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METHYL BROMIDE FUMIGATION OF PINEAPPLE SCALE, DIASPIS BROMELIAE (KERNER)

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SUMMARY

Pineapple scale, *Diaspis bromeliae* (Kerner), was eliminated from pineapple planting material by fumigating with methyl bromide at a dosage of 46 g m^{-3} for 2 h at 20°C. This could be used as a disinfestation treatment to prevent the spread of this pest on planting material into scale-free districts.

I. INTRODUCTION

The pineapple scale, *Diaspis bromeliae* (Kerner), is an occasional pest of pineapples in some south-eastern Queensland districts. The insect is spread from one area to another on infested planting material. Since it is very difficult to eradicate when established in the field, an effective disinfestation treatment for planting material would be of value. Present procedures involve dipping planting material in 1:60 oil-water emulsions or 0·05% diazinon plus 1:100 oil-water emulsion. These are not fully effective. The liquids do not penetrate readily into the basal area of the leaves where the scales are found and some survival occurs.

Investigation of methyl bromide fumigation against *D. bromeliae* was suggested by reports of its effectiveness against scale insects on other crops (Munro 1969). The purpose of this present work was to determine the dosage of methyl bromide effective against *D. bromeliae* for a fumigation of 2 h at 20°C. Observations were also made on the phytotoxicity of the fumigant to pineapple planting material.

II. MATERIALS AND METHODS

The materials used were methyl bromide (commercial grade) and pineapple planting material (*Ananas comosus* var. Smooth Cayenne) consisting of crowns, suckers and slips.

Two fumigation trials were carried out in 1977–78. The first of these was an exploratory trial to indicate the likely effective dosage of methyl bromide for 2 h at 20°C. The dosages used were 27, 36, 46 and 55 g m^{-3}. Trial 2 was used as a second check on the two effective dosages (46 and 55 g m^{-3}) of methyl bromide.

TABLE 1

TRIAL 1. NUMBERS OF PINEAPPLE SCALE STAGES PER TREATMENT FOLLOWING METHYL BROMIDE FUMIGATION (ASSESSMENT 14 DAYS POST FUMIGATION)

Methyl Bromide Fumigant Dosage	No. Immature Scales		No. Mature Females Without Eggs		No. Mature Females With Eggs		Total	
	Living	Dead	Living	Dead	Living	Dead	Living	Dead
27 g m^{-3}	527	1 285	102	1 503	176	1 122	805	3 910
36 g m^{-3}	8	1 253	0	1 326	0	812	8	3 391
46 g m^{-3}	0	1 217	0	1 823	0	898	0	3 938
55 g m^{-3}	0	1 076	0	1 229	0	934	0	3 239
Untreated Control	1 124	459	369	245	321	168	1 814	872

TABLE 2

TRIAL 2. NUMBERS OF PINEAPPLE SCALE STAGES PER TREATMENT FOLLOWING METHYL BROMIDE FUMIGATION (ASSESSMENT 14 DAYS POST FUMIGATION)

Methyl Bromide Fumigant Dosage	No. Immature Scales		No. Mature Females Without Eggs		No. Mature Females With Eggs		Total	
	Living	Dead	Living	Dead	Living	Dead	Living	Dead
46 g m^{-3}	0	2 359	0	858	0	484	0	3 701
55 g m^{-3}	0	2 448	0	876	0	568	0	3 892
Untreated Control	1 760	1 448	699	362	390	236	2 849	2 046

Fumigations were done in Brisbane on material brought from Nambour. In trial 1 the planting comprised 15 suckers and 5 crowns per treatment, whilst in trial 2 it comprised 5 suckers, 5 crowns and 10 slips per treatment. Suckers and slips were heavily infested and crowns only lightly infested, but within each of these three classes of planting material the infestations in the material selected was as uniform as possible. All planting material was conditioned for 24 h at 20°C and then allocated at random to each fumigation treatment and to the untreated controls.

Details of the 0·16 m^3 fumigation chamber have been given previously, Swaine *et al* (1975). The volume of cooled liquid methyl bromide required for each dosage was injected through a silicone rubber septum in the lid of the chamber into a 75 ml beaker directly beneath the septum. Air was circulated continuously throughout all fumigations.

The chamber was aired 30 min after fumigation and the planting material was allowed to ventilate in open wooden boxes for a further 2 h. It was then sealed in heavy duty paper bags to prevent cross-infestation during its return to Nambour.

The effectiveness of fumigation was determined from counts of live and dead scales. This was done after holding the planting material for 14 days at 25°C, since previous observations had indicated that 11 days at 23·3°C were required for all eggs to hatch. For these counts 10 basal turgid leaves were removed from each of 10 suckers in trial 1 and from each of 10 slips in trial 2, and then examined under a stereo-microscope. It was assumed that the effectiveness of fumigant against the scale did not alter with different types of planting material used. Both immature and mature scales were classified as live or dead, the criterion of death being discolouration and shrivelling of the scale. Scales killed by parasites and predators were not included in these assessments.

Observations on fumigant damage to planting material were made 8 weeks after fumigation on planting material not used for scale counts.

III. RESULTS AND DISCUSSION

EFFECT OF METHYL BROMIDE ON *D. bromeliae*. Only the higher dosages of methyl bromide (46 and 55 g m^{-3}) resulted in plants free of living scale (tables 1 and 2). Although no adult scales survived methyl bromide at 36 g m^{-3}, eight living immature scales were found on one plant. Both mature and immature scales survived methyl bromide fumigation at 27 g m^{-3}. Also present at this dosage were apparently healthy eggs which had been laid by females which survived for several days after fumigation before dying.

EFFECT OF METHYL BROMIDE ON PINEAPPLE PLANTING MATERIAL. In the first trial fumigation with all dosages of methyl bromide caused severe leaf burn on the suckers but did not affect the crowns. The only difference between the two types of planting material was that the suckers had a high incidence of top rot caused by *Phytophthora cinnamomi* Rands. It is possible that the diseased suckers had a lower tolerance to methyl bromide. In the second trial where the planting material was healthy no phytotoxicity occurred.

REFERENCES

MUNRO, H. A. V. (1969).—'Manual of fumigation for insect control' F.A.O. Agricultural Studies No. 79, 2nd Edition.

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