PORINA CONTROL: SPRING PASTURE DAMAGE

F. C. ALLEN

Research Division, Department of Agriculture, Lincoln

Summary

Spray formulations of the organophosphorus products CIBA 9491, DOWCO 179 and Shell SD8447 were equivalent in effectiveness of control of porina (*Wiseana* spp.) larvae to fenitrothion in terms of caterpillar counts and pasture yield response. Granule formulations of Shell 8447 at 1.0 and 1.5 lb and of Bayer 5860 at 1.5 lb were similar in effect to 1.0 lb fenitrothion as spray in terms of caterpillar counts, but only Shell 8447 at 1.5 lb was equivalent in pasture response. The figures "1.0 lb dry matter/acre/day per caterpillar/sq. ft" or "0.17 ewe equivalents/acre per caterpillar/sq. ft" are suggested as guides in estimating potential loss of production over the spring and early summer months when small porina caterpillars are found in the early spring.

INTRODUCTION

PORINA (*Wiseana* spp.) caterpillars which pupate in January have caused damage to spring pastures in the Geraldine County (South Canterbury) in the past three seasons. Spring damage also occurs in South Otago, Southland, North Canterbury and has been reported by Lowe (1966) in mid-Canterbury. The first symptoms are thinning out of the base of the pasture and failure to produce the expected bulk of feed. However, because of continued growth, the damage is seldom equivalent in appearance to that produced by a similar number of autumn and winter feeding *W. cervinata* larvae.

Three sets of plots were laid down near Temuka in a pasture containing a mixed population of *W. cervinata* and of "late flight" caterpillars to measure the effect on pasture yield and to evaluate a number of candidate chemicals.

EXPERIMENTAL

Two trials compared water dilutable formulations and one trial granule formulations. An emulsifiable formulation of fenitrothion at 1.0 lb (all rates in active ingredient per acre) was common to the three adjacent trial blocks.

Plots of 1/160 acre (4 replicates) were treated on September 19, 1967. The day was mild with a light breeze and was followed by a fine night with moderate dew.

Caterpillars were sampled by digging before treatment and counted on the surface the morning after treatment.

The plots were sampled by mowing on October 25 and December 18 and sampled by digging on October 26 to estimate the residual caterpillar population.

The soil was dry at the time of treatment and continued so (despite 71 points of rain on October 2) until mid-November when 521 points fell during a three-day period.

RESULTS AND DISCUSSION

Length and weight measurements (Table 1) indicated the presence of two or more age groups of caterpillars. Pupae were present on September 19 (0.6 per sq. ft) and October 26 (< 0.1 per sq. ft) while the mean

TABLE 1: CATERPILLAR DATA AT TIME OF TREATMENT

	Caterpillar Length			Mean No./ sq. ft All sizes
	Less than 1¼ in.	1¼–1½ in.	Over 1½ in.	
No. per sq. ft pre-treatment	4.6	2.2	2.6	9.4
No. per sq. ft post-treatment*	0.4	0.7	0.55	1.65
Mean weight per cater- pillar (g)*	0.29	0.50	0.67	

* Collected from surface of 1.0 lb fenitrothion plot the morning after treatment.

TABLE 2: POST-TREATMENT COUNTS, CATERPILLARS PER SQ. FT

Treatment (lb)	Trial 1 Spray	Trial 2 Spray	Trial 3 Granules
fenitrothion 0.5	1.9 bB	0.73 bB	
fenitrothion 1.0	0.4 bcdB	1.18 bB	0.8 dCD*
fenitrothion 1.0			2.2 bcdABCD
fenitrothion 1.5			2.8 abcABCD
trichlorphon 0.5	1.8 bcB		
trichlorphon 1.0	1.0 bcdB		
SD 8447 0.5	0.9 bcdB		
SD 8447 1.0	0.3 cdB		1.2 cdBCD
SD 8447 1.5			0.4 dD
Dowco 179 0.5	1.0 bcdB		
Dowco 179 1.0	0.2 dB		3.2 abABC
Dowco 179 1.5			3.1 abcABC
Dupont 1179 0.5		5.14 aA	
Dupont 1179 1.0		5.88 aA	
Dupont 1642 0.5		5.00 aA	
Dupont 1642 1.0		5.58 aA	
CIBA 9491 0.5		1.03 bB	
CIBA 9491 1.0		0.44 bB	
B5860 1.0			4.2 aA
B5860 1.5			1.9 bcdABCD
Untreated	4.7 aA	3.97 aA	3.7 abAB
CV	71%	38.5%	51.7%

* Sprayed standard.

number of caterpillars in control plots on October 26 (4.1 per sq. ft) was similar to that of the caterpillars less than 1¼ in. on September 19 (4.6 per sq. ft). It is thus probable that the drop in numbers of larvae between the two counting times was due to transformation of most of the large caterpillars to moths, indicating the presence of two almost equal populations at the time of treatment.

Counts of caterpillars on the surface the morning following treatment revealed a big variation in knockdown. Large numbers were present on fenitrothion and trichlorphon plots, consistent but much smaller numbers on SD 8447, Dowco 179 and the 1.5 lb B5860 plots and none on CIBA 9491 plots. Dupont 1179, 1642 and 1.0 lb B5860 had a few caterpillars on some of the plots. However, the mean value for the best treatment (fenitrothion 1.0 lb) represented no more than 16% of the estimated total population of a plot, and, taken in conjunction with the final C9491 results, confirms the low value of this type of assessment. Scoring on a 0 to 4 scale for relative abundance has now been adopted and gives the required information on knockdown.

The spray formulations of C9491, Dowco 179, SD 8447 and trichlorphon gave similar caterpillar kill to 1.0 lb fenitrothion (Table 2). Dry matter yields (Table 3) indicated that control with Dowco 179 was superior to fenitrothion and the 0.5 lb trichlorphon inferior.

Of the granule treatments, only SD 8447 gave significant reduction in numbers. The more precise dry matter figures show that all treatments other than 1.0 lb B5860 yielded significantly better than control, while 1.0 lb and 1.5 lb fenitrothion and 1.5 lb SD8447 were not significantly less than 1.0 lb fenitrothion as spray.

The dry matter (D.M.) figures, though not as complete as could be wished, are interesting as a guide to the economic significance of porina caterpillars at this time of year. Taking the mean D.M. of the effective 1.0 lb treatments as the potential production of the field for the period of the trial, and comparing this figure with the mean value for the controls, there has been a loss of 48% over the first interval and 33% over the second. With better growing conditions, the relative loss would have been less. Caterpillar intake in relation to stock requirement for the period thus seems a better measure of loss. Requirements in terms of daily D.M. are derived in Table 4 from Coop's (1965) ewe equivalent (EE) figure of 1,310 lb D.M. per annum and his "percentage of annual feed requirement by months" of 41.8% for the trial period. This, of course, assumes 100% utilization by stock and a caterpillar population which does not affect the productive potential of the pasture species. Destruction of growing points becomes increasingly important as the population increases or the rate of pasture growth declines.

The figures cannot be converted directly to monetary values owing to the flexibility of farming operations. Though it is the period of maximum demand by sheep and to a lesser extent by cattle, it is also a period of maximum growth when pasture production is normally in excess of requirement. Loss, except in extreme cases, will show as less hay saved, perhaps a white clover or grass seed crop sacrificed, as a need to sow additional autumn or winter feed crops or as a deterioration of pasture. Action must be determined on a whole-farm basis in relation to the density and extent of the caterpillar population and expected available feed. The figures "0.17 EE per acre per caterpillar per sq. ft" is a guide in these deliberations pending more detailed studies of larval food requirements and pasture dynamics (see Jensen, 1967).

TABLE 3: DRY MATTER YIELDS, TOTAL TWO CUTS, LB PER ACRE

<i>Treatment (lb)</i>	<i>Trial 1 Spray</i>	<i>Trial 2 Spray</i>	<i>Trial 3 Granules</i>
fenitrothion 0.5	1300 bABC	1250 abABC	
fenitrothion 1.0	1350 bAB	1480 aA	1380 aA*
fenitrothion 1.0			1220 abABC
fenitrothion 1.5			1240 abABC
trichlorphon 0.5	960 cCD		
trichlorphon 1.0	1180 bcBCD		
SD 8447 0.5	1220 bcBC		
SD 8447 1.0	1330 bAB		1110 bcABCD
SD 8447 1.5			1210 abABC
Dowco 179 0.5	1340 bAB		
Dowco 179 1.0	1660 aA		1080 bcABCD
Dowco 179 1.5			1060 bcABCD
Dupont 1179 0.5		900 cCD	
Dupont 1179 1.0		940 cCD	
Dupont 1642 0.5		950 cCD	
Dupont 1642 1.0		1020 bcBCD	
CIBA 9491 0.5		1340 aAB	
CIBA 9491 1.0		1330 aAB	
B5860 1.0			930 cdCD
B5860 1.5			1060 bcBCD
Untreated	790 dD	820 cD	810 dD
CV	12.5%	15.3%	12.5%

* Sprayed standard.

TABLE 4: DRY MATTER CALCULATIONS WITH EWE EQUIVALENTS PER ACRE (IN PARENTHESES)

	<i>First Cut Period 36 Days</i>	<i>Second Cut Period 53 Days</i>
Mean dry matter lb/acre:		
Treated	691	673
Not treated	357	453
Dry matter intake/day/ewe equivalent (Coop, 1965)	5.9 (1.0)	5.9 (1.0)
Loss D.M. lb/day	9.3 (1.6)	4.1 (0.7)
lb D.M./acre/caterpillar/sq. ft	1.0 (0.17)	1.0 (0.17)

ACKNOWLEDGEMENT

The help of R. Lough in looking for sites, the co-operation of the farmer R. de C. Gaultier, the assistance of C. C. McLeod and the Field Research staff at Timaru and of T. J. Smallridge, A. L. Wood and E. W. Millard is gratefully acknowledged. My thanks to the Biometrics Section, Dept of Agriculture, Wellington, for statistical analyses and to the respective proprietors for supply of new chemicals.

REFERENCES

- Coop, I. E., 1965: *N.Z. Agric. Sci.*, 1 (3): 13-8.
 Jensen, R. C., 1967: *Proc. 20th N.Z. Weed & Pest Control Conf.*: 135-49.
 Lowe, A. D., 1966: *Proc. 19th N.Z. Weed & Pest Control Conf.*: 258-60.