



Plant & Food
RESEARCH
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Pollination of Cherries in Central Otago

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The New Zealand Institute for Plant & Food Research Limited

What drives poor fruit set in Summerfruit crops?



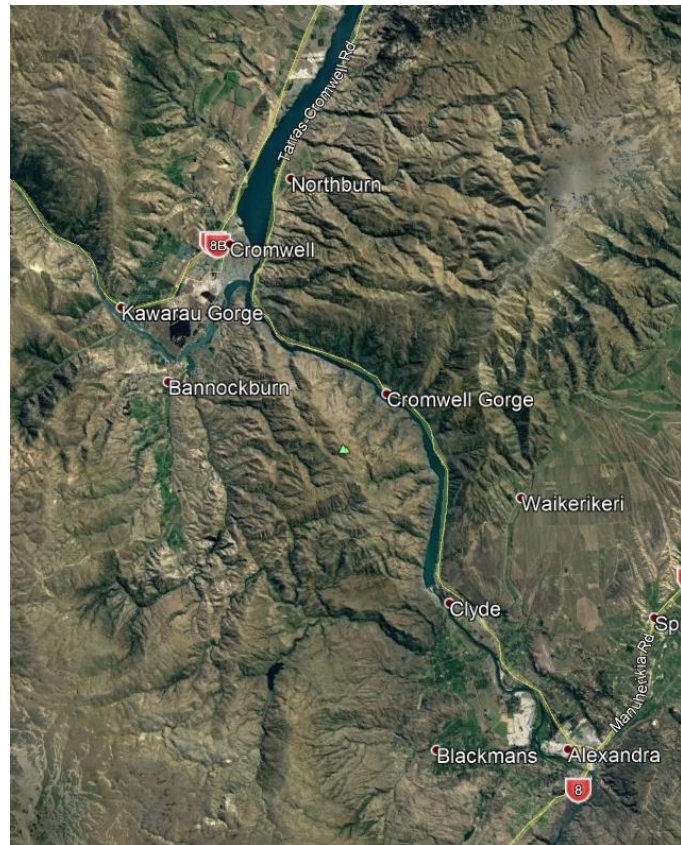
Research Objectives for cherries in 2018

1. Assess the variation in fruit set between orchards
2. Assess the variation in pollinator activity between orchards
3. Determine whether current best practice in use of honey bees for pollination is correlated with higher fruit set
4. Determine whether variation in temperature affects fruit set rates

Study orchards

Fruit set & bee activity:

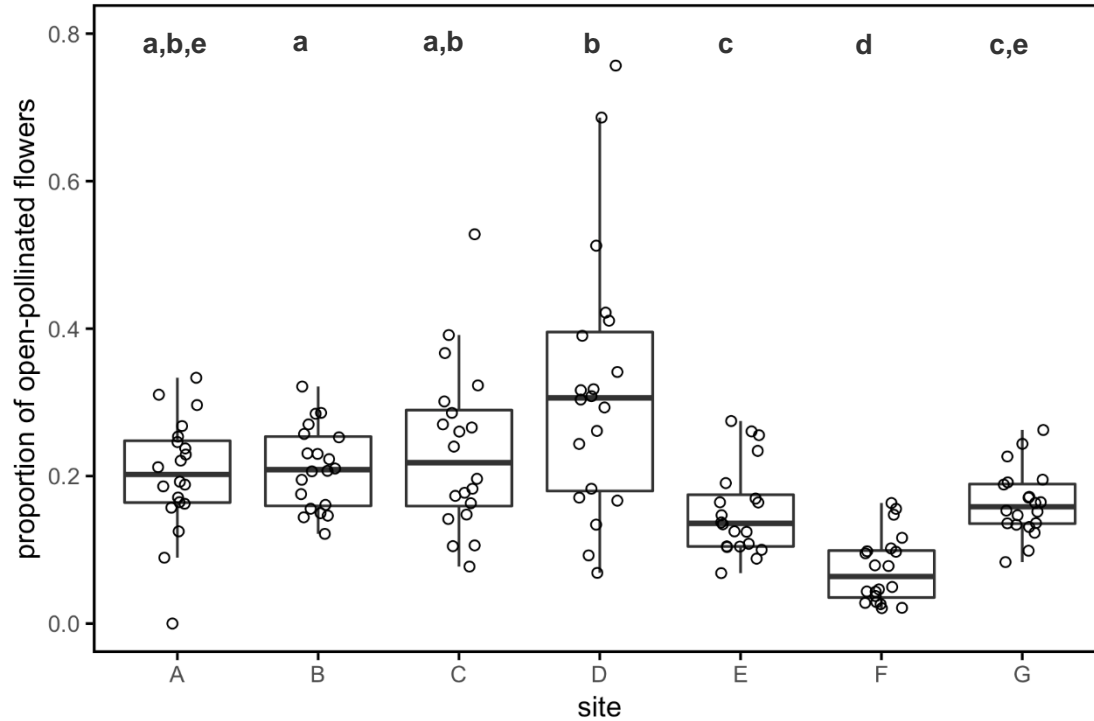
- » 'Staccato'
- » Five orchards in and around Cromwell
- » Two orchards in Clyde/Alexandra



Methods

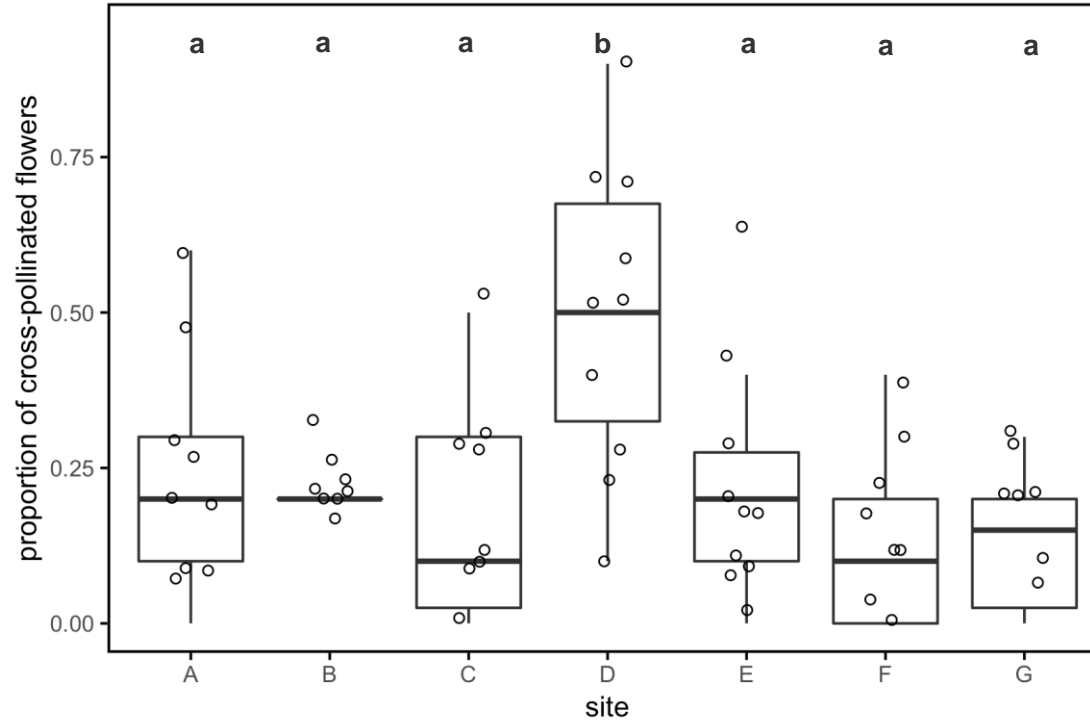
- » Twenty flowering trees of similar size selected per orchard
 - » Open fruit set
 - » Hand cross fruit set (on 10 trees)
 - » Flower visitor surveys: four days with a.m. and p.m. surveys
 - » Temperature records for survey times
- » Grower-supplied information on stocking rates and hive management
- » Hive strength assessments

Open pollination rates



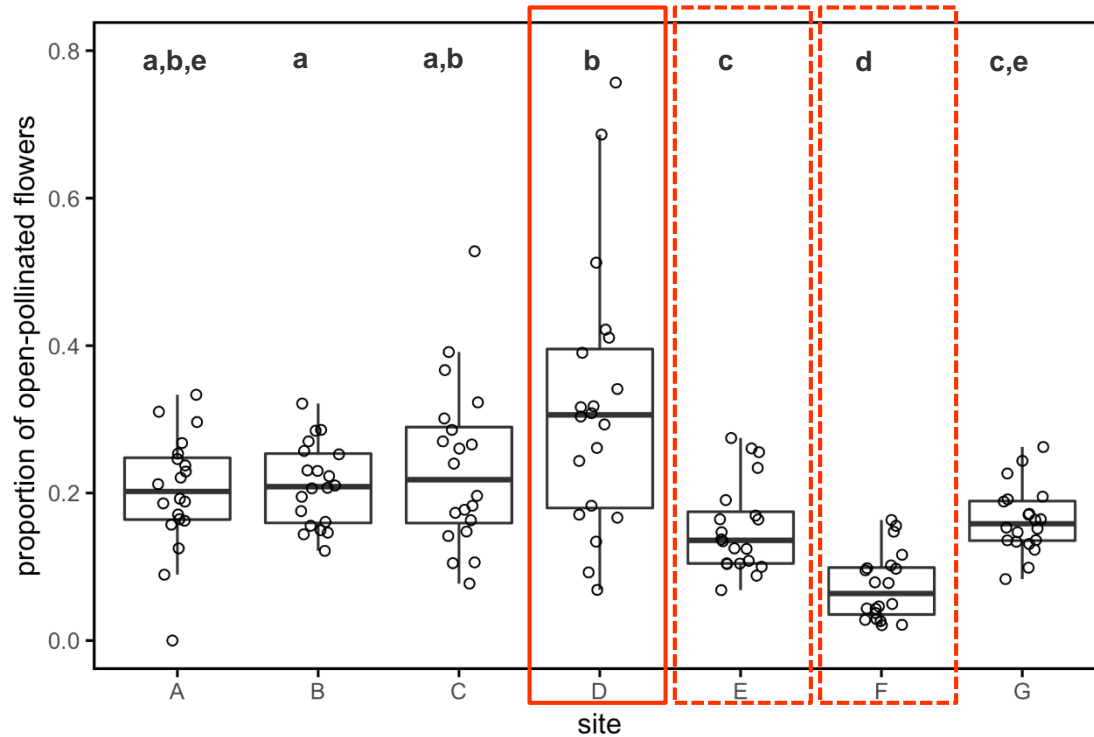
Letters indicate $p < 0.05$ in pairwise comparisons, GLMM

Hand cross-pollination rates



Letters indicate $p < 0.05$ in pairwise comparisons, GLMM

Open pollination rates

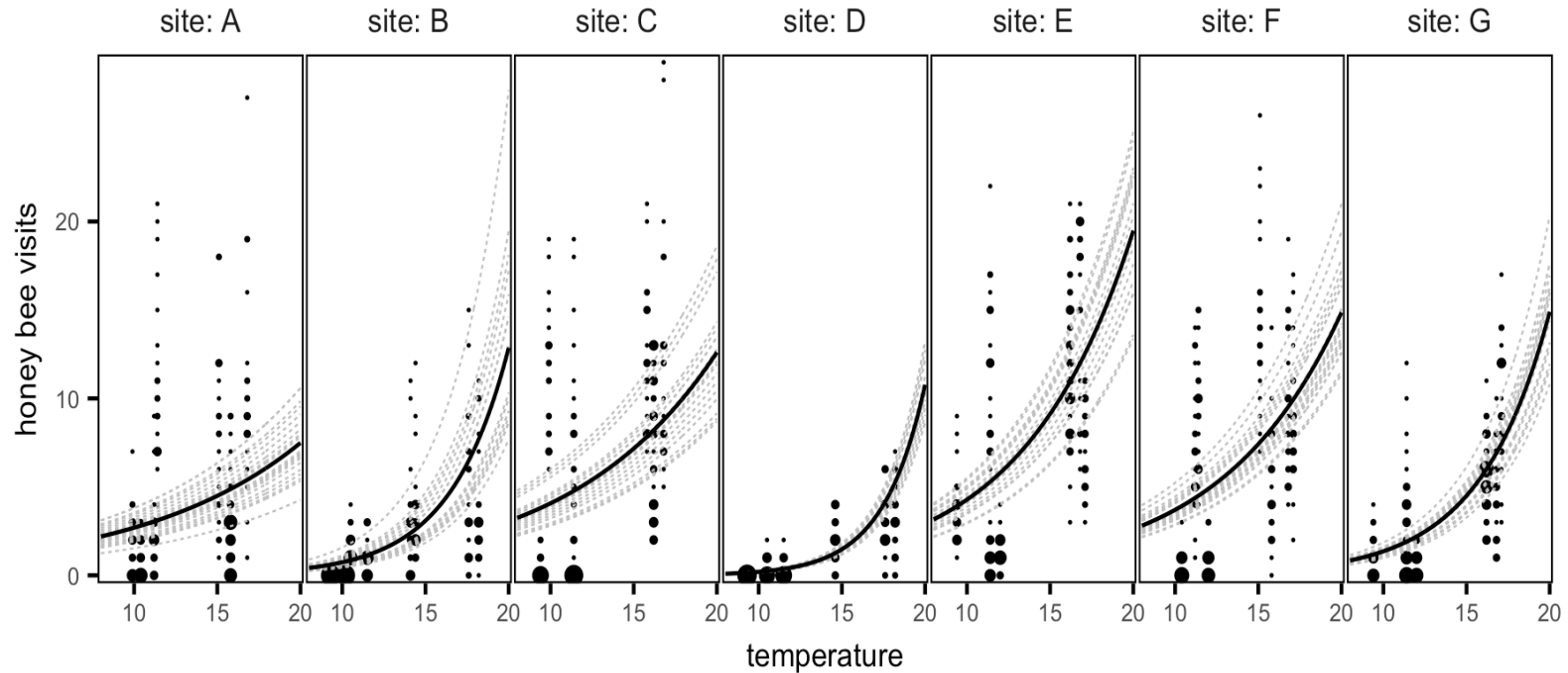


Letters indicate $p < 0.05$ in pairwise comparisons, GLMM

Visits to flowers

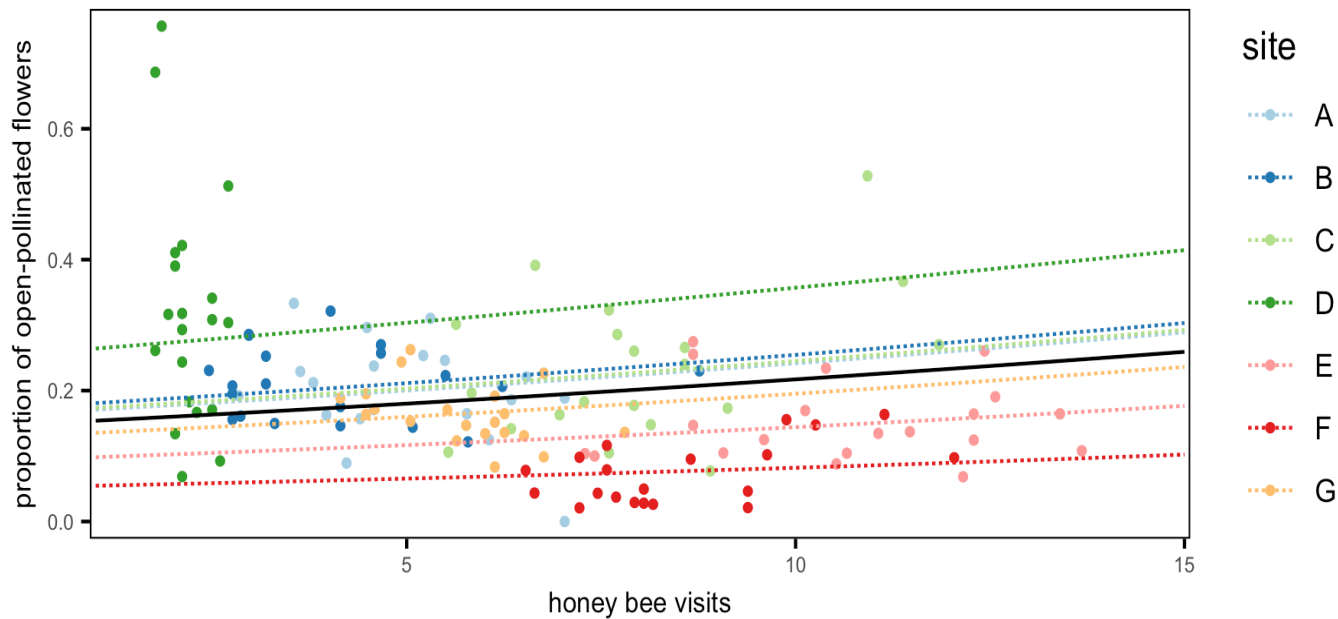
- » 54 surveys completed
- » 5852 flower visitors recorded
- » 95% were honey bees
- » 4% were black hoverflies
- » Also 9 bumble bees, 6 blow flies, 1 silvereye

Honey bee visits & temperature



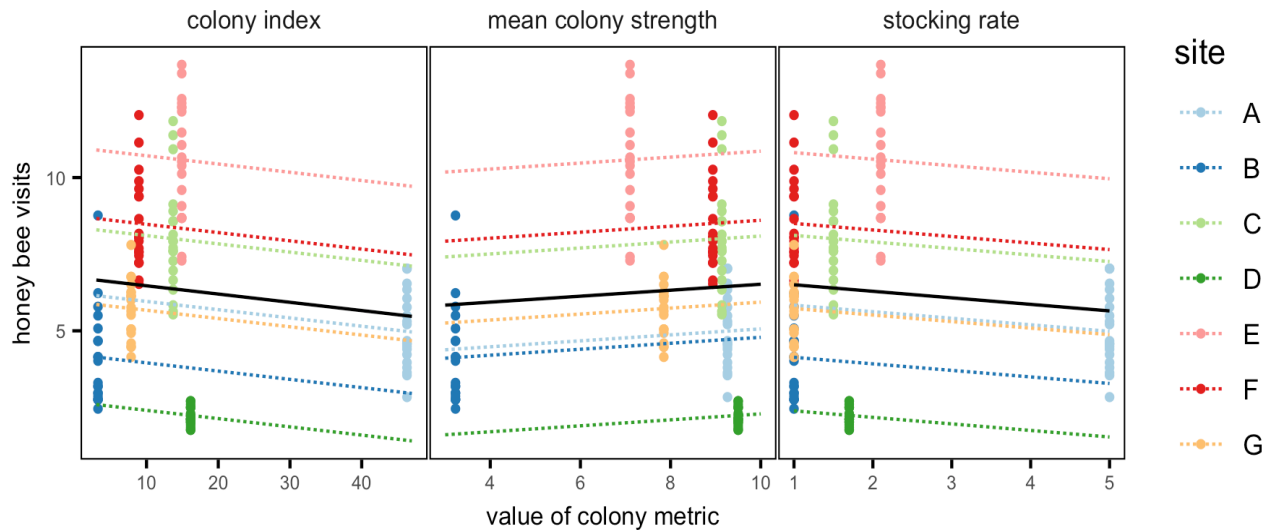
Visits & temperature $p < 0.001$
Between sites $p < 0.001$, GLMM

Correlation between visits (at 16°C) and fruit set



$p < 0.001$, GLMM

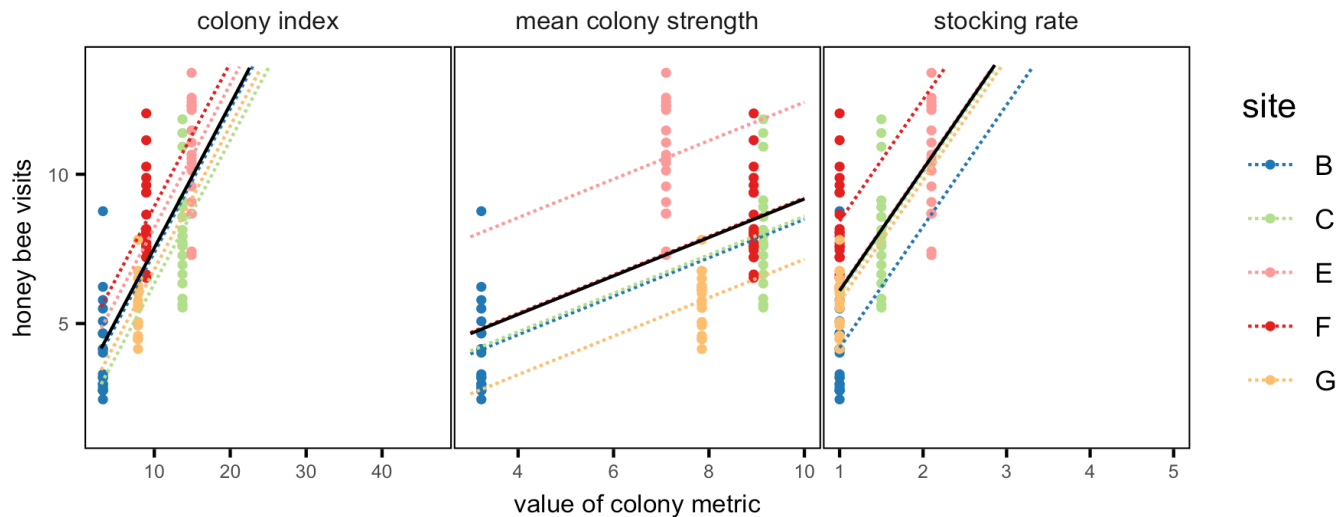
Colony metrics & bee visits



Site D: very low flower number

Site A: very high stocking rate

Colony metrics & bee visits (excluding A & D)



$p = 0.0044$

$p = 0.13$

$p = 0.03$

LMM

Conclusions

- » Variation in 'Staccato' fruit-set indicates opportunity to improve performance of lower-performing orchards
- » Honey bees were the most common visitors to 'Staccato' flowers, and their visitation increased with temperature
- » Fruit set was correlated with bee activity at warm temperatures
- » Bee visit activity was correlated with colony strength metrics at some orchards

Recommendations

- » Higher densities of stronger hives industry-wide will increase bee visit rates and therefore fruit set
- » Consider how the context of the orchard will influence the role of your honey bees

Further research:

- » Would greater pollinator diversity improve pollination in colder weather?

Acknowledgements



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Thank you

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