Feeding preferences of Brown Marmorated Stink Bug in berries, table grapes, and hazelnuts

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Since Brown Marmorated Stink Bug (BMSB) was identified in the Pacific Northwest, small fruit and hazelnut growers have reported damage. While BMSB can feed on multiple crops, the diversity of fruit and nut crops in Oregon's Willamette Valley could result in situational feeding preferences. In particular, the recent increase in hazelnut acreage in the Willamette Valley as well as the low economic threshold makes this crop susceptible to damage from BMSB. Understanding BMSB foraging preferences in the presence of high-quality food items can identify if managing this invasive pest will be influenced by adjacent crops.

Methods

We evaluated feeding choices of BMSB adults in several ways. First, we used a laboratory choice assay where BMSB were offered combinations of grapes and blueberries or hazelnuts and blueberries. We measured damage after 1 week and compared the amount of feeding damage to no-choice assays where BMSB were only provided with a single food item. Organic blueberries and grapes were purchased from a food cooperative, while hazelnuts (Barcelona variety) were collected from an orchard near Corvallis, OR. Grape and berry feeding damage was scored by the number of BMSB stylet sheaths and by the number of wrinkles on each fruit item. Hazelnut damage was scored by abnormal symptoms to the kernel. Second, we investigated how natal plant host affected BMSB foraging in the presence of olfactory cues. We used olfactometers that forced odors of each fruit item to waft towards stinkbugs. We analyzed behavioral decisions including movement into arms connected to each odor source.

We also focused on the phenology of BMSB feeding in hazelnuts during the spring and spring summer months. We used exclusion sleeves to limit BMSB's access to nuts over discrete periods.

Results

While the mean number of stylet sheaths and wrinkles in blueberries was lower than grape (Fig. 1), we expected 3x as much damage on grapes due to their larger weight and size. The weight-adjusted amount of damage was, therefore, far lower in grapes ($t = 3.81$, $df = 58$, $P<0.001$). In choice trials of hazelnuts and blueberries, we identified more damage in blueberries (mean stylet sheaths ± SE = 1.06 ± 0.18) than hazelnuts (0.09 ± 0.05). However, BMSB may have had a reduced propensity to feed on hazelnut due to pre-existing filbertworm damage. In the field trial of hazelnut feeding, we found a similar proportion of damaged kernels across all time periods. BMSB damaged approximately 2% of unprotected nuts, with shriveled and blank nuts as the most common damage.

In assays that only included odors of each crop, BMSB showed no preference of movement towards hazelnut or blueberry odors (Fig. 2). However, there was a non-significant effect of BMSB entering arms connected to odor sources of blueberries more quickly than grapes across all natal hosts (binomial test, P = 0.11). Our results suggest that grape is not a preferred host plant for BMSB. Improving management of BMSB may be a more immediate concern in hazelnuts and blueberries.

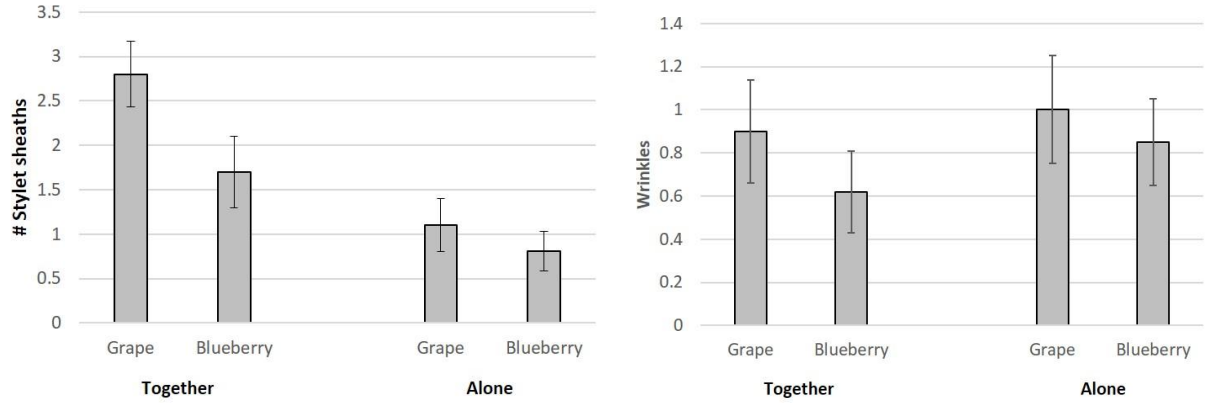

Figure 1. Average (± SE) damage by BMSB to grapes and blueberries in choice (Together) and no choice (Alone) assays.

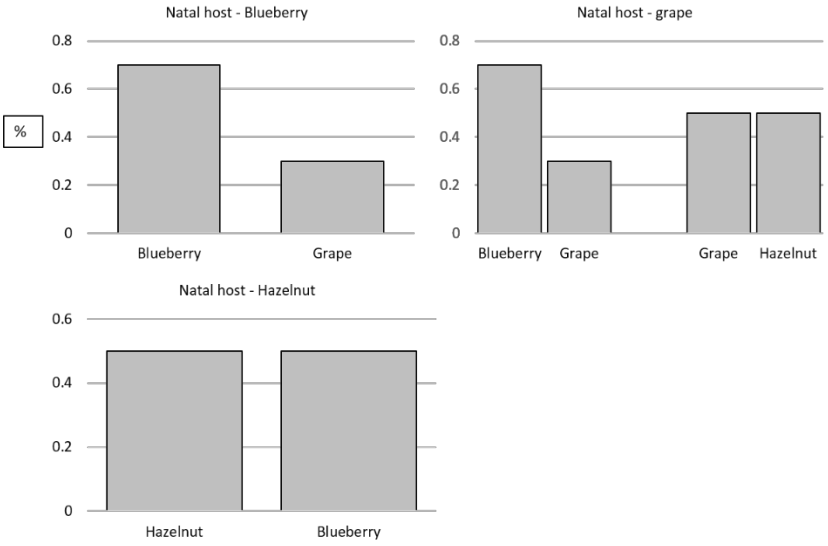

Fig. 2. Percentage of BMSB entering arms connected to odor sources of different fruits and hazelnuts. BMSB movement indicated a slight avoidance of grape compared to blueberry.