

KIWIFRUIT STORAGE AND MINERAL OIL

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Oil sprays applied to kiwifruit late in the season have sometimes been found to cause fruit drop (Sale 1972). The affected fruit was described as developing a soft rot at the attachment to the petiole and up to 20% of the fruit fell to the ground. This loss raised the question of whether the quality of the fruit remaining on the vine was also affected. Kiwifruit is required to have a cool-storage life of many months with no loss in quality, and any factors which could contribute to loss in condition need to be examined. In 1991 a trial was carried out in Auckland examining the storage of kiwifruit after a late season application of mineral oil (Shell Sunspray) (Stevens and Steven 1992). No phytotoxic effects of this pre-harvest spray were observed, even when four times (4%) the normal field rate of oil was used. A more highly refined oil, with reduced phytotoxic properties is now available for the kiwifruit market (Sunspray Ultrafine), and so it was decided to repeat and extend this work using this product. Fruit from four different kiwifruit growing areas in New Zealand were used.

The trial was carried out on orchards in Kerikeri, Auckland, Te Puke and Wanganui. All orchards were managed organically and had received the growers' normal spray programme throughout the season. On all sites a trial spray of 1% oil (normal field rate) applied approximately a week before harvest was compared to a control treatment that had no pre-harvest oil application. At the Te Puke, Kerikeri, and Wanganui sites this was replicated three times. At Auckland there were four replicates; half in normally maintained blocks and half in an abandoned block that had no other sprays applied during the season. Single vine plots were used, and vines were sprayed to run-off with handgun sprayers.

Eighty fruit were harvested from each plot and stored at 0°C in wooden single layer trays. After intervals of 0, 4, 12 and 20 weeks, 20 fruit per plot were removed from coolstorage and assessed for fruit firmness, using a penetrometer, and a subsample of 10 fruit were assessed for the level of soluble solids, using a refractometer. At harvest kiwifruit have an initial flesh firmness of 7-8 kgf, which decreases slowly to about 0.5-0.8 kgf when fruit are ready to eat. The minimum level of soluble solids before 'Hayward' kiwifruit is permitted to be harvested for export is 6.2%. After harvest soluble solid levels normally increase to about 14-16%, at which stage fruit are eating ripe. A higher level of soluble solids means a sweeter fruit. The fruit in this trial were harvested well after the level of soluble solids had reached the minimum level acceptable for picking, and after 20 weeks storage still had some way to go before they could be considered eating ripe (Table 1).

Data were subjected to an analysis of variance, and unless otherwise specified, all significant results refer to the 5% probability level.

There was no difference at harvest in flesh firmness between treated and untreated fruit from Kerikeri, but fruit receiving a pre-harvest oil spray were significantly firmer than untreated fruit after storage of 4 to 20 weeks (Table 1). At harvest, and throughout storage, soluble solids concentration was significantly lower for oil-sprayed fruit. This result suggests that the pre-harvest oil application enhanced fruit quality during storage.

At harvest sprayed fruit from Te Puke exhibited significantly lower flesh firmness and higher soluble solids than unsprayed fruit. However for all samples taken during storage, sprayed fruit were firmer, and there were no significant differences in soluble solids.

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TABLE 1: Mean level of flesh firmness (kgf) and soluble solids (%) after 0 and 20 weeks storage.

Region	Firmness (kgf) (0 weeks - 20 weeks)		Soluble solids (%) (0 weeks - 20 weeks)	
	untreated	treated	untreated	treated
Kerikeri	5.8 - 1.8	5.9 - 2.3	10.3 - 12.7	9.6 - 11.7
Te Puke	6.9 - 1.6	6.6 - 1.9	8.4 - 12.9	8.9 - 12.9
Wanganui	5.1 - 2.2	4.9 - 2.9	9.7 - 10.7	10.0 - 10.6
Auckland (maintained)	5.9 - 2.0	5.4 - 2.2	9.9 - 13.4	11.5 - 14.1
Auckland (abandoned)	6.4 - 2.5	6.6 - 3.3	10.6 - 14.0	9.0 - 13.5

In Wanganui, there was no significant difference between treatment and control fruit, until after 12 and 20 weeks of storage, when sprayed fruit were significantly firmer than unsprayed fruit. There were no differences in soluble solids between the two treatments.

At the Auckland site, fruit from the maintained blocks were generally significantly less firm than fruit from the abandoned blocks. Within the maintained blocks, fruit which received a pre-harvest oil spray were significantly less firm for all storage periods except after 20 weeks when there was no difference. This result contrasts with those from the other sites, where sprayed fruit tended to be firmer. Fruit from the abandoned blocks showed no initial difference in flesh firmness between the two treatments at harvest and after 4 weeks storage. After longer periods of storage fruit which had received a pre-harvest oil spray were significantly firmer than the untreated fruit. All treatments were found to have significantly different levels of soluble solids at harvest. In order of decreasing soluble solids found, this was; standard plots with a pre-harvest oil spray, abandoned control, standard plots, and abandoned plots with a pre-harvest spray. However, after any storage, there were no significant differences.

The results of this study confirm the earlier work showing that there is no detrimental effect on storage of a late season oil spray. At three of the four sites, fruit which had received a pre-harvest spray had a tendency to maintain flesh firmness for longer during storage, but this did not occur in the fruit from the maintained block in Auckland. The quality of the fruit after storage was good and any differences were, from a practical point of view, insignificant.

REFERENCES

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