Deltamethrin-incorporated netting for BMSB IPM strategies

Tom Kuhar & Hayley Bush

Department of Entomology, Virginia Tech

Long-lasting insecticide nets (LLINs)

- Insecticide-treated nets (ITNs) have been widely for malaria control since the mid-1990s
- ITNs are typically treated with a pyrethroid insecticide such as permethrin or deltamethrin, which repel, incapacitate, and kill insect disease vectors (mostly mosquitoes) that land on the nets.
- Conventionally-treated nets are dipped in insecticides, and require retreating after 3 washings or after a year of use
- More recently, long-lasting insecticidal nets (LLINs) have been developed with the netting material (usually polyethylene, or polyester) that has insecticide incorporated within or bound around the fibers

LLINs are commercially-available

- **BASF: Interceptor**® Long-Lasting Insecticidal Nets
- A polymer binder system is combined with Fendona® insecticide (alpha-cypermethrin) and applied directly to the fibers of the nets in a unique treatment process
- Insecticide is slowly exposed on the polymer surface
- long-term effectiveness even after 20 washes

LLINs are commercially-available

- http://www.vestergaard.com/our-products **VESTERGAARD** IMPACTING PEOPLE
- AgBio – possible distributor http://www.agbio-inc.com/
- **ZeroFly ®** (15 m × 1.8 m roll, mesh size = 32 holes/cm^2 deltamethin incorporated at ~ 3.85 mg a.i./g fiber)

Use of LLINs in Agriculture

- Relatively little research has been done on their use against agricultural pests

- Dáder et al. (2014) recently demonstrated their potential for control of aphids and whiteflies.

Dáder, B., S. Legarrea, A. Moreno, E. Viñuela, C.M. Ambros and A. Fereres, O. Skovmand and R. Bosselmann. 2014. Insecticide-Treated Nets as a New Approach to Control Vegetable Pests in Protected Crops. Acta Hort. 1015, ISHS 2014: 103-111.

Are the nets effective against BMSB?

Can the screens replace the dichlorvos NoPest™ kill strip in trap tops? (Leskey and Short – USDA-ARS)

Percentage and time until escape or death (Mean ± SEM) of *H. halys* adults placed in commercial Dead-Inn stink bug trap jars (Leskey and Short 2016 data)

Treatment	% Escaped[1]	Time Until Escape (min)
dichlorvos kill strip	16.67 ± 7.78 a	42.75 ± 10.13 a
lambda-cyhalothrin-treated net	0.00 ± 0.00 b	N/A
ZeroFly net	0.00 ± 0.00 b	N/A
Control	29.17 ± 9.48 a	44.14 ± 12.60 a

How long do the nets remain effective?

- Screens were used in the field for experiments and stored in an outdoor shed during the winter, then re-used again for 2 yrs

- Each yr, BMSB adults were placed on the aged screens cut into discs and placed in Petri dishes.

- Exposed for 24 hr

- Fresh (new) screen killed 100% of BMSB and 3-yr old field-aged screen killed 80%

BMSB aggregate on tree trunks in Sept

Average time that BMSB spend on screen wrapped tree trunk

- n = 96 observations
- Mean ± SD = 12 ± 12 min
- 26% of BMSB remained on screen for >30 min

What % of BMSB that get on the screen end up dead and counted on the catch sheet below?

- Bugs marked with a water-based paint pen (Sharpie USA, Downers Grove, IL)
- 4 reps (trees)
- Total # marked BMSB observed = 241
- % recovered on sheet = 33.6 ± 11.5%

Additional research with tree wraps

- If no tree is present, can you attach the screen to tomato stakes and have it work as well?

- Can you reduce the no. of BMSB entering overwintering shelters (houses)?

Additional research with tree wraps

- Non-target impacts?
- One screen wrapped catalpa tree resulted in 62 dead *C. maculata* and 10 dead spiders on the sheet after 3 days in the field in early October
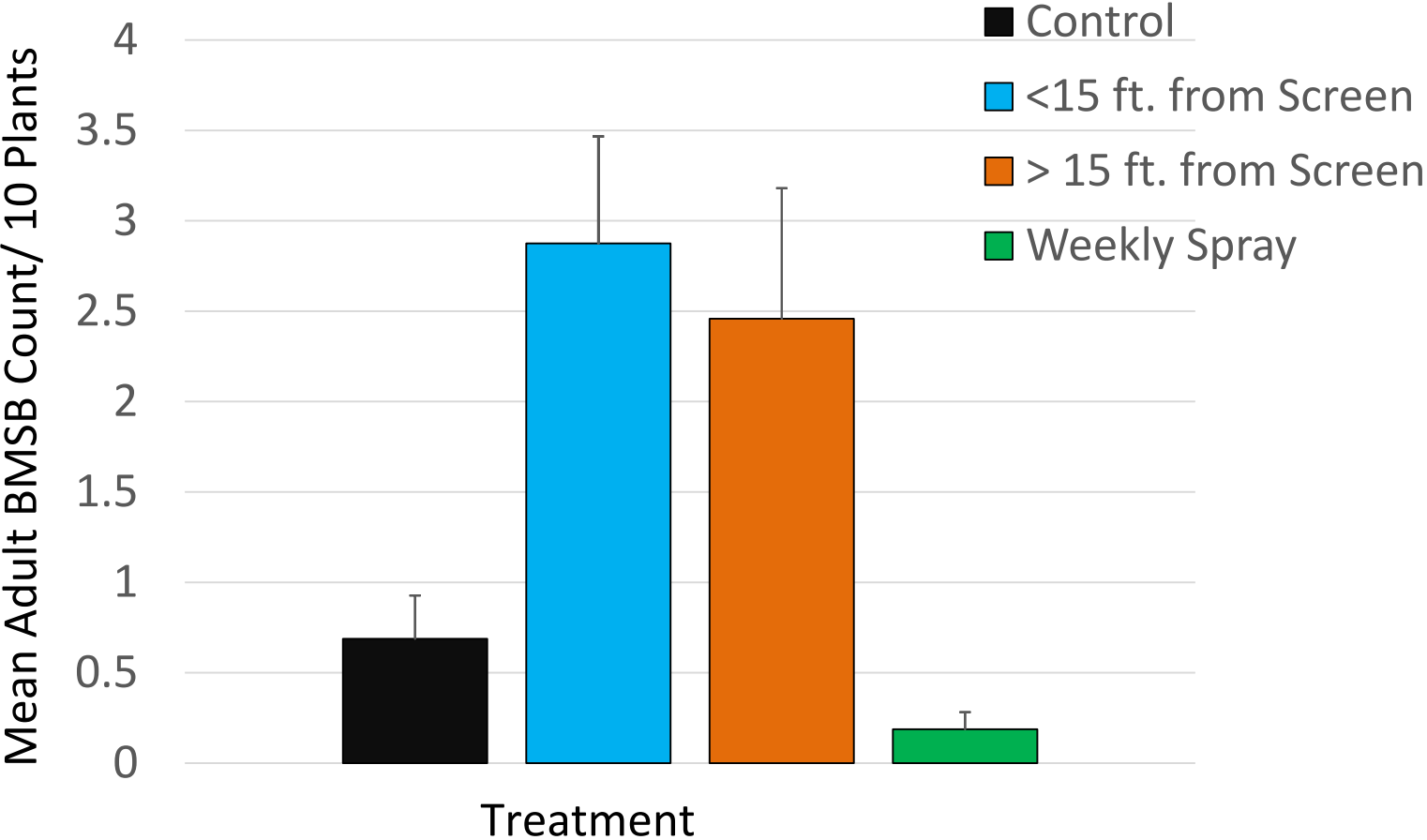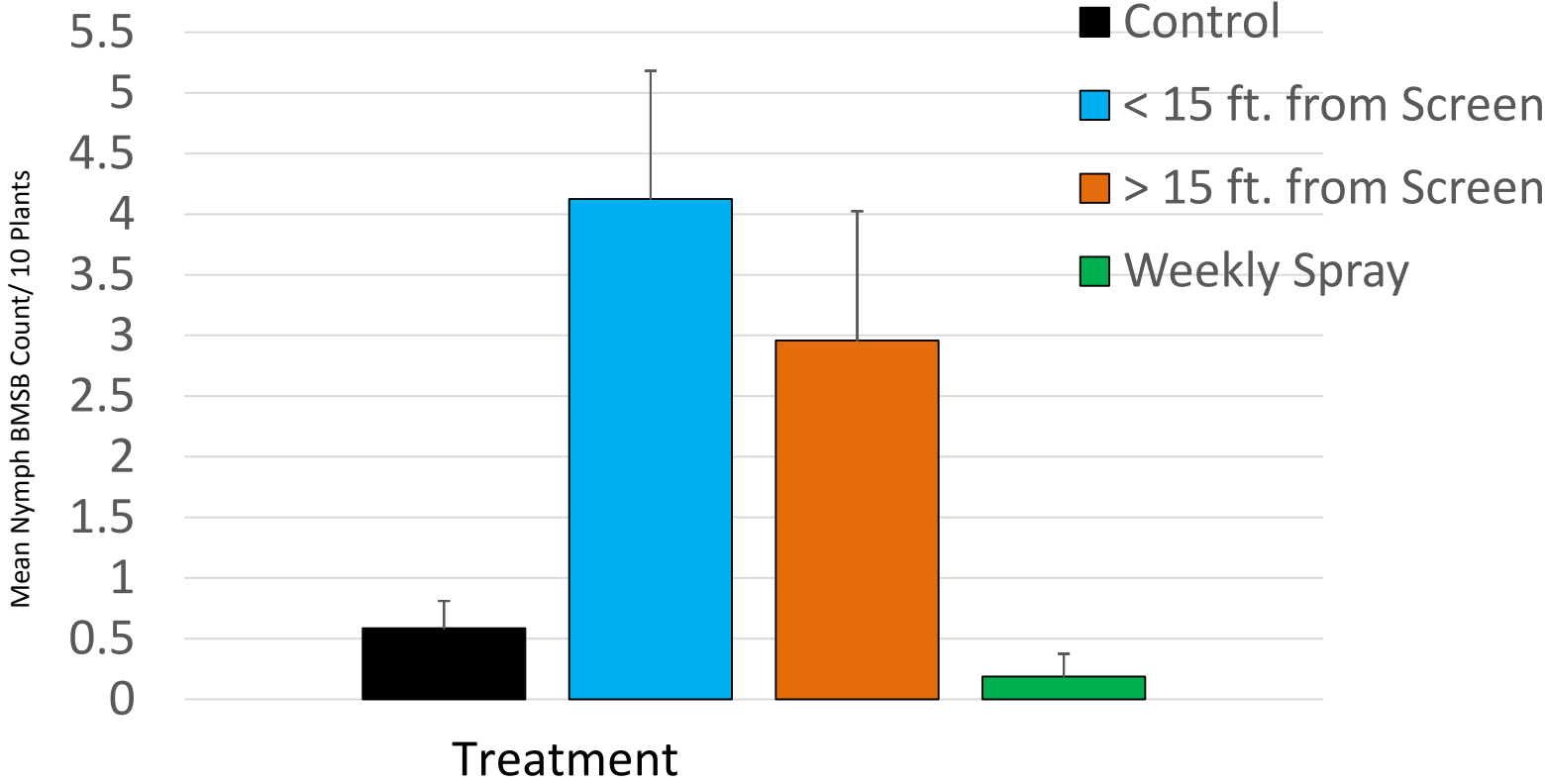
Attract and Kill Approach for Peppers
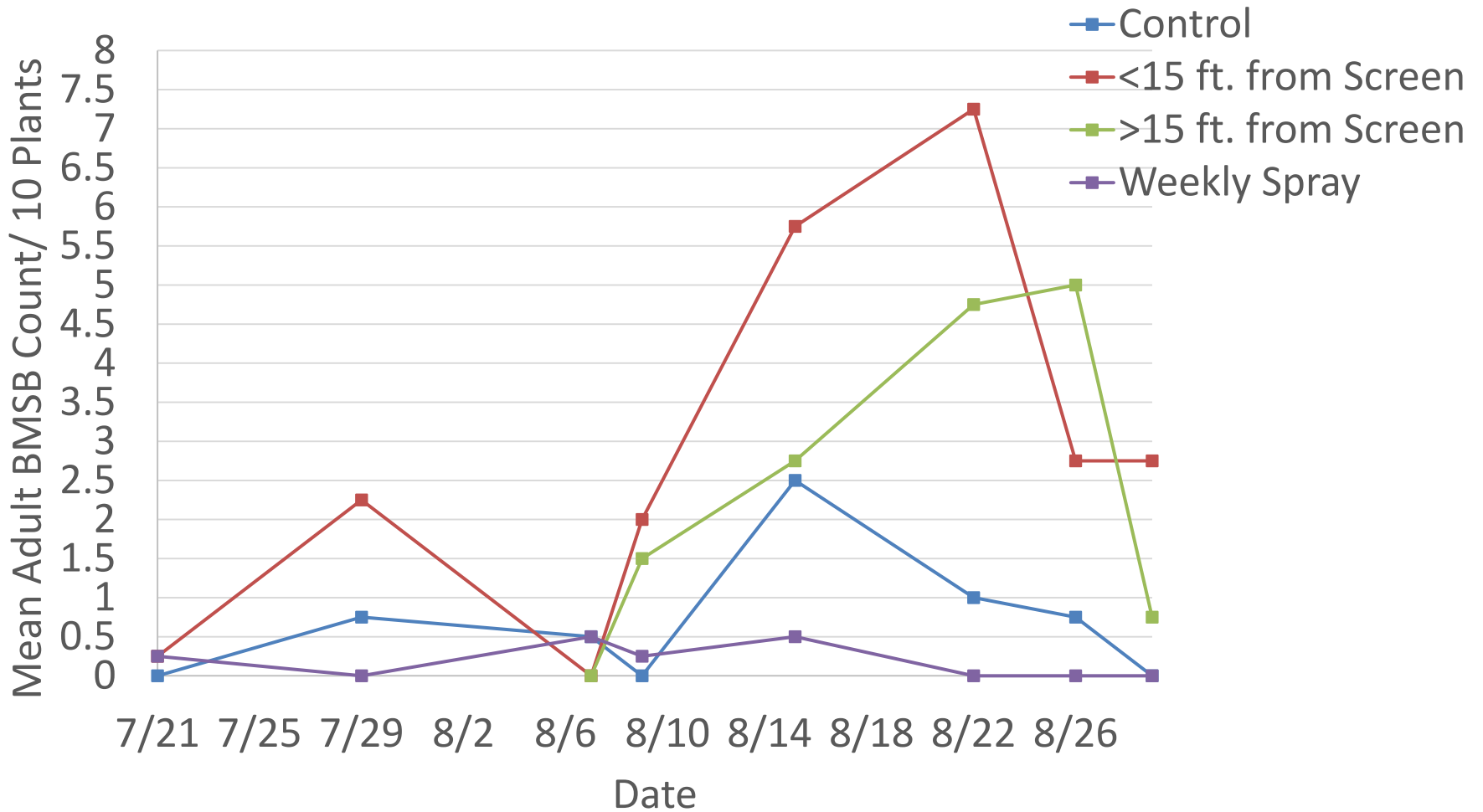## Hayley Bush, M.S. student

Adult BMSB Counts of Attract and Kill Screen Trial in Peppers

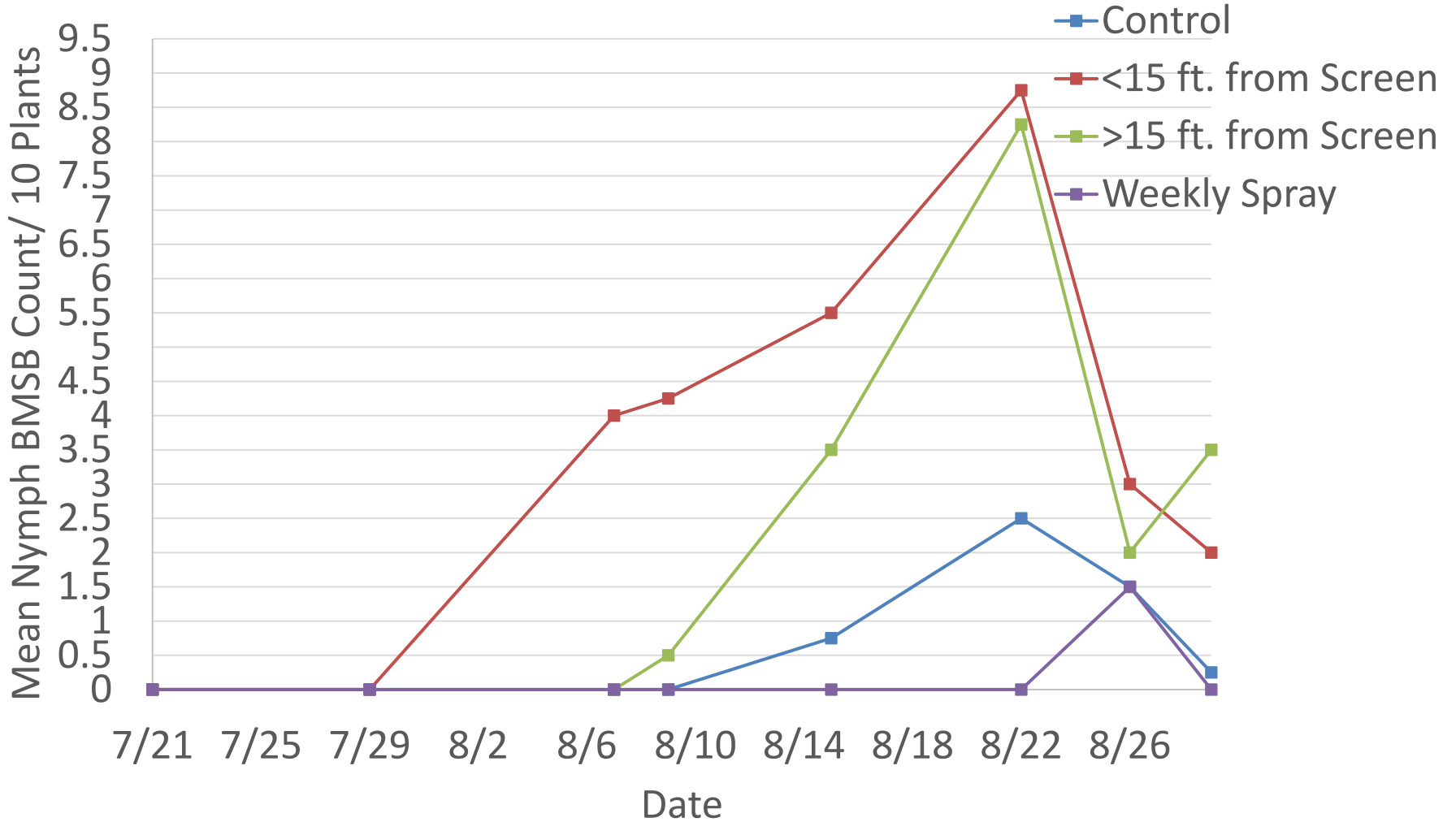Nymph BMSB Counts of Attract and Kill Screen Trial in Pepper

Adult Count Averages Throughout Season

Attract and Kill in vegetables: Where do we go next?