

CONTROL OF GRAPE LEAF BLISTER MITE (*ERIOPHYES VITIS* (PAG.)) IN THE STANTHORPE DISTRICT, QUEENSLAND

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SUMMARY

Materials used in three control trials included azinphos-methyl plus mineral oil, carbaryl, demeton-S-methyl, parathion, parathion plus mineral oil, and lime sulphur.

Carbaryl 0.1% was the only effective material for summer application, and lime sulphur as low as 5 parts of concentrate in 100 gal of water was the best material for winter application. These results have been incorporated into the spray programme recommendations for the control of grape pests in the area and have proved effective in commercial vineyards.

I. INTRODUCTION

Although the grape leaf blister mite (*Eriophyes vitis* (Pag.)) has been present in Queensland for a long time, it has in the past seldom been of concern (Officers of the Department of Agriculture and Stock 1951). The species is European in origin and is now established in many grape-producing countries of the world. It is believed to have reached Australia between 1910 and 1920 (Jenkins 1954). Infestation in the Stanthorpe district became pronounced during 1960, although then confined to a few vineyards. The pest has since spread to infest the majority of vineyards in the area.

Most Australian workers (e.g. Officers of the Department of Agriculture and Stock 1951; Jenkins 1954; Mathys and Hugi 1961) have indicated that the species is readily controlled by sprays of sulphur or lime sulphur or by sulphur dusts. The use of these materials for disease control on grapes in the Stanthorpe district has no doubt assisted in keeping the mites in check. It became apparent,

however, that the sulphur spray programme recommended in the area for the control of powdery mildew (*Uncinula necator* (Schw.)) (Shea 1961) was not giving satisfactory results against the grape leaf blister mite.

Investigations were therefore undertaken to compare the efficacy of various alternative materials applied during the dormant, semidormant or summer period. These trials were conducted from 1963 to 1965.

II. MATERIALS AND METHODS

The materials used and the percentages of active constituents in prepared sprays were as follows:—

Azinphos-methyl.—A wettable powder containing 25% w/w active constituent; used at 0.05%.

Carbaryl.—(a) A wettable powder containing 80% w/w active constituent: 0.1% (trials 2 and 3).

(b) A wettable powder containing 50% w/w active constituent: 0.1% (trial 1).

Demeton-S-methyl.—An emulsifiable concentrate containing 25% w/v active constituent: 0.025%.

Lime sulphur.—A solution containing 20% sulphur (S) as polysulphide sulphur: 5 in 100 and 10 in 100.

Mineral oil.—An emulsifiable concentrate containing 95.3% by volume, 95.0% by weight refined mineral oil, unsulphonatable residue not less than 85%; 82.0% w/v active constituent: 0.82%.

Parathion.—An emulsifiable concentrate containing 50% w/v active constituent: 0.02%.

Parathion and oil.—An emulsifiable concentrate containing 10% w/v parathion and 90% w/v mineral oil; parathion 0.05% and oil 0.45%.

Sulphur.—A wettable powder containing 89% w/w sulphur; 3 lb per 100 gal.

All trials were conducted in commercial vineyards on the variety Muscat Hamburg.

Spray applications were made at a pressure of 200–250 lb/sq in, using a small power spray with a hand-operated lance. Complete vine coverage was aimed at. Prior to the experimental applications all vines received uniform treatment with sprays by the orchardists. No sulphur or lime sulphur had been applied, however, in the semidormant stage prior to the experiments.

Trial 1 (1963-64) consisted of a 4 x 6 randomized block with six vines per plot. Treatments (see Table 1) were applied on October 28 and repeated on November 12, December 3, December 18, January 3 and January 17. On each of the same dates the orchardist applied a combination spray of copper oxychloride and sulphur to all vines in the experimental area.

Trial 2 (1965) consisted of a 6 x 4 randomized block with eight vines per plot. Treatments (see Table 2) were applied respectively on March 26, April 2, 9, 15 and 23.

Trial 3 (1965) consisted of a 6 x 4 randomized block with eight vines per plot. The dormant treatments (see Table 3) were applied on August 15. Semidormant treatments were applied on September 9.

Assessments of blister mite infestations were of two kinds. For summer assessments, the terminal 10 leaves on random canes were examined in the field for the presence or absence of leaf blisters. The small axillary leaves were ignored. Ten canes were examined per plot in trial 1 and 80 canes per plot in trials 2 and 3. For the winter assessment, 16 random canes per plot were excised and examined under a stereoscopic microscope in the laboratory. The numbers of live mites in the buds and under cracks in the bark of the first and second internodes of each cane were recorded.

III. RESULTS

Results for the three trials are given in Tables 1-3.

TABLE 1

TRIAL 1: SUMMER CONTROL TRIAL, 1963-64
Percentage infested leaves

Treatment	Transformed Mean†	Equivalent Mean
Carbaryl 0.1% (plus sulphur*)	12.15	4.4
Parathion 0.02% (plus sulphur*)	40.42	42.0
Demeton-S-methyl 0.025% (plus sulphur*)	52.88	63.6
No additional treatment (sulphur only*)	61.86	77.8
Necessary differences for significance .. {	5%	..
	1%	..

* As applied by orchardist.

† Inverse sine transformation.

TABLE 2

TRIAL 2: SUMMER CONTROL TRIAL, 1965
Percentage infested leaves and number of mites in basal buds

Treatment	Date of Application	Percentage of Infested Leaves, Mar. 17-18; Pretreatment Count	Mites per Two Basal Buds and Associated Bark, May 25		Percentage of Infested Leaves, Dec. 2
		Mean	Transformed Mean*	Equivalent Mean	Mean
Carbaryl 0.1%	March 26	73.3	0.945	8	31.0
Carbaryl 0.1%	April 2	78.3	1.274	18	33.7
Carbaryl 0.1%	April 9	73.1	1.800	62	37.0
Carbaryl 0.1%	April 15	75.8	1.622	41	38.3
Carbaryl 0.1%	April 23	78.1	2.109	127	28.4
No treatment ..		74.8	3.378	2,389	66.7
Necessary differences for significance	for $\left\{ \begin{array}{l} 5\% \\ 1\% \end{array} \right.$	9.3	1.321	..	8.0
		12.3	1.827	..	11.0

* $\log(1 + x)$ transformation.

TABLE 3

TRIAL 3: WINTER CONTROL TRIAL, 1965
Percentage of infested leaves

Treatment	Time of Application	Mean
Lime sulphur 5 in 100	Vines dormant Aug. 5 ..	35.5
Lime sulphur 10 in 100	Vines dormant Aug. 5 ..	30.0
Azinphos-methyl 0.05% + oil 1 in 100	Vines dormant Aug. 5 ..	65.4
Parathion 0.05% and oil 0.04% ..	Vines dormant Aug. 5 ..	55.9
Lime sulphur 5 in 100	Vines semidormant Sept. 9	35.9
No treatment		68.2
Necessary differences for significance	$\left\{ \begin{array}{l} 5\% \\ 1\% \end{array} \right.$	9.1
		12.6

IV. DISCUSSION

Summer control: Carbaryl 0.1% was the only effective treatment for summer control. In trial 1, despite six applications of wettable sulphur sprays in plots receiving no other treatments almost 80% of leaves were infested. This result was surprising in view of information in the literature but is in agreement with experience in commercial orchards in the Stanthorpe district. Parathion and demeton-S-methyl each with six applications also performed poorly.

Trial 2, concerned with time of application, was commenced so that the early applications were made while mites were on the leaves, the later applications being made after the mites had migrated from the leaves back towards the buds. All applications gave comparable reduction in over-wintering mite numbers and the reduction was still significant during the following summer. This suggested that carbaryl has sufficient systemic or other action to kill blister mites inside the buds. Morgan, Yee, and Brinton (1962) have demonstrated that carbaryl is systemic against a related species, the pear blister mite (*Eriophyes pyri* (Pag.)).

Winter control.—It is evident from the results of trial 2 that summer control reduces overwintering populations to some extent but winter control measures are still required.

Lime sulphur was the most effective treatment and there were no significant differences between the dormant and semidormant application times or between the two application rates. Azinphos-methyl plus oil and parathion and oil were ineffective.

Schedule control recommendations.—The current results enable an improvement to be made in the grape pest control programme in the Stanthorpe district proposed by Bengston in 1961 in a Deciduous Fruits Handbook supplied to orchardists.

Lime sulphur 5 in 100 at the semidormant or early bud movement stage was already recommended for the control of the grape leaf rust mite (*Calepitrimerus vitis* (Nal.)). This recommendation to include blister mite is reinforced. Carbaryl 0.1% has since been recommended by the Department as an alternative to lead arsenate or azinphos-methyl for the control of light-brown apple moth (*Epiphyas postvittana* (Walk.)). This should now be used in preference to these other materials whenever grape leaf blister mite is a problem. Additional spray applications of miticides for this pest are thus not required.

On the basis of these investigations, information on the new control recommendations was released in the area in 1964 and results have been satisfactory in commercial practice.

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REFERENCES

- BENGSTON, M. (1961).—Grape pest control in the Granite Belt. *Qd Agric. J.* 87:255-6.
JENKINS, C. F. H. (1954).—Vine leaf blister mite. *J. Agric. West. Aust.* 3:55-6.

- MATHYS, G., and HUGI, H. (1961).—Damage to vines by *Eriophyes vitis* (Pgst.) *Revue Romande Agric. Vitic. Arboric* 17:29-30.
- MORGAN, C. V. G., YEE, P. T., and BRINTON, F. E. (1962).—Sevin as a systemic miticide for the pear leaf blister mite, *Eriophyes pyri* (Pgst.). *Can. Ent.* 94:680-6.
- OFFICERS OF THE DEPARTMENT OF AGRICULTURE AND STOCK (1951).—"The Queensland Agricultural and Pastoral Handbook, Vol. III, Insect Pests and Diseases". (Government Printer : Brisbane).
- SHEA, K. N. (1961).—Grape vine diseases. *Qd Agric. J.* 87:248-53.

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