ARGOS

AGRICULTURE RESEARCH GROUP ON SUSTAINABILITY

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Assessing the sustainability of kiwifruit production: the ARGOS study design

Introduction

The Agriculture Research Group On Sustainability (ARGOS) is seeking to identify pathways to improved sustainability for New Zealand agriculture. To do this, ARGOS is studying and comparing the economic, social and environmental consequences of different farming systems. An important first question for ARGOS is whether Certified organic, Integrated Management and Conventional orchards and farms perform differently. ARGOS is researching sustainability in five agricultural sectors: dairy, sheep/beef (low-land and high country), kiwifruit, and Maori land holdings. About 100 farms in total are included in the programme with coverage across most of NZ. Kiwifruit was included because it represents small scale but high intensity farming and because Industry was keen for it to be included. Also, ecologically the kiwifruit orchards represent a predominately woody and complex ecological landscape supporting a highly intensive form of agriculture. This differs from the other types of farming that ARGOS is studying and so we will be able to compare outcomes.

The Kiwifruit study design

Two main varieties of kiwifruit are commercially grown in NZ: the green-fleshed Hayward (*Actinidia deliciosa*) variety and the yellow-fleshed Hort16A (*A. chinensis*) variety. Nearly all kiwifruit is grown using integrated pest management (KiwiGreen) while about 5% (of total trays produced) is grown organically. The following systems were chosen to be studied by ARGOS as they are the most common: A. KiwiGreen Hayward ('Green') B. Organic Hayward ('Organic') and C. KiwiGreen Hort16A ('Gold'). As Gold is a relatively new crop, its inclusion was seen as valuable for gaining some insight into how new varieties might be commercialised in the future. Organic Hort16A orchards were not considered as there were too few suitable ones to choose from.

Twelve of each type of orchard is being studied providing a total of 36 orchards. Each cohort or group of 12 is also known as a 'panel'. Orchards are arranged into twelve clusters with each cluster containing one of each of the three different types of orchards close together (for seven of the 12 clusters, no two orchards are more than 1km apart while for the other five clusters, no two orchards are more than 3km apart). Clustering allowed us to match orchards of the three types for soil type, altitude and climate – an important way to filter out background ecological drivers so that differences between orchard types are more detectable. From the outset it was decided that the majority of clusters (Figure 1) would be located in the Bay of Plenty (BoP) region where about 80% of the total crop (in terms of area) is grown. It was also decided that a cluster would also be located in each of Kerikeri (Northland) and Motueka (Nelson). Outside of BoP, these are two of the biggest

kiwifruit growing regions with each growing about 5% of the total crop. These regions also have very different environments which may result in very contrasting sustainability outcomes.

Orchard selection process

Within the Bay of Plenty, the main growing areas (Te Puke, Tauranga and Katikati) were targeted which provided a north-to-south spread. A range in altitudes was also desired. In each area, Organic orchards were targeted first as there are much less of these (less than 200 out of a total of about 3000). Organic orchards were only considered if they had nearby Green and Gold orchards. Within each cluster, orchards had to have the same training structure (pergola or T-bar) as this can significantly impact on production and management. As pergola is the predominant form of training structure, we established ten clusters of pergola and two of T-bar (one in Te Puke and one in Motueka where a lot is still grown on T-bar). Where possible, orchards within each cluster were also matched in terms of their management structure (i.e. owner-operated, managed or leased) and age (although Hort16A orchards have only been established in the last 10 years whereas the Hayward orchards are much older). We designed a low barrier to involvement in the study in order to minimise bias in the study group. In the course of finding 36 suitable orchards, about 15 orchardists that we approached did not want to be involved. Reasons included: too busy; overcommitted, trying to wind-down and tired of people coming on to the orchard. These reasons are unlikely to have biased the study sample to any great extent.

Conclusion

ARGOS has now established a network of farms through NZ. In the kiwifruit sector, clusters of orchards have been established and this design means that differences between orchards are likely to be due to differences in management rather than background variables like soil type and climate.

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See ARGOS Research Note 1 for more detail on the overall study design.

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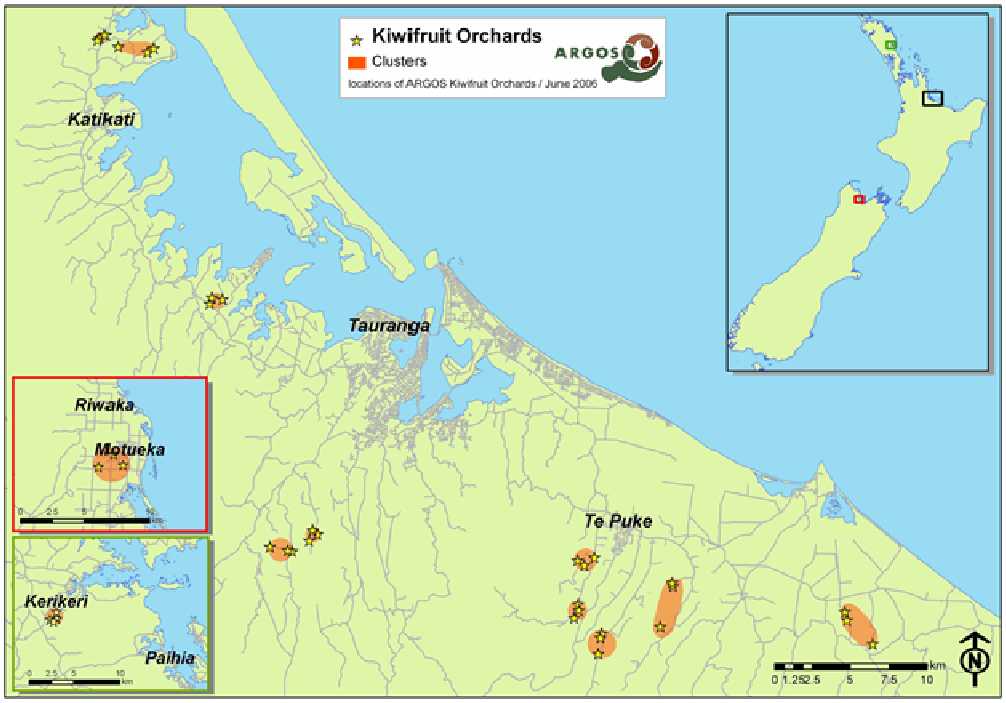

Figure 1. Location of ARGOS kiwifruit clusters throughout NZ.