



ARGOS RESEARCH NOTE: NUMBER 26, NOVEMBER 2006

Kiwifruit orchard floor vegetation

Introduction

The Agriculture Research Group On sustainability (ARGOS) recently compared the amount and type of vegetation on the ground under vines in three different types of NZ kiwifruit orchards - KiwiGreen Hayward ('Green'), KiwiGreen Hort16A ('Gold') and Organic Hayward ('Green Organic'). Some orchards encourage a long sward and variety of plants on the orchard floor (Figure 1, top), whereas others prefer a closely cropped sward and spray the vine line to discourage vegetative cover around the vine trunks in particular (Figure 1, bottom).

Why measure vegetation?

Our soil monitoring has identified some consistent and large differences in soil quality between the Organic and KiwiGreen production systems (see ARGOS Research Report 05/02). Orchard floor vegetation can affect water penetration and retention of nutrients, earthworms and microbial activity in the soils, so we decided to measure variation in orchard floor vegetation to see if it links to variation in soil health between orchards. It is also possible that orchard floor vegetation could provide an indicator of orchard health and the impacts of orchard management, but the main long-term goal for ARGOS is to provide practical orchard management advice. Is the effort in maintaining a short grass sward and spray strip worth it? Could altered orchard floor vegetation offer economic and environmental gains?

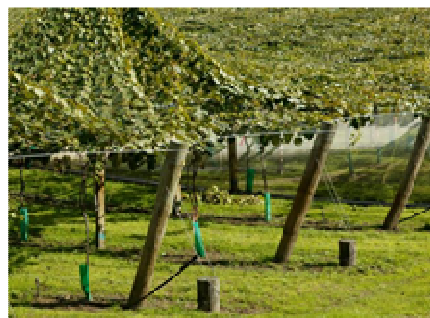
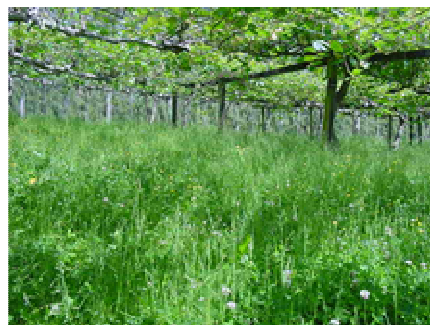


Figure 1. Contrasting styles of orchard floor management.

Sampling

We sampled the vegetation growing under the vine canopies on a single day in all the 30 ARGOS orchards in the Bay of Plenty region (10 of each type) in the spring of 2005/06. We repeatedly assess soil quality at nine permanent soil monitoring sites (SMS) on each orchard. In order to maximize cross-linkage of our results, we measured the vegetation at these same SMSs. At each SMS, we sampled the areas within-rows (under the leaders) and between-rows (alleyways). We placed a

0.5m x 0.5m wire frame ('quadrat') containing a 5 x 5 grid on the ground and scored cover and the predominant species within each of the 25 sub-plots. Bare soil was counted as a 'species'. The height of sward was also determined using a 'rising plate meter', a nifty 'moving disc on a stick' which dairy farmers use to measure dry matter of pasture in their paddocks.

Results

After bare ground, which on average occupied 41% of the surveyed sites, grass was the most predominant element across all orchards (30%); followed by buttercup (8%), clover (5%), dandelion and dock (each 2%). The % bare ground was lowest in the Green Organic orchards. This difference would have been mainly due to the presence of herbicide strips within-rows on the Green and Gold orchards. Average sward height was significantly higher in the Green Organic orchards, but there was no evidence of difference between the Green and Gold orchards (Fig. 2, top). Similarly, there were more species in the Green Organic orchards, although this difference was small in real terms (Fig. 2, bottom). Average sward height 'within-rows' (vine lines) and 'between-rows' (alleyways) was not different between Green and Gold orchards. However, vegetation was higher within-rows on the Organic orchards compared to Green and Gold, mainly because these areas are mowed less often and because of an absence of 'herbicide strips'. In 2004/05 and 2005/06, the Organic orchardists on average mowed the within-row areas 2.4 times and the between-row areas 3.8 times. Overall, herbicide strips down the entire length of vine lines occur in at least 75% and 60% of the plots on Green and Gold orchards respectively (a further 10% and 30% respectively spot spray around the posts and vines). There were more species found between-row (2.0) compared to within-row (1.4). These results from a single survey will have been influenced by the time since last mowing and season (although we tried to sample several weeks after mowing).

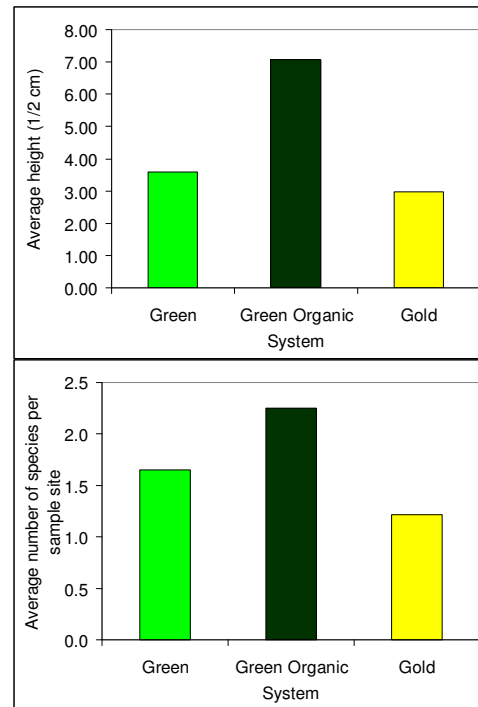


Figure 2: Average height of orchard floor vegetation in different kiwifruit production systems (top) and the number of species present (bottom).

Conclusions

The results of this first survey confirm anecdotal observations that orchard floor vegetation in Organic kiwifruit orchards is more lush and varied. These differences can be seen particularly with-in rows (under the leaders) where herbicides are generally used on KiwiGreen but not on Organic orchards. Differences in soil quality between systems have also been more notable within-rows so we suspect the two systems are linked. We will now explore statistically whether the soil indicators within each type of orchard go up or down according to orchard floor management.

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