



Managing climatic risk

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Over the years our fruitgrowers have suffered regularly from both frost and hail. This year Nelson was rather badly mauled by hail, with Hawke's Bay, Gisborne and the Bay of Plenty suffering frost damage.

Insurance is widely used here to provide some financial cover for hail, and in the case of kiwifruit, frost. Premiums are expensive and climbing, so perhaps it is time to look into alternatives. Overseas there has been a tendency to move towards hail net covers for protection against hail, particularly in Europe and Australia. Admittedly these areas probably suffer more hail injury than we do, so insurance became very expensive for them.

Frost

Frost tends to be a predictable site-related event which in my view makes it a poor candidate for insurance cover. Furthermore, good protection systems for frost protection are readily available.



Fig 1: 'Eve' Braeburn fruitset close to the wind machine.

The frosts in Hawke's Bay this year gave us a good chance to observe some of these protection methods in action under particularly severe conditions.

Our observations are that well-designed overhead water sprinklers gave full protection provided they were turned on soon enough, and completely covered the crop canopy being protected.

For temperate fruit crops which tolerate temperatures down to -1.5 to -2.0°C before suffering substantial damage under-tree sprinklers gave protection where sufficient water was being applied. Hawke's Bay frosts got down to around -2.7°C this year and we measured a lift of between 0.5 and 1°C from under the tree sprinklers, which was enough to give protection. This would not have been sufficient to protect frost tender crops such as grapes or kiwifruit from frosts of this magnitude. However, in Gisborne where frosts were less severe and kiwifruit damage occurred, I saw instances where under-vine sprinklers had given protection.

Helicopters and Wind Machines

Again, for temperate crops, these machines were effective for the areas that they were capable of covering, even though inversion layers were absent or very weak.

This year we mapped the effectiveness of two wind machines on a large intensive orchard which suffered significant fruit loss from frost in areas beyond wind machine cover.

Using fruit set data on two year and older spurs on early flowering varieties such as Braeburn, Pacific Beauty™ and Pacific Rose™ we were able to estimate the areas protected by these wind machines.

Areas fully protected with fruitset > 6 fruit/cm² branch cross sectional area were 1.39 and 4.25 ha respectively for the windward and leeward machines. In addition, these machines partially protected with fruitset 3 to 6 fruit/cm² a further 3 ha each, giving a total area of influence of about 4.5 ha and 7.3 ha respectively for each machine. These areas were protected under advection frost conditions with little or no inversion layer and no additional orchard heating.

On radiation frost nights, one would expect the windward machine to have shown better performance than under these advection frost conditions. Similarly, orchard heating along the windward boundary would have also lifted the performance of the windward machine.

Hail

Unlike frost, hail occurrence is much less predictable and therefore more difficult to protect against with cost effective methods.

Covering with hail netting is the only bulletproof method for combating hail injury, other than through paying regular hail insurance premiums.

Recently there have been some reports on the use of hail nets published in overseas journals.



Fig 3: Fruit set on Pacific Beauty™ close to the wind machine.



Fig 4: Absence of Pacific Beauty™ fruit set beyond the reach of the wind machine.

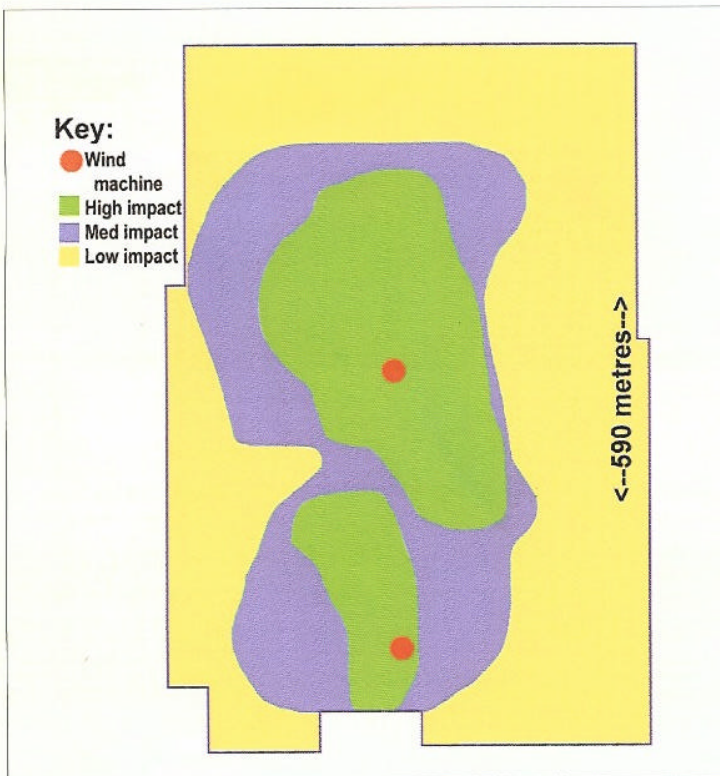


Fig 5: "The Trotter Road Partnership block showing areas and levels of wind machine impact."

Reference

Middleton, S, McWaters, A (2002) "Hail Netting of Apple Orchards - Australian Experience" The Compact Fruit Tree, Vol 35, 2, pp 51-55.

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