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FUMIGATION OF CONTARINIA SORGHICOLA (COQ.) DIAPAUSING LARVAE

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SUMMARY

The sorghum midge (*Contarinia sorghicola* (Coq.)) may be introduced into uninfested areas with transported sorghum grain, as sound grain may carry diapausing larvae in damaged florets which are attached.

The fumigant phosphine, applied under semi-commercial conditions at 1 g per 80 kg of infested grain, was shown to eliminate infestation. The parasite *Eupelmus australiensis* Gir. was not eliminated by fumigation. Seed germination was not affected by the treatment.

I. INTRODUCTION

Larval diapause constitutes the mechanism for the survival of sorghum midge, *Contarinia sorghicola* (Coq.) from season to season. As larvae remain within the damaged florets for the whole of the diapause stage, seed and feed sorghum grain carrying such damaged florets constitute a mechanism for the distribution of *C. sorghicola* from infested to uninfested sorghum areas.

The production of sorghums over recent years in the Ord River District of Western Australia where the pest has not yet been recorded has focused attention on the need for quarantine against its spread.

Passlow (1958) demonstrated that carbon bisulphide fumigation would kill diapausing larvae in seed grain but this technique is not suitable for quarantine treatment because the fumigant is inflammable.

During 1971, further tests using methyl bromide and phosphine were carried out (Dept. Primary Industries, unpublished reports). Methyl bromide was ineffective, and reduced the germination of sorghum seed. Phosphine, on the other hand, was shown to have potential as a quarantine treatment as no living diapausing larvae were recorded after fumigation at each of three phosphine levels, i.e. one, two and three commercial tablets (one commercial tablet weighing approximately 3 g produces 1 g of phosphine) per 80 kg sample of infested grain. The present study was designed to test further the efficacy of phosphine for the purpose.

II. METHODS

The study was carried out at the Department of Primary Industries Hermitage Research Station in southern Queensland commencing in July 1972.

A 15 x 2 randomized block design was employed with a plot size of 80 kg (one bag) of grain sorghum carrying large numbers of damaged florets containing diapausing larvae. A pre-treatment assessment of the numbers of *C. sorghicola* diapausing larvae and of the parasite *Eupelmus australiensis* Gir. larvae was made from five random samples each of 200 damaged florets from the total trial material prior to the allocation of plots to treatments. Samples were examined and insect material assessed as dead or alive, using the methods of Passlow (1958).

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Treatments were: no fumigation (control), and one tablet (1 g phosphine) placed in the centre of the grain mass of each bag. Fumigation proceeded for 5 days and was followed by 5 days aeration. The trial material was then placed in ventilated storage for 4 months before post-treatment assessments were made.

Post-treatment populations of both *C. sorghicola* and *E. australiensis* were assessed from a random sample of 200 damaged florets from each plot.

Temperature during fumigation was recorded, and pre-treatment grain moisture content and percentage germinations at termination were determined.

III. RESULTS

Mean numbers of living and dead insects recorded per sample are given in table 1.

Temperature during the fumigation period ranged from —3°C to 24°C. Moisture content of the grain at fumigation was 12%. Germinations of untreated and fumigated grain were 95·7% and 97·7% respectively.

TABLE 1

MEAN NUMBERS OF LIVING AND DEAD INSECTS PER SAMPLE OF 200 DAMAGED FLORETS

—	*Contarinia sorghicola*		*Eupelmus australiensis*
	Diapause Larvae		Larvae
	Living	Dead	Living
At pre-treatment (July 1972)	50·8 ± 5·45	7·4 ± 1·83	9·60 ± 2·38
At post-treatment (November 1972)			
Phosphine treated	0	82·0 ± 3·93	3·67 ± 0·61
No fumigation	55·7 ± 3·40	21·4 ± 1·56	5·12 ± 0·82

IV. DISCUSSION

Table 1 clearly demonstrates the efficacy of phosphine as a fumigant against diapausing *C. sorghicola* despite variation in population levels of both *C. sorghicola* and *E. australiensis* between pre- and post-treatment. This may be related to the small number of pre-treatment samples examined. The increase in mortality in unfumigated samples can be attributed to normal population decline during the 4 month period (Passlow 1965).

Populations of the parasite *E. australiensis* are not eliminated by phosphine fumigation treatment.

REFERENCES

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