

SOME FACTORS INFLUENCING THE POLLINATION OF KIWIFRUIT BY HONEY BEES

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To obtain adequate honey bee visitation to kiwifruit flowers, Palmer-Jones and Clinch (1974, 1975) recommended that 8 colonies per hectare be placed in kiwifruit plantations for the duration of the blossom period. The reason for recommending this high density is that kiwifruit flowers do not secrete nectar, and only produce a dry pollen, whereas honey bees prefer to visit competing flowers that supply both nectar and pollen (e.g. white clover). The weather during the blossom period also affects honey bee activity and consequently the visitation rate to kiwifruit flowers.

EFFECT OF WEATHER AND COMPETING POLLEN SOURCES

For the past four seasons, the Apiculture Section from Wallaceville has used pollen traps to monitor pollen collection by honey bee colonies in plantations during the blossom period in the Te Puna district. Results of the pollen collection from one plantation are given in Fig. 1. The levels of bee visitation to kiwifruit flowers in the same plantations were recorded concurrently.

In 1978, the weather was fine throughout the blossom period but there was severe competition from white clover flowers and, as a consequence, honey bee visitation to kiwifruit flowers was poor.

In 1979, the weather was also fine for most of the blossom period, but as there was little competition from other flowers, visitation to kiwifruit flowers

was good. In 1980, the weather was changeable during the blossom period but as there was little competition from other flowers, visitation to kiwifruit flowers was again good. In 1981, the weather was again changeable and although there was moderate competition from white clover and honeysuckle, visitation to kiwifruit flowers was good. These results suggest that competing plants have a far more serious effect in fine weather, because in these conditions bees can travel long distances to them. Changeable weather tends to restrict the bees to work within plantations.

POLLEN COLLECTION BY DIFFERENT HIVES

It was noted that individual hives even if situated side-by-side may have very different preferences for kiwifruit pollen. This effect may be partly related to differences in the genetic make-up of the bees as it is possible to breed for particular pollen preferences. It may also be the result of recent experience of pollen collection before the hives were moved into the plantation.

EFFECT OF MALE : FEMALE VINE RATIOS

It has frequently been observed that fruit formed from kiwifruit flowers close to male vines can be significantly heavier than fruit formed from flowers that are more distant. In the 1981/82 season, a study of fruit size relative to distance from male vines was undertaken in pergola and T-bar blocks at a number of plantations near Tauranga and Te Puke.

The 1981/82 season was a poor flowering season with most plantations having only about half the number of flowers that would be present in a good season. Nevertheless, with satisfactory bee visitation, in one plantation with a male:female ratio of 1:8 on pergolas, and in another with the same ratio on T-bars, fruit close to the male vines contained significantly

more seeds ($P < 0.01$) than those most distant from the males. Clinch (in preparation) found that in some seasons 770 seeds may be required for fruit to reach 72 g (minimum export weight). Fruit most distant from the males contained only slightly more than this number of seeds. Thus in a good season, when pollination is normally less satisfactory on account of a greater number of flowers competing for pollination, it could reasonably be expected that much more of the fruit would fail to reach 72g.

Preliminary results indicate that in other layouts and male:female ratios better pollination is achieved in plantations where males are more numerous than in the 1:8 layout.

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Fig.1 Kiwifruit pollen collected during blossom period by honey bees at Te Puna

