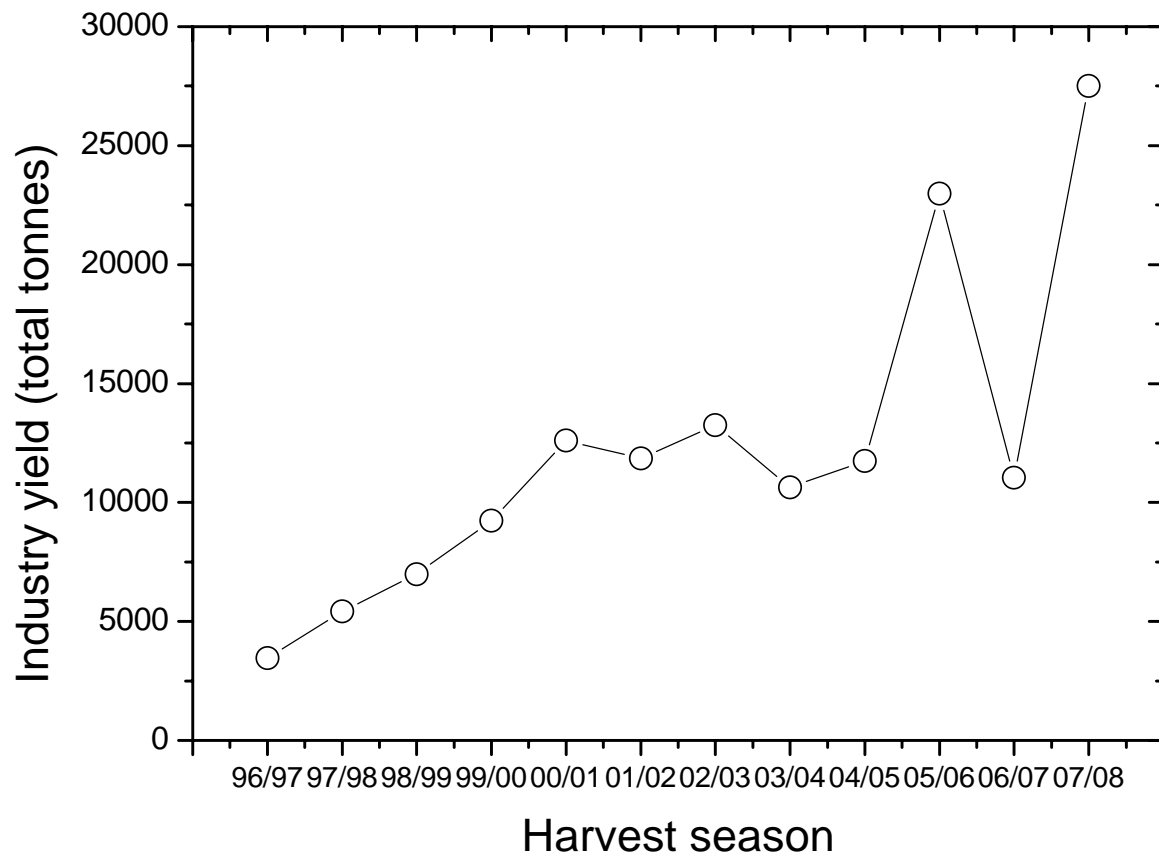# Factors Influencing Fruit set of Hass Avocado In New Zealand

Jonathan Dixon, Roger Barber, Toni Elmsly, Elaine Dixon, Andrew Mandemaker, Henry Pak

Background

- Unexpectedly low yields in 2002 to 2005

- Strong alternate bearing pattern has developed

Background

Why?

• The cause was assumed to be low temperatures where pollination is limited causing cukes and excessive fruit drop

• Marginal climate

   – other countries are warmer

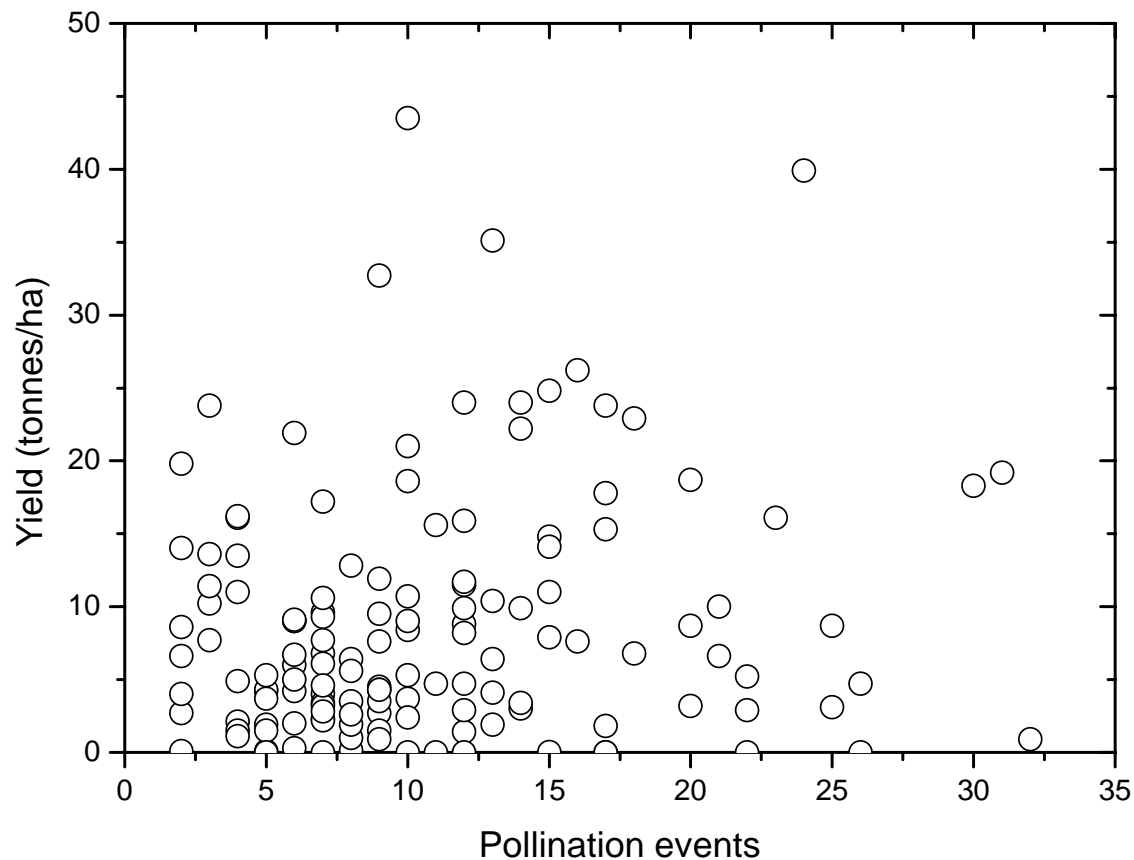   – Mean Annual Temperature: 15°C

Research Programme

- In the last 4 years we have investigated:

  - relationship between temperature and yield

  – flowering, bees, nectar, initial fruit set, phenology

  - treatments to compensate for cool temperatures

  – application of foliar boron
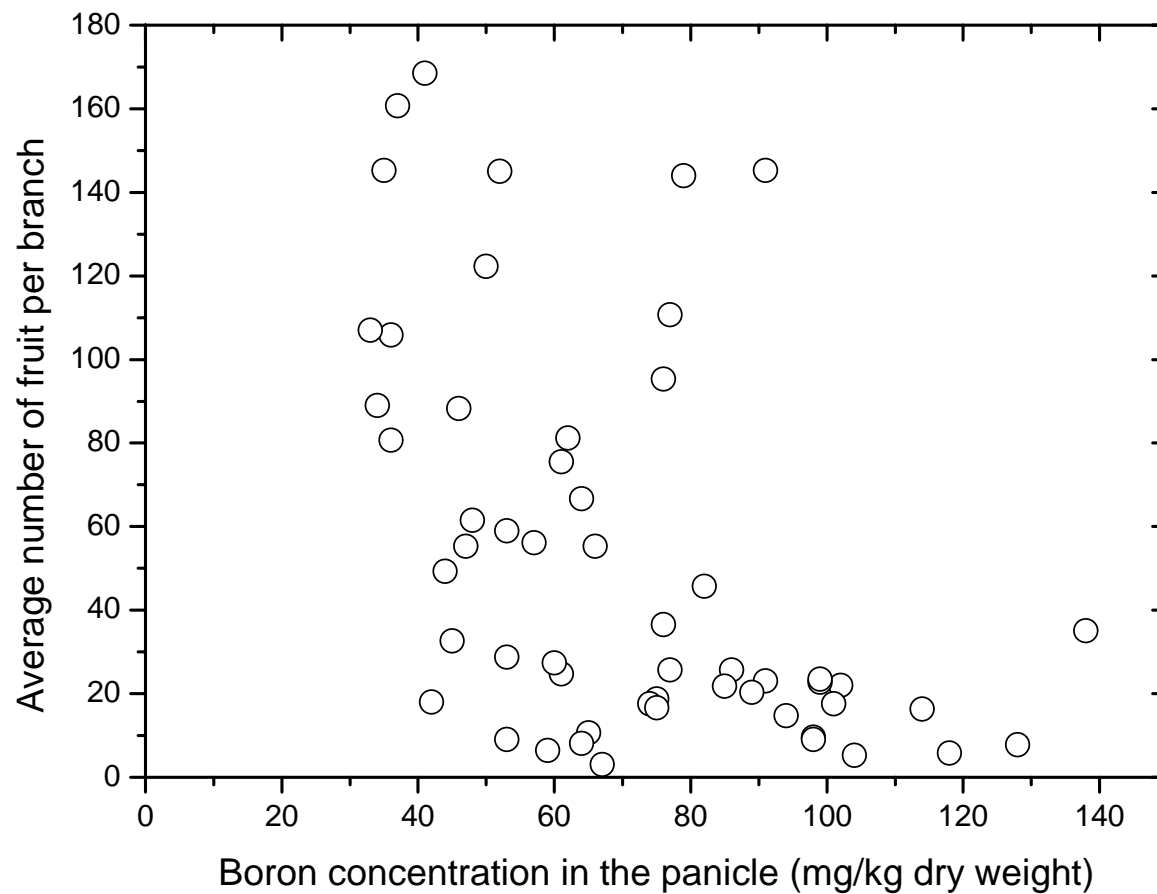
Results -Temperature

Pollination event:

For two consecutive days, maximum temperature > 17°C and night minimum > 11°C

Results – Foliar Boron

Evaluation of Research Outcomes

- In New Zealand, avocado fruit set is not determined by one factor alone but is a complex of factors

- There is no single cause for fruit set failure

- The research programme focused on issues to do with the realization of fruit set at flowering not on understanding how the potential fruit set is established
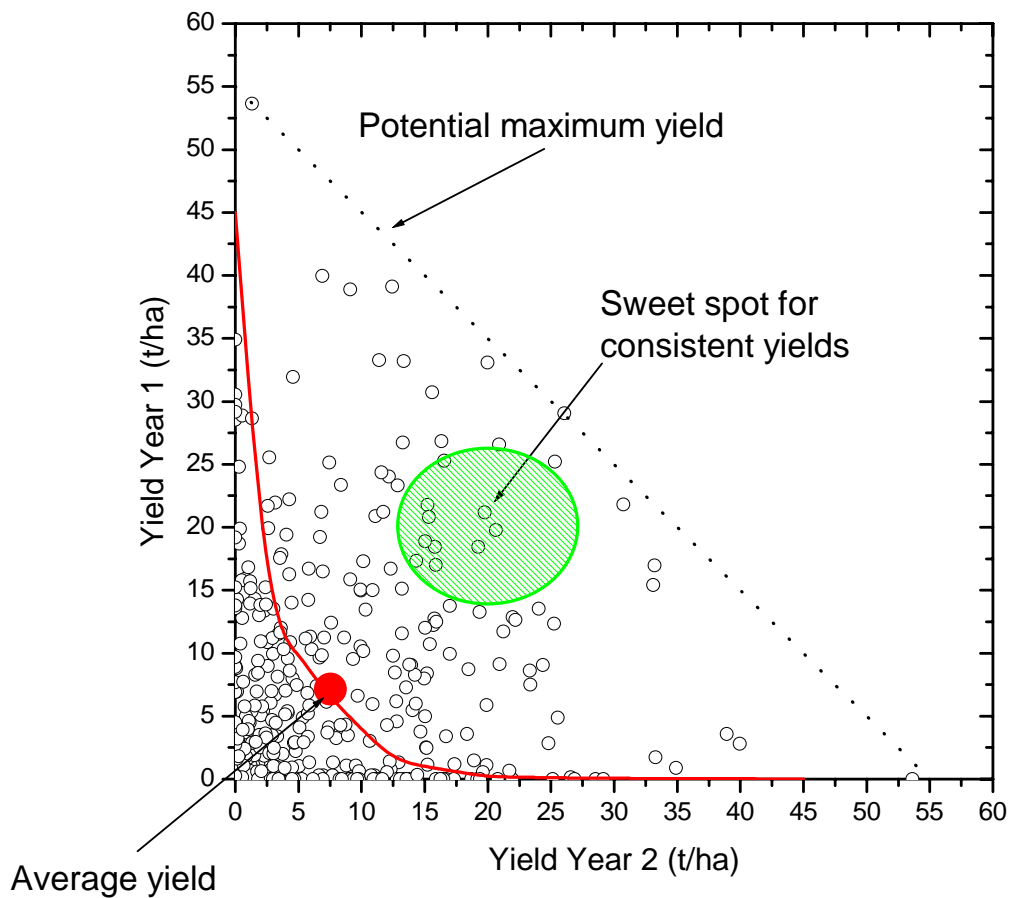
New Direction

- How is the potential fruit set determined?

- From cumulative influences in the two years before harvest.

- Based on a better understanding of tree phenology cycles from the initiation of flowering wood to flowering and fruit set in on and off years

- What are the influences setting up the flowering and fruit set?

Overview of Yields

Yields for orchards in the Western Bay of Plenty

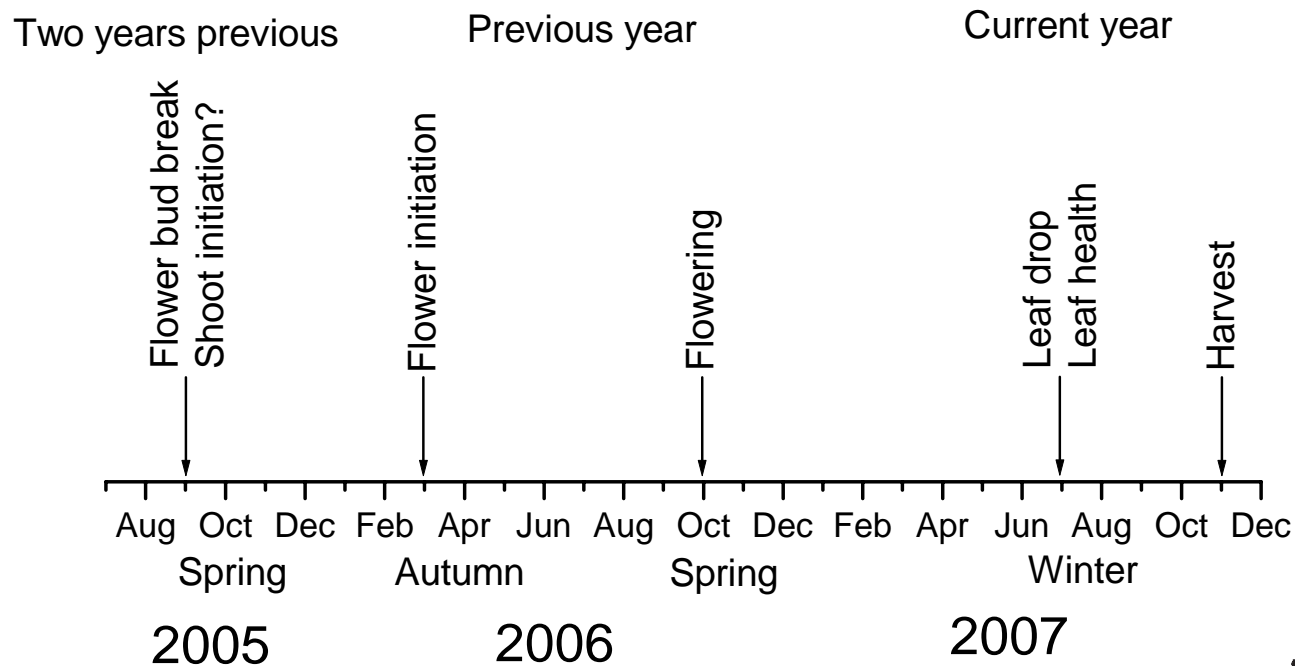Number of data points = 442
Number of orchards = 177

Average yield each year
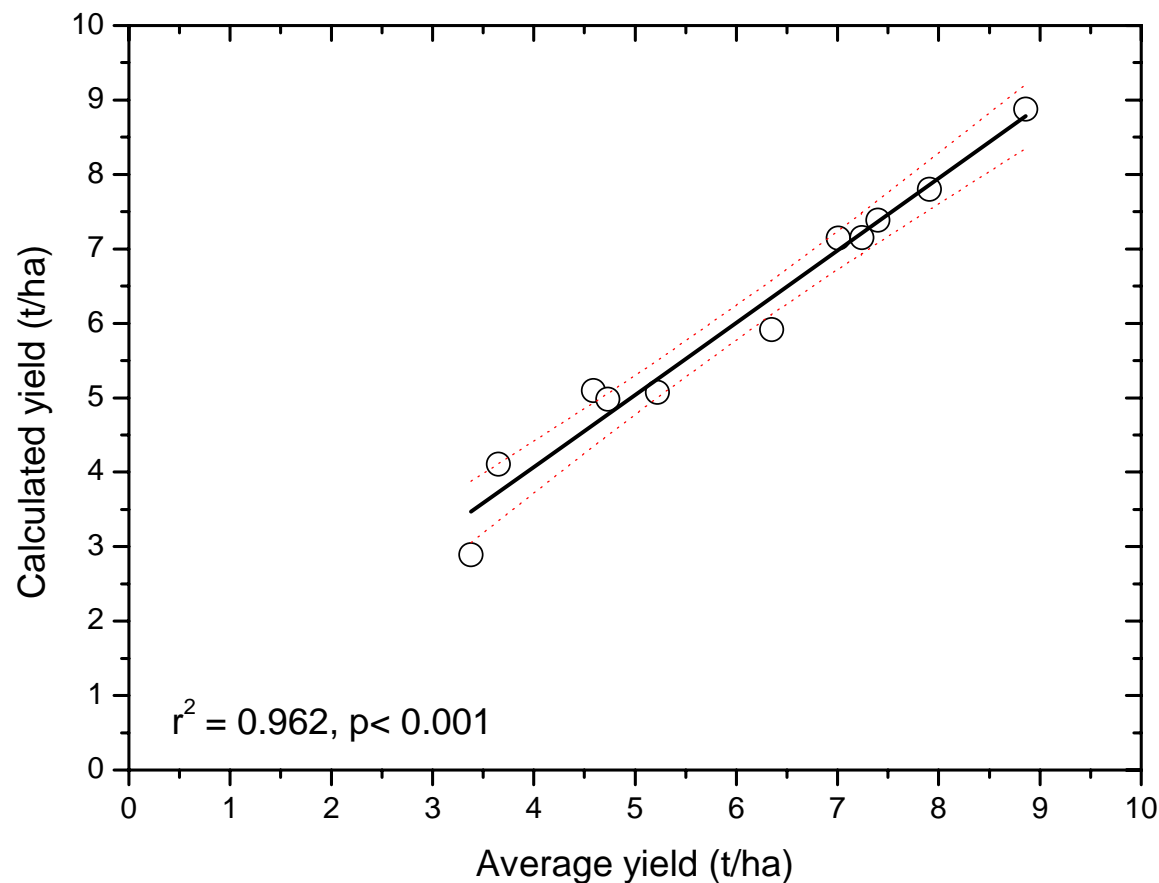approx. 7 t/ha

Approx 75% of orchards
are underperforming

Phenology in New Zealand

Establish a descriptive model using first principles based on phenology

Beyond Flowering
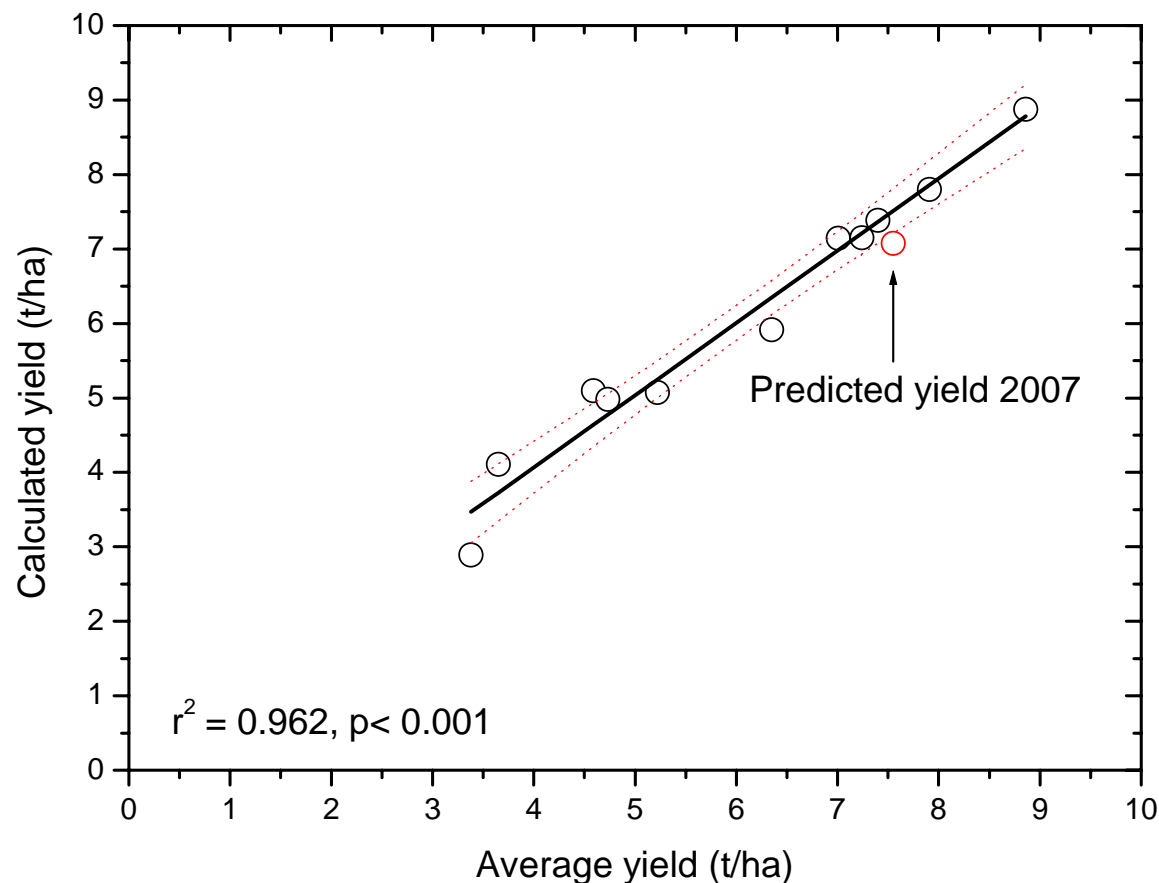

r² = 0.962, p< 0.001

X-axis: Average yield (t/ha)
Y-axis: Calculated yield (t/ha)

Model uses aspects of the weather in:

• September two years prior (shoot initiation?)
• October one year prior (flowering)
• July of current year (leaf drop)

Beyond Flowering

r^2 = 0.962, p< 0.001

(Graph axes: Calculated yield (t/ha) vs Average yield (t/ha), with "Predicted yield 2007" labeled)

Model uses aspects of the weather in:

• September two years prior (shoot initiation?)
• October one year prior (flowering)
• July of current year (leaf drop)

Questions to Investigate

- It is likely there are factors outside of the main flowering period that set up the fruit set potential each year

- Do these factors influence the response to climatic conditions at the time of important phenological events?

- How can this knowledge be used to overcome alternate bearing?