REDUCED PRUNING OF FEMALE KIWIFRUIT VINES FOLLOWING DAMINOZIDE APPLICATION AT PETAL FALL

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SUMMARY

Summer and winter pruning of kiwifruit (*Actinidia deliciosa* (A. Chev.) cv. Hayward) is a labour intensive activity. By controlling vegetative growth, daminozide can significantly reduce pruning requirements. On T-bar grown vines one foliar spray of between 1275 ppm and 2000 ppm to run-off at petal fall gave an average annual saving over seven different trials of 62-68 h/ha. In one trial with vines growing on a pergola system, daminozide at 1275 ppm and 1700 ppm reduced pruning by 54 h/ha and 101 h/ha respectively.

INTRODUCTION

Most kiwifruit growers use an annual cane replacement system in which winter pruning consists of removing two year old fruiting wood and unwanted tangles and tying down one year old canes. By pruning laterals and removing tangles several times throughout the summer, growers aim to maintain an open growth habit in their vines, essential for bee access during flowering and to enable adequate spray, light and air penetration (Sale 1983). Some growers also select and train potential fruiting canes in the summer.

The growth reduction effects of daminozide (Alar-85) on kiwifruit vines were first described by Davison (1971). Our preliminary trials in 1976 and 1979 indicated that a 2000 ppm foliar spray of daminozide applied to run-off once per growing season at petal fall (mid December), would significantly suppress the vegetative growth of kiwifruit until harvest in May. Larger field trials were started in 1980 to determine if this growth reduction would result in reduced pruning and easier vine management. In all cases mature vines which had filled their allotted canopy space were selected for trial purposes.

Initial work was carried out on two varieties, Bruno and Hayward, but as Hayward became the only acceptable export variety, all trials from 1980 onwards were conducted on this variety alone.

METHOD

Replicated plot trials

In 1980 a pruning management trial (Table 1, No. 1) was laid down on T-bar trained vines on a Katikati property. Treated plots consisted of four adjacent female vines, randomised with four untreated female vines and replicated three times. Daminozide was applied at petal fall. Full coverage hand-gun applications, at a pressure of 1400 kPa and sprayed to the point of run-off, used seven litres of spray per vine, or approximately 2400 litres/ha.

Normal cultural practices were carried out by the grower throughout the season. While no measurement was kept of the amount of summer pruning carried out prior to treatment (i.e. in the period from budburst to full bloom), the time was recorded for summer pruning subsequent to the daminozide application and for the winter prune during vine dormancy.

In December 1981 daminozide was re-applied to Trial 1 and Trials 2 and 3 were commenced. Application techniques and trial methods were similar to those previously described. Treatments were again re-applied to all existing trials in December 1982 and another replicated trial (Trial 4) was started.

TABLE 1: Location of trials and rates of daminozide applied.

Trial No.	Location	Training system	Application method	Application date	Daminozide rate (ppm)
1	Katikati	T-bar	Handgun	15/12/80	2000
			Handgun	15/12/81	2000
			Handgun	20/12/82	2000
2	Kumeu	T-bar	Handgun	14/12/81	2000
			Handgun	17/12/82	1275, 2000
3	Te Puke	T-bar	Handgun	15/12/81	2000
			Handgun	20/12/82	2000
4	Motueka	T-bar	Handgun	14/1/83	1275, 1700
5	Motueka	T-bar	Airblast	22/12/82	1700
6	Tauranga	T-bar	Airblast	14/12/82	1275, 1700
7	Katikati	T-bar	Airblast	31/12/82	1275, 1700
8	Te Puke	Pergola	Airblast	12/12/82	1275, 1700

Non-replicated block trials

In 1982-83 daminozide was evaluated for the first time in several non-replicated trials (Trials 5-8) where treatments were applied to blocks ranging in size from 0.1-0.3 hectares. The chemical was applied by growers using normal orchard airblast, high volume spray equipment. Typical of these was the Motueka site, where two rows, each containing 15 six year old female vines, were sprayed on the 22 December 1982. The Cropliner 2000 airblast sprayer, operated at a pressure of 2000 kPa, applied approximately 2200 litres of spray wash/ha. Another group of vines on the same property, of equivalent size and age and similarly located with regard to shelter belts, was used as an unsprayed comparison. Standard vine management and pruning/training was carried out by the grower in each block and records were kept of the times taken for post-treatment summer and winter pruning.

In instances where trials ran for more than one season on the same vines, pruning data was averaged for each grower over the number of seasons of testing, and then averaged over the number of different trial sites where a particular rate was tested. Each rate was compared only with untreated pruning times from those properties where that rate was applied. Data was subjected to an analysis of variance and means tested for significance using least significant difference (LSD).

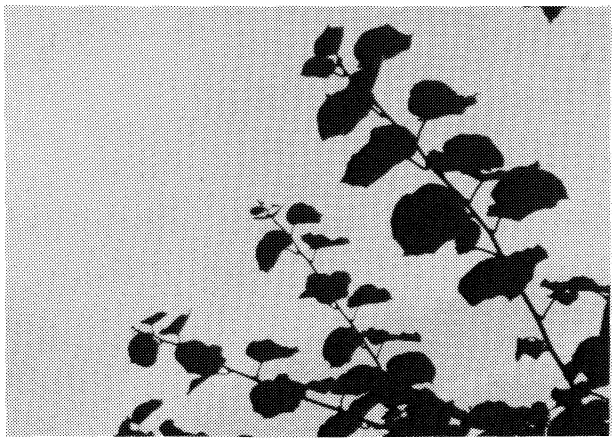

Fig. 1: Treated with daminozide, 2000 ppm, mid December. Photographed February.

RESULTS AND DISCUSSION

After application of daminozide at 2000 ppm, kiwifruit vines produced strong self-terminating renewal canes with a concentration of large buds at their distal ends (Fig. 1). Davison (1971) recorded that growth virtually ceased within 3 weeks of treatment. Untreated renewal canes continued to grow long and spindly (Fig. 2). In practice these require tipping to prevent a dense tangle developing in the canopy. After tipping shoot regrowth may occur from the terminal bud, which necessitates additional summer pruning.

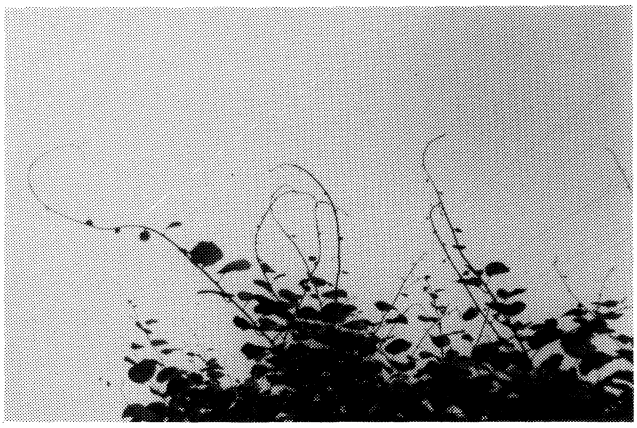

Fig. 2: Typical untreated canes.

Table 2 shows the time taken for post-flowering summer pruning and winter pruning of untreated and daminozide treated T-bar trained female kiwifruit vines. In this paper one hectare of vines refers to the canopy area, about 300 female vines on most properties.

There was a wide variation in the amount of time spent summer pruning by individual growers. While this was due in part to differences in vine vigour at the

TABLE 2: The effect of daminozide on the post-flowering summer and winter pruning times of T-bar trained female kiwifruit vines (h/ha).

daminozide (ppm)	1275	1700	2000
Mean summer[1] pruning time untreated	72	77	77
Individual grower range	48-98	48-98	30-105
Mean summer pruning time treated	57	52	46
Individual grower range	37-80	35-66	22-62
Mean reduction in summer pruning	15*	25*	31**
Mean winter pruning untreated	185	148	207
Individual grower range	87-287	87-266	162-234
Mean winter pruning time treated	138	105	170
Individual grower range	73-231	71-141	125-195
Mean reduction in winter pruning	47	43	37**
Mean annual reduction	62*	68*	68**

Significantly different from untreated: *P < 0.05 **P < 0.01

[1]Summer pruning assessed only post-daminozide application and includes any pruning prior to harvest in May.

different sites and under different climatic conditions, the main influence on the amount of summer pruning carried out was the individual orchardist's pruning technique. Standard practice is to carry out one major post-flowering pruning, normally in late January or early February. However some growers made up to three additional less detailed pruning trips through the orchard in late summer. Also some growers tied down the next season's fruiting canes in the summer, a task normally left until winter. A daminozide treatment at petal fall was found to simplify and significantly shorten summer pruning by virtually eliminating tangles and the need for tipping. At rates of 1275 ppm, 1700 ppm and 2000 ppm it reduced post-flowering summer pruning by an average of 15 h/ha, 25 h/ha and 31 h/ha respectively.

The amount of winter pruning carried out by growers again varied considerably, ranging from 87 h/ha to 287 h/ha for untreated vines. Growers who carried out detailed summer pruning spent less time pruning and training vines in the winter. These growers showed less of a benefit from daminozide in the winter because their vines were already very orderly. Grower variability meant that the mean reduction in winter pruning of 47 h/ha and 43 h/ha for daminozide rates of 1275 ppm and 1700 ppm was not significantly different from the controls. This tends to hide the true savings which occurred on some orchards. The actual savings made to the winter pruning by the grower in Trial 9 were 119 h/ha with daminozide at 1275 ppm and 157 h/ha with daminozide at 1700 ppm.

When post flowering summer and winter pruning are considered together, all rates of daminozide tested significantly reduced the pruning requirement. A petal fall application of 1275 ppm, 1700 ppm and 2000 ppm gave a mean annual saving of 62 h/ha, 68 h/ha and 68 h/ha respectively.

Table 3 shows the effect of daminozide on the time taken to prune female kiwifruit vines trained over a pergola system. Sale (1983) reports that pergola trained vines require a greater labour input than T-bar grown vines. This is due to the increased difficulty of handling foliage above the fruiting canopy. The grower in Trial 8 took 456 hours to prune one hectare of untreated female vines, whereas the maximum time recorded to prune an untreated plot in the T-bar trials was 358 h/ha. Daminozide at rates of 1275 ppm and 1700 ppm reduced post-flowering summer pruning on the pergola trial by 32 h/ha and 45 h/ha respectively and winter pruning by 22 h/ha and 56 h/ha respectively, an annual saving of 54 h/ha and 101 h/ha.

TABLE 3: The effect of daminozide on post-flowering summer and winter pruning times of pergola trained female kiwifruit vines (h/ha).

daminozide (ppm)	1275	1700
Summer[1] pruning time untreated	159	159
Summer pruning time treated	127	114
Reduction in summer pruning	32	45
Winter pruning time untreated	297	297
Winter pruning time treated	275	241
Reduction in winter pruning	22	56
Mean annual reduction	54	101

[1]Summer pruning assessed only post-daminozide application and includes any pruning prior to harvest in May.

These trials demonstrate that a foliar spray of daminozide will reduce vegetative growth of kiwifruit. Further trials are presently underway to quantify the effect on pruning of lower rates of daminozide applied prior to flowering and repeated later in the season. Daminozide will not be registered for use on female kiwifruit vines in New Zealand until international fruit residue tolerances are obtained. When cleared it will offer kiwifruit growers a useful management tool.

CONCLUSION

When used to control vegetative growth daminozide significantly reduces both summer and winter pruning of kiwifruit. An application of 1275 ppm at petal fall

resulted in an average annual saving of 62 h/ha in 4 trials using T-bar grown vines and 54 h/ha in one trial using pergola grown vines. Higher rates were found to give greater reductions in pruning time.

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