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CLIENT REPORT

FASTAC, KARATE ZEON AND SUMI-ALPHA FOR THE CONTROL OF GREASY CUTWORM CATERPILLARS IN SEEDLING MAIZE AND SWEETCORN

Prepared for:
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SUMMARY

- Six replicated field trials were undertaken to evaluate Fastac (alphacypermethrin, 10% EC), Karate Zeon (lambdacyhalothrin, 25% capsule suspension) and Sumi-Alpha (esfenvalerate, 5% EC), applied as broadcast sprays in combination with pre-emergence herbicides, for the control of greasy cutworm (*Agrotis ipsilon aneituma*) caterpillars in seedling maize and sweetcorn (*Zea mays*).

- The trial contained the following treatments:-

untreated	
Fastac	150 ml/ha
Fastac	200 ml/ha
Karate Zeon	40 ml/ha
Sumi-Alpha	250 ml/ha

  Each insecticide treatment was applied in combination with the herbicides Roustabout (3 litres/ha) and Gesaprim 500 FW (3 litres/ha).

- In four trials cutworm caused sufficient damage to assess insecticide activity. In Trials 2, 4 and 6 all insecticide treatments were equally effective at reducing the number of cut plants compared to the untreated controls ($P<0.001$). Cutworm appeared to be present only as caterpillars at the time of insecticide application in these trials.

- In Trial 5, numbers of plants cut were reduced by both rates of Fastac ($P<0.001$), Karate Zeon ($P<0.001$) and Sumi-Alpha ($P<0.01$) compared to numbers cut in the untreated plots. Both rates of Fastac and Karate Zeon displayed similar efficacies and all were more effective than Sumi-Alpha (all $P<0.01$).

- The period of residual activity for Sumi-Alpha appeared to be shorter than that of the other two insecticides. In situations where cutworm are present as eggs at the time of insecticide application, Sumi-Alpha may not give adequate cutworm control.

- In some trials damage from black beetle (*Heteronychus arator*) adults or Argentine stem weevil (*Listronotus bonariensis*) larvae also occurred. The insecticides appeared to have little effect on either of these two pests.

- Rainfall appeared to have little effect on insecticide efficacy.

- The insecticide/herbicide combinations had no visible effect on seedling development or the performance of the herbicides with excellent weed control in all treatments.

OBJECTIVE

To evaluate Fastac (alphacypermethrin, 10% EC), Karate Zeon (lambdacyhalothrin, 25% capsule suspension) and Sumi-Alpha (esfenvalerate, 5% EC), applied as broadcast sprays in combination with pre-emergence herbicides, for the control of greasy cutworm (*Agrotis ipsilon aneituma*) caterpillars in seedling maize and sweetcorn (*Zea mays*).

METHOD

During October and November 2001, a series of six trials were laid down at sites chosen for their potential for cutworm damage (based on previous history, weed cover and short fallow periods). All trials were planted with a Nodet precision planter set to plant at 66,000 (sweetcorn, Trials 3,4 and 5) or 103,000 seeds/ha (maize, Trials 1, 2 and 6) and 3 - 4 cm depth. At all sites planting occurred after short fallow periods of 1-2 weeks. The insecticide treatments (Table 2) were applied as broadcast sprays in combination with the herbicides Roustabout (3 litres/ha) and Gesaprim 500 FW (3 litres/ha). All control plots received only the combination of herbicides. Application was via a CO_2 powered precision sprayer with a 3 m wide hand-held boom fitted with Tee Jet 80015 nozzles and operated at 200 kPa. Application volume was 150 litres/ha.

All treatments were replicated four times in a randomised block design. Further trial details are listed in Table 1.

Immediately following planting in Trial 6, eight cutworm caterpillars (3^{rd} - 5^{th} instars reared from eggs laid by field collected moths) were released along the centre of each plot to augment any natural cutworm population present.

In all trials, numbers of emergent seedlings were counted 2 weeks post-planting. Numbers of seedlings newly cut by cutworm caterpillars were assessed 2 to 4 times each week from seedling emergence till damage ceased (4 – 6 weeks post-planting). Seedlings killed by black beetle (*Heteronychus arator*) adults or Argentine stem weevil (*Listronotus bonariensis*) larvae were also recorded. In all trials, assessments were undertaken in the centre 2 rows only to avoid edge effects.

The data were analysed using ANOVA.

Rainfall was recorded daily by an automated weather station situated about 100 m from Trial 1 and within 12 km of all trials (see Appendix for rainfall data).

RESULTS AND DISCUSSION

In all trials, except Trial 3, similar numbers of seedlings emerged in all treatments (Table 2). In Trial 3 no sweetcorn seedlings emerged at all. Inspection of some seeds revealed the seeds had rotted prior to germination, probably a result of cool, wet soil conditions (around 32 mm of rain fell within 3 days of planting). This trial was abandoned. In the two other sweetcorn trials (Trials 4 and 5), numbers of emergent seedlings were lower than expected. This resulted from seeds not germinating and seedlings rotting before emergence.

In all trials the insecticides, when applied in combination with the herbicides, had no visible effect on seedling development or the performance of the herbicides. Weed control in all treatments was excellent and no post-emergence herbicides were required.

Cutworm caterpillars proceed through 6-9 instars (usually 7) depending on temperature and humidity conditions. The first three instars are spent on the soil surface, feeding on plant leaves. Usually at the fourth instar stage cutworm caterpillars begin to burrow into the soil, emerging at night to sever plants near ground level.

In Trial 1 very little cutworm damage occurred with only 5 cut plants recorded. A small number of seedlings were killed by black beetle adults or stem weevil larvae (Table 3). The insecticide sprays appeared to have little effect on either of the latter two pests.

Cutworm damage occurred in Trials 2, 4 and 6 with around 2%, 12% and 8% of the untreated plants cut respectively. No leaf damage was evident. Cutworm caterpillars found in the untreated plots were all over 30 mm long (probably 4^{th} or later instars) and buried in the soil. This indicated the cutworm were present only as caterpillars and not eggs at the time of insecticide application. In all three trials all insecticide treatments were equally effective at reducing cutworm damage compared to the untreated controls ($P<0.001$) (Table 4). Very little, if any, black beetle or stem weevil damage occurred in these trials.

Initially, cutworm damage in the untreated plots in Trial 5 included both leaf damage and cut plants. Small caterpillars, some less than 5 mm long, were observed on the soil surface or feeding on maize leaves. It is likely that many of these small caterpillars were still at the egg stage when treatment application occurred. Although not assessed, leaf damage appeared to decline as cutting damage increased. Total numbers of plants cut in Trial 5 were reduced by both rates of Fastac ($P<0.001$), Karate Zeon ($P<0.001$) and Sumi-Alpha ($P<0.01$) compared to numbers cut in the untreated plots (Table 5). Both rates of Fastac and Karate Zeon displayed similar efficacies and all were more effective than Sumi-Alpha (all $P<0.01$). In Sumi-Alpha treated plots no cut plants were recorded at the first 2 assessments (8 and 10 days post-treatment), but leaf damage was clearly evident. Cutting damage was evident from 12 days post-treatment onwards. It would appear that caterpillars present at treatment application were controlled by Sumi-Alpha, but later hatching caterpillars were not. This indicates that the period of residual activity for Sumi-Alpha is shorter than that of the other two insecticides.

Some black beetle damage also occurred in Trial 5 (Table 5). As in Trial 1 all the insecticides appeared to have little effect.

Rainfall appeared to have little effect on insecticide efficacy. In the four trials where cutworm caused sufficient damage to assess insecticide activity rainfall ranged from 0.3 to 50.3 mm over the four days following treatment application.

CONCLUSIONS

Fastac, Karate Zeon and Sumi-Alpha, when applied as broadcast sprays in combination with pre-emergence herbicides, will reduce greasy cutworm caterpillar damage in seedling maize and sweetcorn. Excellent reductions in damage from all three insecticides would occur in situations where the cutworm are present as caterpillars at treatment application. In situations where cutworm are present as eggs at treatment application it is likely that only Fastac and Karate Zeon would provide adequate control. Since it is not practical for growers to assess if cutworm eggs are present, Fastac or Karate Zeon should be used in preference to Sumi-Alpha.

APPENDIX (RAINFALL)

Date	Rainfall (mm)
18/10/01	0.3
19/10/01	0.6
20/10/01	4.4
21/10/01	5.6
22/10/01	0.7
23/10/01	0
24/10/01	0
25/10/01	0
26/10/01	2.5
27/10/01	2.1
28/10/01	27.7
29/10/01	1.0
30/10/01	0.1
31/10/01	0.6
01/11/01	28.5
02/11/01	3.0
03/11/01	6.8
04/11/01	12.0
05/11/01	0
06/11/01	0.3
07/11/01	7.8
08/11/01	3.5
09/11/01	0
10/11/01	9.1
11/11/01	0.2
12/11/01	0
13/11/01	14.6
14/11/01	7.7
15/11/01	0
16/11/01	0
17/11/01	0.3
18/11/01	0
19/11/01	0
20/11/01	0
21/11/01	3.7
22/11/01	27.0
23/11/01	7.3
24/11/01	3.8
25/11/01	0.2
26/11/01	0

TABLE 1: Location, planting date, spraying date, cultivar, soil type and plot size of 6 trials evaluating insecticide sprays for cutworm control in maize or sweetcorn.

Trial no.	Location	Planting date	Spraying date	Cultivar	Soil type	Plot size (m)
1	Rukuhia	18 October	18 October	Maize, Pioneer 36H36	Horotiu sandy loam	21 x 3
2	Hamilton	25 October	31 October	Maize, Pioneer 36H36	Hamilton clay loam	36 x 3
3	Hamilton	25 October	31 October	Sweetcorn, Tendersweet (Gaucho treated)	Hamilton clay loam	12 x 3
4	Rukuhia	6 November	9 November	Sweetcorn, Tendersweet (Gaucho treated)	Horotiu sandy loam	30 x 3
5	Rukuhia	14 November	16 November	Sweetcorn, Honey and Pearl (Promet treated)	Horotiu sandy loam	15 x 3
6	Hamilton	15 November	16 November	Maize, Pioneer 34K77 (Gaucho treated)	Mineralised peat	15 x 3

TABLE 2: The effect of Fastac, Karate Zeon and Sumi-Alpha, applied as broadcast sprays in combination with pre-emergence herbicides, on the emergence of maize or sweetcorn.

Treatment	Application rate (ml/ha)	Mean number of emergent seedlings at 2 weeks post-planting					
	Trial:	1	2	3	4	5	6
untreated	-	287.3	521.5	0	146.3	75.3	210.3
Fastac	150	286.3	536.8	0	152.8	81.0	215.5
Fastac	200	296.0	516.5	0	147.5	76.3	212.5
Karate Zeon	40	291.5	527.0	0	153.5	82.0	219.8
Sumi-Alpha	250	298.8	514.3	0	157.0	82.5	217.3
LSD P<(0.05)		27.2	28.5		19.2	11.9	22.3

TABLE 3: Trial 1. The effect of Fastac, Karate Zeon and Sumi-Alpha, applied as broadcast sprays in combination with pre-emergence herbicides, on the number of maize or sweetcorn seedlings cut by cutworm caterpillars or killed by black beetle adults or Argentine stem weevil larvae.

Treatment	Application rate (ml/ha)	Mean number of seedlings cut by cutworm caterpillars	Mean number of seedlings killed by black beetle adults	Mean number of seedlings killed by ASW larvae
untreated	-	0.8	5.5	2.8
Fastac	150	0.3	4.8	2.5
Fastac	200	0.0	5.5	1.8
Karate Zeon	40	0.0	5.0	2.0
Sumi-Alpha	250	0.3	6.5	2.0
LSD P<(0.05)			2.2	1.9

TABLE 4: The effect of Fastac, Karate Zeon and Sumi-Alpha, applied as broadcast sprays in combination with pre-emergence herbicides, on the number of maize or sweetcorn seedlings cut by cutworm caterpillars.

Treatment	Application rate (ml/ha)	Mean number of seedlings cut		
	Trial:	2	4	6
untreated	-	11.0	17.0	17.1
Fastac	150	0.5	0.0	0.8
Fastac	200	0.3	0.3	0.5
Karate Zeon	40	0.5	0.0	0.3
Sumi-Alpha	250	1.5	0.3	1.3
LSD P<(0.05)		3.0	1.9	2.1

TABLE 5: Trial 5. The effect of Fastac, Karate Zeon and Sumi-Alpha, applied as broadcast sprays in combination with pre-emergence herbicides, on the number of maize or sweetcorn seedlings cut by cutworm caterpillars or killed by black beetle adults.

Treatment	Application rate (ml/ha)	Mean number of seedlings cut by cutworm caterpillars	Mean number of seedlings killed by black beetle adults
untreated	-	18.4	5.5
Fastac	150	4.0	5.0
Fastac	200	2.3	5.5
Karate Zeon	40	2.3	5.0
Sumi-Alpha	250	9.8	6.3
LSD P<(0.05)		3.9	1.8