COMPARATIVE EFFICACY OF PYRETHROID INSECTICIDES AGAINST SYMPHYLANS IN TALL FESCUE SEED CROPS

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Introduction

The garden symphylan (*Scutigerella immaculata* Newport) is a serious soil arthropod pest whose root feeding affects the yield potential and survival of several high-value crops in western Oregon, particularly during crop establishment (Umble and Fisher, 2003). Recent research efforts (Willette et al., 2023; Bateman et al., 2023) have evaluated various insecticide products that represent diverse modes of action for the management of symphylans in both tall fescue [*Schedonorus phoenix* (Scop.) Holub] and perennial ryegrass (*Lolium perenne* L.) seed crops. In both trials, a liquid fertilizer-ready formulation (LFR) of bifenthrin (Capture LFR) emerged as a promising candidate for symphylan management using preplant incorporation. These results prompted us to further evaluate the comparative efficacy of various pyrethroid products formulated as emulsifiable concentrates (EC) and other insecticides identified in previous laboratory or field evaluations.

Materials and Methods

In March 2023, the trial was established in a symphylan-infested commercial tall fescue field in Linn County, OR. Soil type on the site is Malabon/Conser silty clay loam. The trial design included six insecticidal treatments and an untreated control arranged in a randomized complete block with three replications (Table 1). Plots were 12 feet x 25 feet. Tall fescue (var. 'Dynamite G-LS') was planted at 9 lb/acre using a John Deere 8300 double run metering, double disk opener, at 12-inch row spacing. The seeding depth was approximately 0.35 inch.

Immediately after planting, insecticide treatments were applied using a broadcast method with a CO_2-pressurized backpack sprayer applying 20 gal/acre spray volume at 22 psi through AM11002 nozzles. Approximately 0.75 inch of rainfall was recorded within 48 hours of insecticide application, which facilitated insecticide incorporation.

Symphylan abundance data were collected using the potato bait method successfully used in past studies by deploying three bait stations per plot 10, 28, and 38 days after treatment (DAT) (Willette et al., 2023). Plant density was measured in each plot at 52 DAT by counting the number of tall fescue plants per 3.2-foot length of a randomly selected row within each plot. Data were analyzed using ANOVA, and means were separated using Fisher's protected LSD ($P \leq 0.05$) (SAS Institute, Inc., 2023).

Results and Discussion

At 10 DAT, no differences in mean symphylan counts were detected in plots due to insecticide treatment (Table 1). Symphylan counts at 28 DAT indicated a reduction in symphylans in plots treated with all pyrethroid insecticide treatments, i.e., Bifender LFC, Bifenture 2EC, Brigade 2EC, Capture LFR,

Table 1. Trade name (active ingredient), rate, IRAC class, mean symphylan counts, and plant density in an insecticide efficacy trial conducted in a spring-planted tall fescue field in Linn County, OR, 2023.

Trade name (active ingredient)	Rate	IRAC class	------ Mean symphylan count per plot[1] ------			Plant density[1]
	(fl oz/a)		10 DAT	28 DAT	38 DAT	52 DAT
Untreated control	—	—	5.0 a	24.0 a	30.7 a	12.7 c
Bifender LFC (bifenthrin)	7.4	3	0.7 a	6.7 bc	9.0 b	52.0 ab
Bifenture 2EC (bifenthrin)	6.4	3	0.3 a	0.0 c	1.7 b	68.0 a
Brigade 2EC (bifenthrin)	6.4	3A	3.0 a	2.0 c	6.7 b	31.7 bc
Capture LFR (bifenthrin)	6.8	3A	1.7 a	3.0 c	1.3 b	48.3 ab
Torac (tolfenpyrad)	21.0	21A	3.3 a	21.3 ab	24.7 a	46.0 ab
Warrior II (lambda-cyhalothrin)	1.92	3	0.3 a	2.0 c	10.3 b	35.0 bc
P-value	—	—	0.1154	0.0122	0.001	0.012

[1]Means within a column followed by a common letter are not different ($P = 0.05$).

and Warrior II, compared to Torac and the untreated control (Table 1). At 38 DAT, all insecticide treatments except Torac showed increased symphylan suppression compared to the untreated control (Table 1). Corresponding to the symphylan suppression, plots with Bifenture 2EC treatments had a higher plant density (Table 1), followed by other pyrethroid insecticide treatments, Bifender LFC, Capture LFR, and Torac, than the untreated control.

Our primary objective of comparing the efficacy of pyrethroid products formulated as EC with other previously tested products, such as LFR products, resulted in no observable differences. We propose that future work on grass seed symphylan suppression should examine the effects of different bifenthrin formulations mixed with carbon at planting, with either in-furrow or T-band application methods.

References

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