Surround for Control of Brown Marmonated Stink Bug on Apple In New Jersey

Win Cowgill, Dean Polk, Rebecca Magron, and Atanass Antanssov
New Jersey Agricultural Experiment Station, Rutgers Cooperative Extension

Wesley Autio
Stockbridge School of Agriculture, University of Massachusetts

A replicated trial was conducted to investigate Surround and other products for control of Brown Marmonated Stink Bug (BMSB) on mature apple trees at the Rutgers Snyder Research and Extension Farm in Pittstown, Hunterdon County, NJ in 2011. The focus was on controlling BMSB at the end of the growing season, comparing insecticides with known activity against BMSB combined with Surround as compared to Surround alone and an untreated control. Four single-tree replications were utilized for each treatment in a completely randomized trial.

A mature orchard was selected with Suncrisp apple as the treatment trees and Sun Fuji apple trees as the buffer trees. Both of these cultivars ripen in mid October. The block consisted of 8 rows of trees alternating rows by cultivar. These were 12-year-old mature trees 12-14 feet tall spaced 10' x 20'.

Surround was used early season June 26, July 4, and August 1 as a protectant on all treatments except the untreated control. Treatments began August 17. The experimental block was scouted weekly for BMSB with 3-minute observations, beating limbs and collection with trays and visually examining the fruit. During the season, very little BMSB activity was observed in the surrounding blocks and none in the experimental block.

Treatments were applied with a Rears Tower Sprayer (Rears Mfg. CO.2140 Prairie Rd.
Eugene, OR 97402) fitted with air-induction nozzles. Sprays were applied tree-row-volume dilute at 180 GPA.

Fifty fruit were examined visually on each single-tree replicate on August 12, October 4, and the number of fruit with visible feeding was recorded.

At harvest, 100 fruit per single-tree replicate were harvested, stored, and then peeled to look for external and internal feeding.

Results & Discussion

In 2011 BMSB populations were more variable at the treatment location than in 2010. Some adults were observed early in the season, but then visual observations declined. Our experiment was designed to evaluate treatments in August and September when the BMSB clustering starts

Table 1. Treatment list. Treatments were applied August 17, August 31, September 14, and September 28, 2011.

Treatments
Untreated control
Surround @ 50 per 100 followed by 25/100 or 25 /50 followed by 12.5/50
Surround + Actara @5.5 ounces/Actara 2.75 ounces/100or 1.375 ounces /50
Surround + Assail @8 ounces/Acre or 4 ounces/100 or 2 ounces 50
Surround + Acti-Gel[1] @ 2 lb /100 or 1lbs/100 or 1 lb /50 or 0.5lb/50
Surround + Acti-Gel[1] + Actara@5.5 ounces/Acre 0r 2.75 ounces/100 or 1.375 ounces /50

[1] Active Minerals International, LLC

Table 2. Effects of various surround and insecticide combinations on the incidence of brown marmorated stink bug injury in Suncrisp apple in New Jersey. No significant differences were observed among treatments.

Treatment	Visual damage (% of fruit)			Internal damage (% of fruit at harvest)	Average number of stings per damaged fruit
	12 Aug	4 Oct	At harvest		
Untreated Control	14.0	16.0	1.3	31.0	3.4
Surround	11.5	11.8	0.3	28.5	2.9
Surround + Actara	12.8	10.0	0.0	21.0	3.0
Surround + Assail	13.5	15.8	0.0	39.8	2.8
Surround + ActiGel	12.5	10.5	0.0	31.5	2.6
Surround + ActiGel + Actara	9.3	9.0	0.0	23.3	3.5

All data were subjected to analysis of variance with PROC GLM of the Statistical Analysis Systems Software (SAS Institute, Cary, NC). Visual damage, internal damage, and the number of stings per damaged fruit did not differ significantly among treatments. Further, covariance analyses (using PROC CORR of the SAS Software) between visual and internal damage showed no significant relationships.

to occur and typically the most injury appears to occur.

There are many challenges with this insect in trying to design the experiment and collect data. We still do not have an effective way to monitor for this insect to predict the start of treatments and/or determine threshold levels for treatment applications. We observed no insects in the untreated control treatments, so we did not initiate treatments until August 17. Our first data collection was a fruit examination August 12 of 50 fruit per tree on all treatments. Fruit from all quadrants and high and low were examined. Even with no visible BMSB's present prior to this date, we had damage to the fruit. While there were no significant differences between treatments at this date, all treatments had a smaller amount of injury than the untreated control. All these treatments had Surround applied three times during the growing season prior to this date as maintenance sprays. It appears that all treatments with Surround had less injury than the untreated control.

Our second data collection was a fruit examination October 4 of 50 fruit per tree of all treatments. As with the August 12 data collection, the October 4 sampling had no significant differences between treatments, however numerically all treatments had a smaller amount of visible surface injury than the untreated control.

Fruit were harvested on October 17 in non-Retain treated blocks and October 25 in Retain treated blocks. Both sets of fruit were harvested at optimum maturity for Suncrisp. Fruit were peeled and examined between November 14 and 17 and on November 28, respectively.

Surface injury was examined prior to peeling on all samples and rated. While there were no significant differences between treatments, numerically all treatments had a smaller amount of visible surface injury than the untreated control.

The lack of statistical significant results was disappointing in this experiment. However we feel that significant amounts of variability within the data were due to the nature of the insect. It is a rapid flyer, always on the move, and extremely hard to scout for.

Each harvested fruit (100 per tree per replication) was individually peeled and rated for internal damage. The data were expressed as the percentage of damaged fruit by BMSB at harvest. There were no statistical differences however the Surround alone, Surround + Actara, and Surround + Actara + ActiGel. All had a numerically smaller percentage of the fruit damaged at harvested than the untreated control.

Conclusion

It is our feeling based on the results of the 2011 study above and observations of other Surround-treated apple bocks at Rutgers Snyder farm in both 2010 and 2011 that Surround can and does provide some level of repellency to BMSB on apple. We would like to see additional work with Surround on BMSB done for this reason. In addition, it is proving to be one of the only controls that organic apple growers have for BMSB.

As we learn more about this pest, its cycles, habits, and how to scout for it, we will be better able to utilize tools to control it. Surround has a role to play in its control.

We are have been using Surround successfully on apple for the past 6 years for successful sunburn control on Honeycrisp and to repel Japanese beetles, which prefer both Honeycrisp and Liberty apples.

On PYO-harvested fruit, one limitation of Surround will be its residue on the fruit. Spraying surround late into August and September for an October harvested apple leaves an objectionable residue. The white colored Surround looks like pesticide residue and therefore is not desirable for PYO harvested fruit. All of our fruit harvested at the Rutgers Snyder Farm needed to be put through a Tew brusher washer to eliminated this residue.