EVALUATION OF METAFLUMIZONE FORMULATION AS A DRENCH TREATMENT FOR RED IMPORTED FIRE ANTS

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Metaflumizone (formerly BAS 320 00 I, 21.99% a.i.; 240 SC water-based; lot# 607-90; ESA Est. No. 0068323-NC-001; BASF Corp., 26 Davis Dr., Research Triangle Park, NC 27709) is a relatively new class of insecticide active ingredient, a semi-carbazone. This laboratory trial was conducted to assess the effectiveness of metaflumizone for use as an imported fire ant mound drench for the control of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera:Formicidae). This material has been formulated and evaluated in field trials both as experimental bait (i.e., stomach poison) and as an ant mound drench. Field observations indicate the material is rather fast-acting, and the bait formulation evidently is expected to perform similarly to bait formulations of indoxacarb.

Materials and Methods

For the purpose of this laboratory assessment, worker ant mortality to various dilutions of metaflumizone was assessed using the "straw technique" described by Drees (2002). An initial concentration of 39 mls/2 gal (1.25 ml/cup) metaflumizone was diluted to 0.63, 0.31, 0.16, 0.08 ml/cup (1, 0.5, 0.25, 0.13, 0.05 x rates, respectively) in distilled water. Water, only, served as the untreated control. A glass 1.0 ml pipette (marked in 0.1 ml increments) was used to measure the initial concentration (1.25 ml). However, due to the milky (opaque) nature and high viscosity of the formulation, the exact amount of material may have varied slightly (i.e., by $\pm$0.2 ml). Worker ants (8 to 24, replicated 4 times for each concentration) were submerged in the solution for 5 to 10 seconds at 17°C (10:30 to 11:00 a.m., Nov. 17, 2005). Surviving ants were monitored 6 hours (4:30 p.m., 22°C), 24 hours (11:10 a.m., Nov. 18, 20°C) and 4 days (8:35 a.m., 17°C), 5 days (8:30 a.m., Nov. 22, 17°C) and 6 days (8:30 a.m., Nov. 23, 2005, 20°C) following exposure. Percent mortality was calculated.

Results and discussion

No distinct effect of the treatment occurred within 24 hrs of exposure, although ants in one straw (0.5X rate, replicate B, **Table 1**) experienced high mortality. Otherwise, the 1.0X treatment rate caused 20 to 50 percent of exposed worker ants to become moribund or act intoxicated 4 days after treatment. These ants were unable to walk, and thus two percent mortality figures were calculated for Table 1, with moribund ant numbers added to dead ant

numbers for the value marked with an asterisk. This effect intensified and resulted in mortality up to 100% by 6 days of exposure at the 1.0X rate. A rate response was evident during this assessment. Even at the lowest rate evaluated (0.05X), some mortality (10 to 83.3%) occurred relative to untreated ants (0 to 25%) after 6 days of exposure. Statistical analysis of these data has not been performed. Arc-sin transformation of percent mortality would be required before further analysis using an appropriate statistical method (regression analysis).

Literature cited

Drees, B. M. 2002. A new technique for laboratory assessment of red imported fire ant mound drench treatments. Southwestern Entomologist 27(2):177-183.

Table 1. Red imported fire ant worker mortality (in parentheses) following 5 to 10 second submersion in metaflumizone solution, initiated Nov. 17, 2005, 10:30 a.m., monitored at 6 hours (4:30 p.m., 22°C), 24 hours (11:10 a.m., Nov. 18, 20°C) and 4 days (8:35 a.m., 17°C), 5 days (8:30 a.m., Nov. 22, 17°C) and 6 days (8:30 a.m., Nov. 23, 2005, 20°C) following exposure.

Treatments/ Replicate	**No. live ants, 0 hr.**	**6 hrs.**	**24 hrs.**	**4 days**	**5 days**	**6 days**
untreated						
A	8	0 (0%)	0 (0%)	0 (0%)	1 (12.5%)	2 (25%)
B	10	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
C	16	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
D	18	0 (0%)	0 (0%)	1 (5.6%)	1 (5.6%)	2 (11.1%)
metaflumizone 1.25 ml/cup (1.0X)						
A	15	0 (0%)	0 (0%)	6* (0, 40*%)	15 (100%)	15 (100%)
B	15	0 (0%)	0 (0%)	3* (0, 20*%)	15 (100%)	15 (100%)
C	10	0 (0%)	1 (10%)	5* (0, 50*%)	1* + 9 (90, 100*%)	10 (100%)
D	17	0 (0%)	0 (0%)	4* (0, 23.5*%)	17 (100%)	17 (100%)

metaflumizone 0.63 ml/cup (0.5X)						
A	10	0 (0%)	0 (0%)	0 (0%)	3* + 5 (30, 100*%)	8 (80%)
B	22	22 (100%)	19 (86.4%)	22 (100%)	22 (100%)	22 (100%)
C	19	0 (0%)	0 (0%)	3* (0, 15.8*%)	18 (94.7%)	18 (94.7%)
D	24	0 (0%)	0 (0%)	6* (0, 25*%)	1* + 23 (95.8, 100*%)	24 (100%)
metaflumizone 0.31 ml/cup (0.25X)						
A	15	0 (0%)	0 (0%)	0 (0%)	8* + 1 (6.7, 100*%)	9 (60%)
B	12	0 (0%)	2 (16.6%)	5 (41.7%)	4* + 8 (66.7, 100*%)	12 (100%)
C	15	0 (0%)	0 (0%)	3 (20%)	12* + 3 (20, 100*%)	13 (86.7%)
D	12	0 (0%)	0 (0%)	1 (8.3%)	10* + 2 (16.7, 100*%)	6 (50%)
metaflumizone 0.16 ml/cup (0.13X)						
A	12	0 (0%)	0 (0%)	1 (8.3%)	9* + 3 (25, 100*%)	9 (75%)
B	22	0 (0%)	0 (0%)	2 (9.1%)	20* + 2 (9, 100*%)	13 (59.1%)
C	20	0 (0%)	0 (0%)	1 (5%)	17* + 3 (15, 100*%)	10 (50%)
D	11	0 (0%)	0 (0%)	2 (18.2%)	6* + 5 (45, 100*%)	8 (72.7%)
metaflumizone 0.08 ml/cup (0.05X)						
A	14	0 (0%)	0 (0%)	1 (7.1%)	0 (0%)	3 (21.4%)
B	18	0 (0%)	0 (0%)	8 (44.4%)	11* + 7 (38, 100*%)	15 (83.3%)
C	23	0 (0%)	0 (0%)	1 (4.3%)	21* + 2 (8.7, 100*%)	5 (21.7%)
D	10	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (10%)

* Moribund (drunk?)

Figure 1. Visual of the “straw technique” described by Drees (2002) used to assess worker ant mortality to various dilutions of metaflumizone.