

Annual report on USGA ID# 2015-08-523

Selection of Insecticides Applied at Different Timings for Control of Billbug Species on Zoysiagrass Fairways

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Objectives: The overall objective is to evaluate insecticides for efficacy and appropriate application timing for the control of billbug damage on zoysiagrass fairways.

Billbug (*Sphenophorus* spp.) damage on zoysiagrass (*Zoysia japonica* Steud.) is becoming an emerging problem in recent years. Among possibly nine billbug species, both hunting (*S. venatus vestitus* Chittenden) and bluegrass billbug (*S. parvulus* Gyllenhal) could potentially injury zoysiagrass (Fig 1).



Fig 1. Bluegrass (left) and hunting billbug (right) adult.

Field plots were established adjacent to the area where heavy billbug damage has been previously documented at a local golf course (Fig 2). Insecticides included bifenthrin (Talstar[®]), deltamethrin (DeltaGard[®]), lambda-cyhalothrin (Scimitar[®]), and imidacloprid (Merit[®]) for control adults, clothianidin (Arena[®]) and thiamethoxam (Meridian[®]) for control larvae, and chlorantraniliprole (Acelepryn[®]) for control both adults and larval. Compound, alone or in combination, were applied as single (5/22), or sequential (6/19) at the highest label suggested rates.

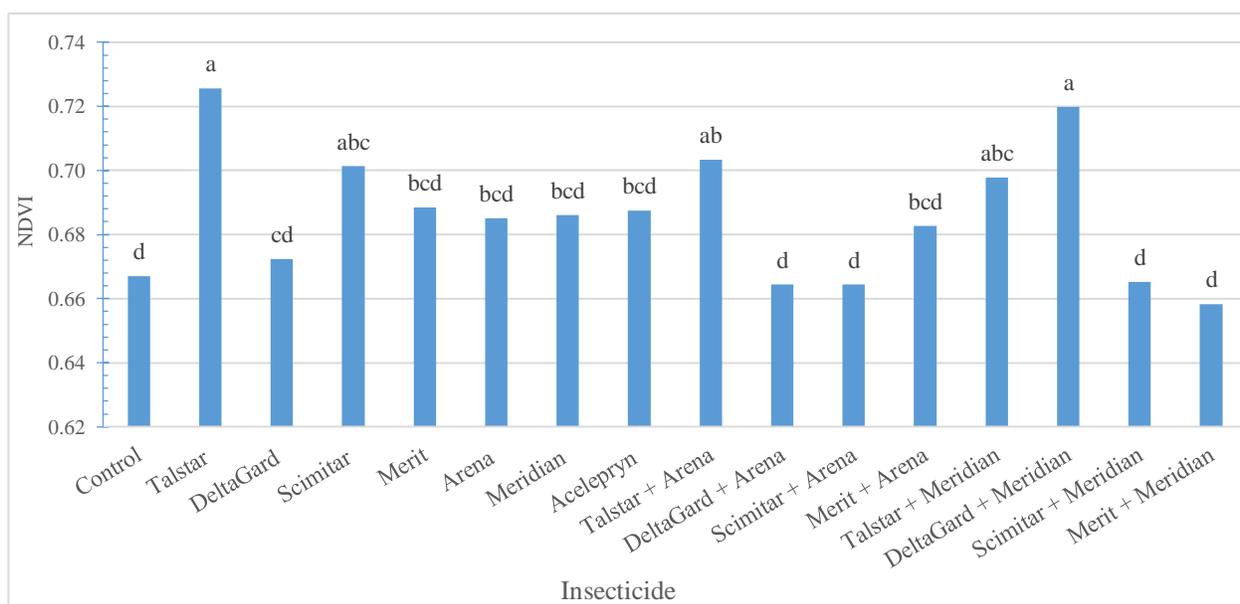


Fig 2. Insecticide application on the 11th fairway of A. L. Gustin Golf Course, Columbia, Missouri.

The experiment design was a split-plot in RCBD with four replications. The whole-plot (5 × 10 ft with 10 ft boarder) variable was insecticide and the sub-plot (5 × 5 ft) variable was application timing. Pitfall traps (total 128) were installed at the center of each sub-plot. Weekly evaluations included turf quality and normalized difference vegetation index (NDVI), and billbugs counts to the species. All data were subjected to ANOVA (Proc Mixed in SAS 9.4).

Turf performance were significantly affected by main effect of evaluation date and insecticide without interaction. All applications maintained or improved turf quality, indicated by NDVI, compared to control (Fig 3). Insecticide Talstar[®], alone or in combination, maintained supreme turf performance compared to control, in addition to other compounds such as Scimitar[®].

Fig 3. Insecticide main effect on normalized difference vegetation index (NDVI). Data were collected at 4, 9, 13, and 17 weeks after initial treatment application (WAIT; 6/20, 7/29, 8/28, and 9/16, respectively). Data were pooled over application as no significant application effect was found. Bars labeled by the same letters were not significantly different based on Fisher's Protected LSD ($P < 0.05$).



Hunting billbugs dominated the population, and two peak adult activities were found with one occurred 6/12 (3 WAIT), and another and bigger peak occurred on 9/11 (16 WAIT). The highest amount of billbugs collected were 47 from the plot area. Significant interaction between insecticide and application was detected, and Scimitar[®]+Arena[®] seemed to yield the lowest billbug counts (up to 90% reduction compared to control). The full extent of treatment effect, however, is yet to be determined after spring greenup, when most damage to turf and over-winter billbug population can be assessed.

Summary:

- Hunting billbugs in our region might be 1.5 or 2 generations per year;
- Some of the insecticide combinations targeting on both adult and larvae billbugs might provide better and year-round billbug control;
- Assessment of overwinter population in spring likely reveal full extent of insecticide efficacy.