

Evaluation of Insecticides for Efficacy on Turfgrass Pests

Kai Umeda and Gabriel Towers

Abstract

No masked chafer larvae were observed for treatments of imidacloprid, imidacloprid plus bifenthrin, clothianidin, and the two higher rates of DPX-E2Y45. The inconsistent and low populations of masked chafer larvae and billbugs in the turfgrass did not provide for conclusive results. Clothianidin and the two higher rates of DPX-E2Y45 had no billbug larvae. An early rating date showed that more billbug adults were in turf treated with imidacloprid and DPX-E2Y45. Later rating dates showed a decline in adults for all treatments.

Introduction

Masked chafer grubs (*Cyclocephala* spp.) were identified as a key pest of turfgrass on central Arizona golf courses. A trapping and monitoring program initiated in 2004 provided golf course superintendents data about occurrences of masked chafer adult beetle flights. Subsequently, predictions of timing of egg lay and larval emergence would enable superintendents to effectively time insecticide applications if needed. Several soil-applied insecticides can be used to control grubs in the early instar stages of growth. Imidacloprid (Merit* and other brand products), imidacloprid plus bifenthrin (Allectus*), clothianidin (Arena*), thiamethoxam (Meridian*) are in the chemistry class of neonicotinoids. A new class of chemistry called the anthranilic diamides from DuPont includes a new insecticide DPX-E2Y45 (Rynaxypyr*). Merit, Allectus, Arena, and DPX-E2Y45 were evaluated for grub control efficacy and incidentally billbug control in turfgrass. Billbugs (*Sphenophorus* spp.) are commonly observed in Arizona turfgrasses but the species have not been identified nor the economic injury level determined. At least two species (Phoenix and Denver billbugs) have been identified in Prescott, AZ and a third (Hunting billbug) or fourth may also be suspected.

Materials and Methods

A small plot experiment was conducted on the driving range bermudagrass turf at Granite Falls Golf Club in Sun City, AZ. Treatment plots measured 10 ft by 10 ft and each treatment was replicated four times in a randomized complete block design. Insecticides were applied using a backpack CO₂ sprayer equipped with a hand-held boom with three 8003LP flat-fan nozzles spaced 20-inches apart. Two 5-ft wide passes per plot were made delivering the sprays in 25 gpa water pressurized to 25 psi. A soil wetting agent, Aqueduct* at 8.0 oz/gal was added to each treatment to aid with soil penetration. At the time of insecticide applications on 28 June 2007, the air temperature was 90°F, sky clear, and no winds with soil temperature at 65°F at approximately 2 in depth. The insecticide application timing was triggered when masked chafer adult beetle flights were determined to have peaked at approximately 3-4 weeks earlier. Turfgrass soil insect evaluations were made at 2, 4, and 8 weeks after treatment (WAT) by using a Ryan sod-cutter. Sod was cut 10 ft across each treatment replicate plot to a depth of approximately 1 in at a width of 18 in (15 ft² per plot). The total number of masked chafer larvae and billbug larvae and adults were counted in each treatment replicate.

Results and Discussion

Masked chafer larvae were not found at the first rating date on 12 July at 2 WAT (Table). At 4 WAT on 26 July, an average of 2.5 larvae was found in the untreated check plots. Only one other masked chafer larvae was found among all other treatment replicates. No masked chafer larvae were observed for treatments of imidacloprid, imidacloprid plus bifenthrin, clothianidin, and the two higher rates of DPX-E2Y45. At 8 WAT on 22 August, again no masked chafer larvae were found in turf treated with imidacloprid alone, clothianidin, and DPX-E2Y45 at 0.209 lb a.i./A. Masked chafer larvae found at 8 WAT were not a significant number to differentiate treatments from the untreated check.

No billbug larvae were observed for any treatment on 12 July at 2 WAT while an average of 1 larva was found in the untreated check. Adults were observed for all treatments except none were in turf treated with clothianidin. Turf treated with imidacloprid alone and by DPX-E2Y45 had more billbug adults than in the untreated check but the populations were not significant. Adults found in turf treated by DPX-E2Y45 exhibited a reverse rate response with 3.5 adults at the highest rate of 0.209 lb a.i./A, 2.3 at 0.157 lb a.i./A, and 1.5 at 0.104 lb a.i./A compared to 1.3 in the untreated check.

At 4 WAT, billbug larvae counts demonstrated a rate response for DPX-E2Y45 with more observed at the lowest rate. The highest rate was comparable to imidacloprid treatments and clothianidin with less than 0.3 larvae observed. An average of 2.3 billbug adults were found in untreated turf at 4 WAT compared to less than 0.3 adults for all treatments.

Almost no billbug adults were observed at 6 WAT, including the untreated check. The untreated check had an average of 3.0 larvae that was similar to the imidacloprid plus bifenthrin treatment. Imidacloprid alone had 1.8 larvae that were not significantly different from the untreated check. Clothianidin and the two higher rates of DPX-E2Y45 had no billbug larvae.

The inconsistent and low populations of masked chafer larvae and billbugs in the turfgrass did not provide for conclusive results. The population of the masked chafer or billbugs did not cause visual damage to turf even in the untreated check. However, all four insecticides tended to provide very good masked chafer larvae and billbug control at 4 WAT. Imidacloprid treatments controlled less billbug larvae at 6 WAT. Clothianidin treated turf had no larvae of either pest and only 1 adult billbug was seen in a single replicate on one date. DPX-E2Y45 at all rates demonstrated efficacy against masked chafer and billbugs comparable to imidacloprid treatments and clothianidin.

Acknowledgement

We express our appreciation to Drue Hardy and Dave Bergstrom, superintendents at Sun City Grand Golf Club, and their staff for their cooperation to enable us to conduct the experiment on the Granite Falls Golf Course.

*Product names mentioned are registered trademarks. Any products, services, or organizations that are mentioned, shown, or indirectly implied in this publication do not imply endorsement by The University of Arizona.

Table. Soil insecticide efficacy against masked chafer larvae and billbugs in turfgrass.

<u>Treatment</u>	<u>Rate</u> (lb a.i./A)	<u>Chafer larvae</u>		<u>Billbug larvae</u>			<u>Billbug adult</u>		
		7/26	8/22	7/12	7/26	8/22	7/12	7/26	8/22
----- Average number of insects / 15 sq ft sampling area -----									
Untreated check		2.5	0.5	1.0	2.0	3.0	1.3	2.3	0
Imidacloprid	0.3	0	0	0	0.3	1.8	2.3	0.3	0
Imidacloprid + Bifenthrin	0.25 + 0.2	0	0.3	0	0	3.0	1.0	0	0.3
Clothianidin	0.3	0	0	0	0	0	0	0.3	0
DPX-E2Y45	0.104	0.3	0.3	0	0.8	0.3	1.5	0.3	0
DPX-E2Y45	0.157	0	0.5	0	0.5	0	2.3	0	0
DPX-E2Y45	0.209	0	0	0	0.3	0	3.5	0.3	0.3
LSD (p=0.05)		1.88	0.95	0.65	1.52	2.89	2.75	1.12	0.41

Insecticide application date – 28 June 2007

Sampling dates – 12 July = 2 WAT, 26 July = 4 WAT, 22 August = 8 WAT