More bugs were killed with the Tedder’s trap than with the panel trap or the ramp trap, and more bugs were killed at traps containing murgantiol combined with benzyl isothiocyanate than at those with murgantiol alone (B). This research demonstrated that harlequin bugs, with use of proper visual and semiochemical stimuli, can be drawn to trapping devices and effectively killed after contact with deltamethrin-incorporated netting. Further improvements to semiochemical baits and physical trap designs are needed to increase harlequin bug retention as exposure to deltamethrin-incorporated netting is not immediately lethal. Our experimental trap prototype still imposes a risk of harlequin bug spill over to other food crops, as observed in Virginia experiments on non-host such as pepper fruits and raspberries (C).



**Above:** Total number of dead harlequin bugs (dark grey bars) and coccinellid (light grey bars) recorded over 48h period from green versus yellow murgantiol-baited square panel traps wrapped with deltamethrin-incorporated netting. Treatments were positioned within a randomized complete block design with a four replicates. June 8, 2015. Asterisk (\*) indicates significantly different trap captures (Fisher’s Exact Test,  $p < 0.05$ ).

## Trap Collections 48h Post High Mow

