HIVE STOCKING RATES AND PLACEMENT FOR POLLINATION EFFICIENCY

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- Projects funded by ABA and HIA
- Field experiments and survey 2011- 2017
- Reports available with all details

CSIRO

Horticulture Innovation Australia

ALMOND BOARD OF AUSTRALIA

CMV GROUP

State Government Victoria

Department of Environment and Primary Industries

Australian Bee Services

Purpose of research

- Pollination is critical to production
- How to ensure it is done efficiently
- If there is a shortage of hives, need to understand consequences of practice change

Messages from our research

1. Almond orchards are hard to pollinate
2. There are benefits available from higher pollination
3. Trees more than a few hundred metres from hives have lower production
4. Reducing hive density (below 6.7hph) reduces nut production
5. The ideal hive deployment strategy is a complex cost/benefit question

1. Almond orchards are hard to pollinate

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Bees can fly many kms. But d they want to?

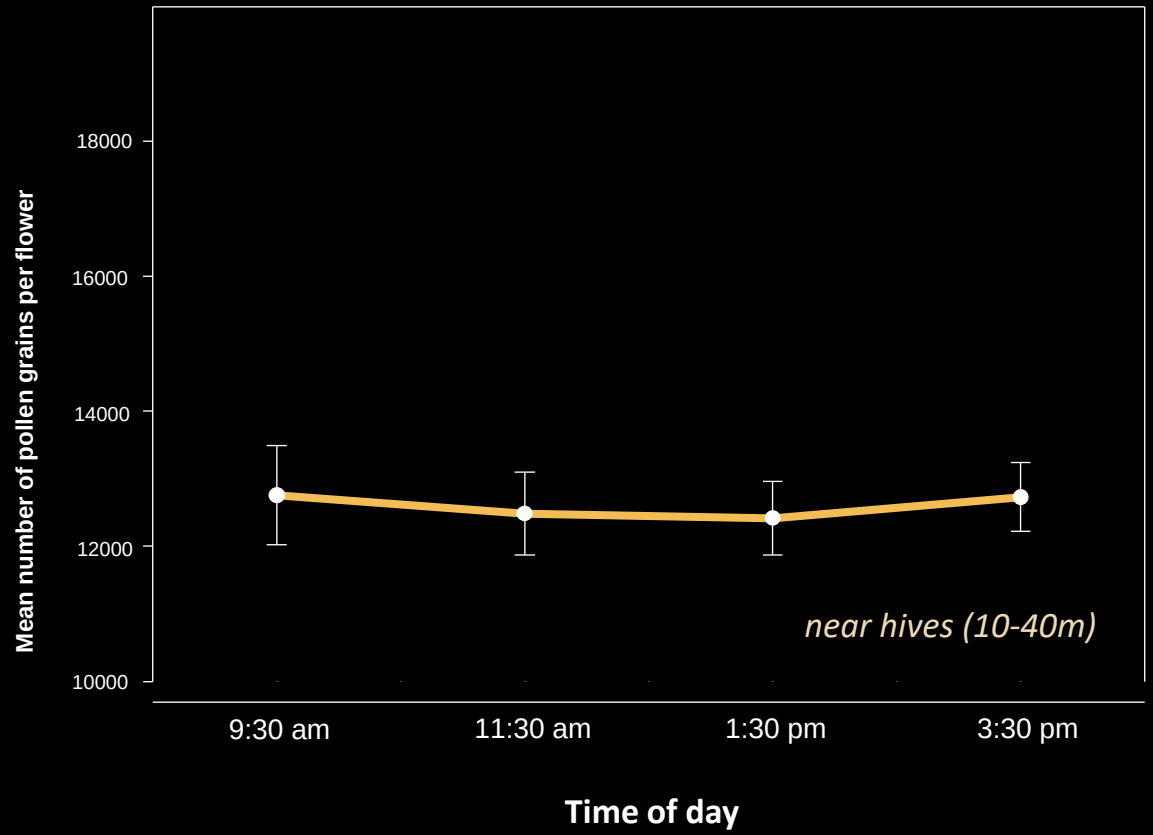
Nine placements, ~120 hives each

Survey included six pairs of transects

Monitor pollen removal from flowers

1. Almond orchards are hard to pollinate

Pollen that bees have not collected



How many restaurants will you walk past before you stop?

2. There are benefits available from higher pollination

Evidence

We can increase nut production by hand pollination

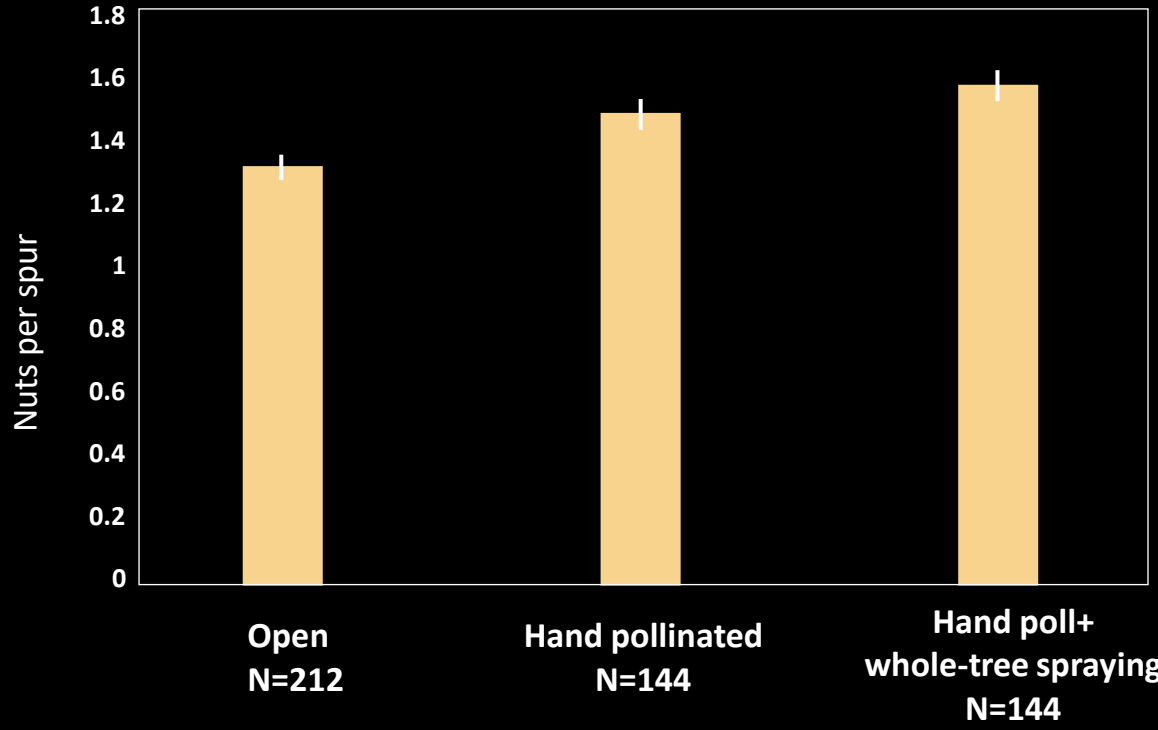
2. There are benefits available from higher pollination

Evidence

Spraying pollen over whole trees increased yield by ~10% above that achieved by bees

2. There are benefits available from higher pollination

We increased nuts per spur by 19%



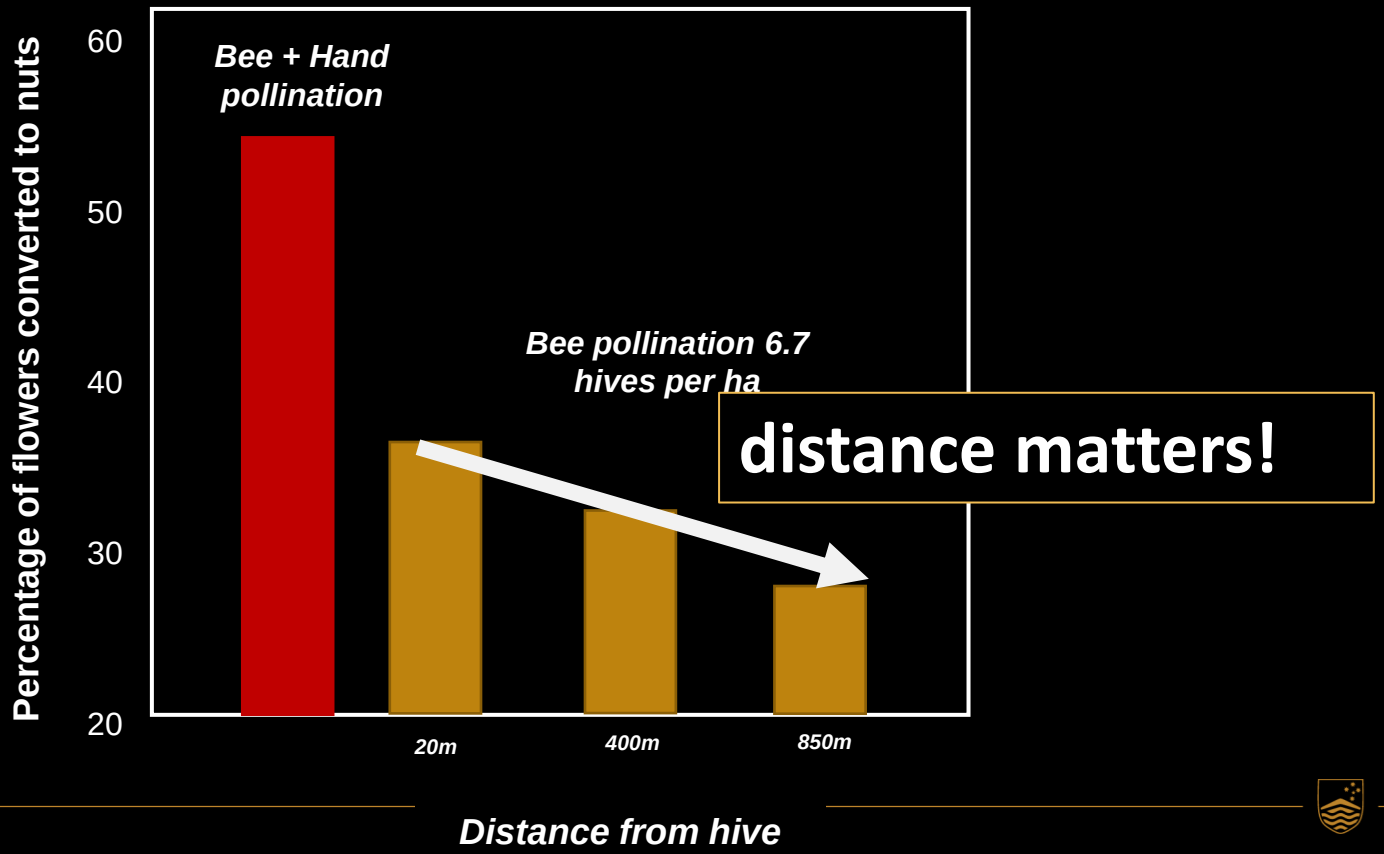
Effect of hive distance on nut set

Standard large hive placements, ~ 120 hives

54 transects in 2012, 62 transects in 2013

581 trees total. ~ 200 flowers per tree.

3. Trees more than a few hundred m from hives have lower production



Effect of hive density on nut set

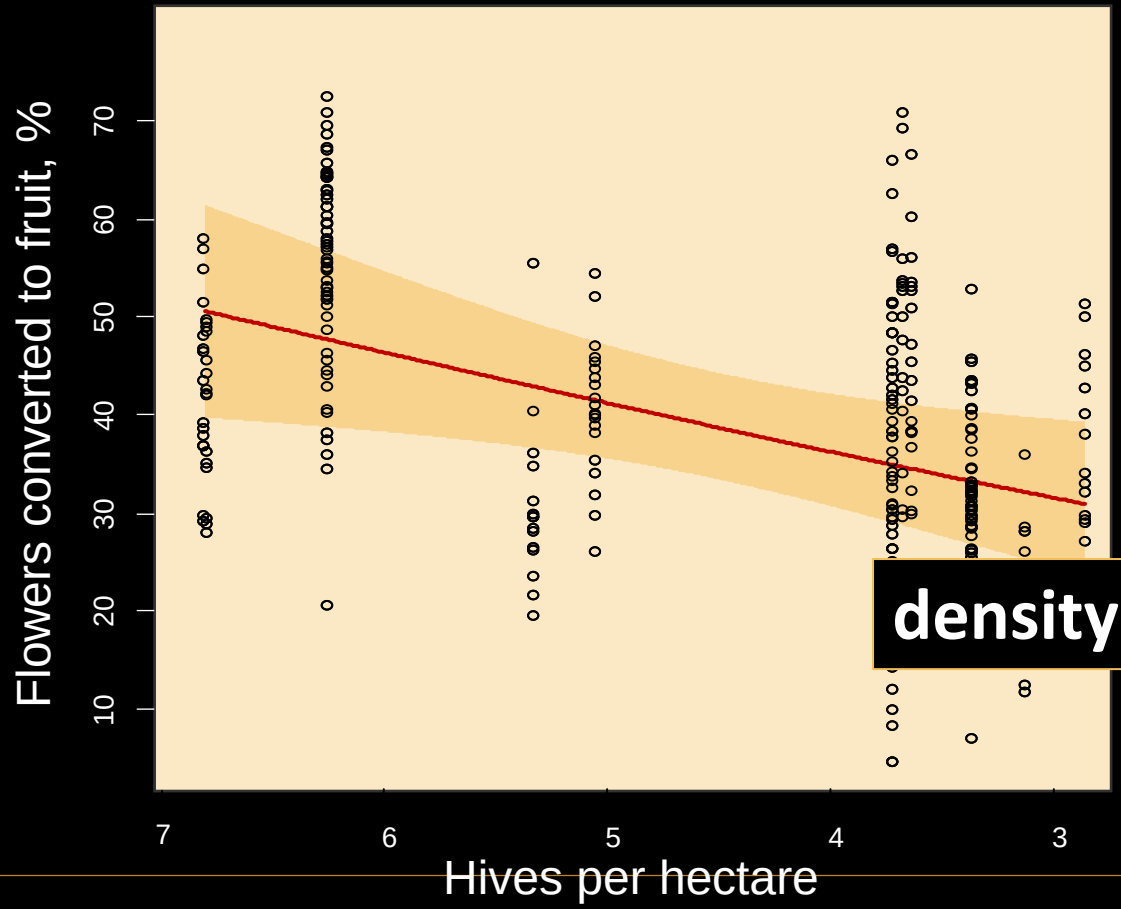
Smaller placements, applied in isolated blocks

15 blocks across 9 orchards

34 transects in 2012, 26 transects in 2013

313 trees total. ~ 200 flowers per tree

4. Reducing hive density (below 6.7hph) reduces nut production



39% decrease in nut set (6.8hph vs 2.8)

density matters!

5. The ideal hive deployment strategy is a complex cost/benefit question

Cost side

- Per hive fee (*influenced by supply*)
- Cost of deployment (*depends on strategy and labour cost*)

Benefit side

- Increased nut set (*influenced by hive arrangement, hive quality, orchard variables*)
- Price for nuts (*influenced by market*)

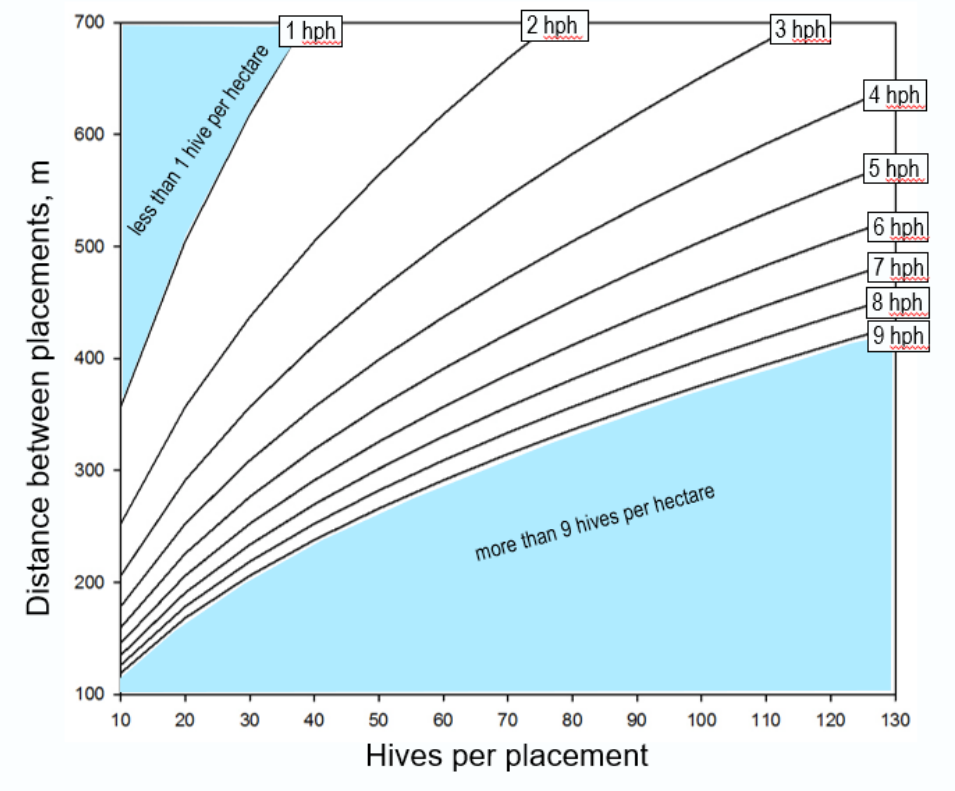
5. The ideal hive deployment strategy is a complex cost/benefit question

Distance between placements*hives per placement

= hive density

A huge range of possibilities

5. The ideal hive deployment strategy is a complex cost/benefit question



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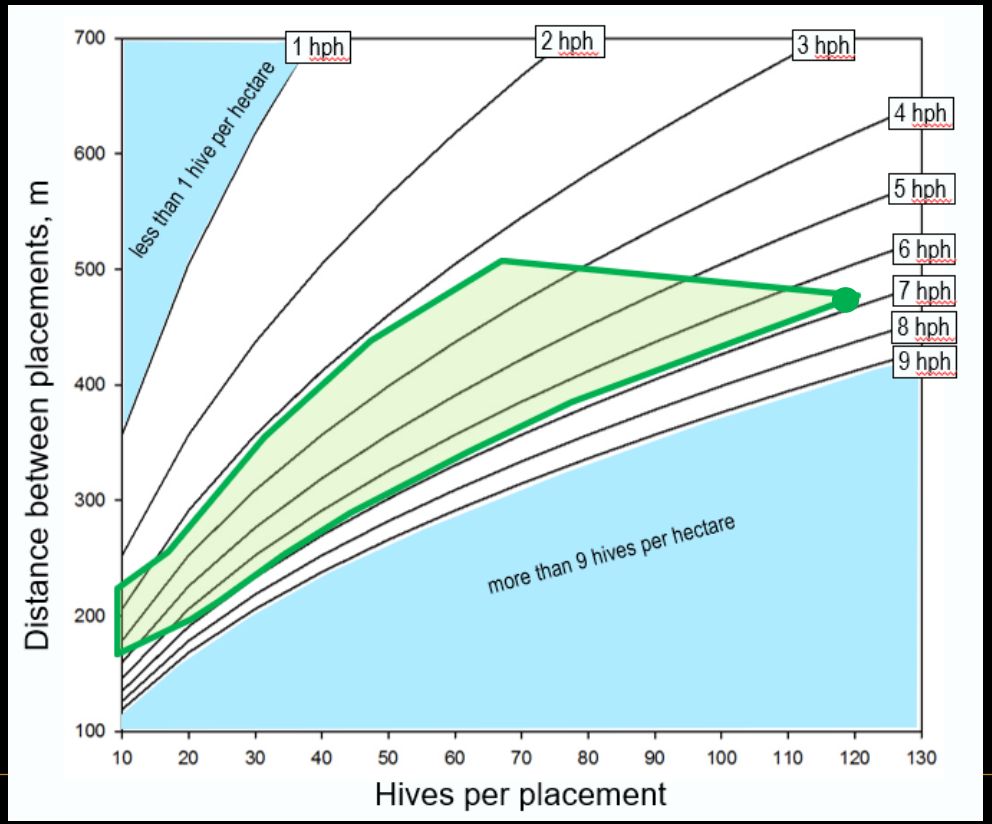

- We only explored some options

i.e. Lower density (<7hph)

Placements closer together (<400m)

- Deployment comes at a cost

We know	Less certain….
Varroa controls have reduced the supply of hives	Will we turn the Varroa problem around?
Reducing hive density below 6.7hph reduces nut production	At what hive **density** is nut production maximised?
If you want to maximise the production benefit when using fewer hives, use smaller placements and reduce the distance between them	What would it cost to change **arrangement**?
The best hive arrangement would consider costs (hives, labour) as well as benefit (value of increased yield)	Will the market price for nuts reward the benefit of the change?

Pollination Security CRC

OUR PROGRAMS OUR TEAM

Pollination Security Cooperative Research Centre

A Pollination Security Cooperative Research Centre (PSCRC) has been proposed to bring together industry, research organisations and communities to improve Australia's pollination capabilities.