

Grower Trial

Effects of Boron on Avocado Yields

Aim: -

To test which application of Boron are most effective on avocado trees.

Introduction: -

Avocados are a large and growing industry here in New Zealand but avocados require the element Boron

Boron is found in very low levels in New Zealand soils, so farmers must apply Boron to Avocado orchards. Avocados are a rainforest tree from Central America they have a very limited ability to extract boron from soil; this limits the tree ability to set fruit.

The current practice is to: -

- 1: apply regular applications of solubor boron to the soil under the trees (Solubor, Granubor) and
- 2: apply foliar spray of a weak boron solution to the trees while flowering, this is repeated three times between September and November.

Two experiment trials are to be assessed.

One is using a special boron spray – Biomin. This is a new product that has the boron atom attached to an amino acid called Glycine.

Glycine is actively transported into the leaves carrying the boron with it, like a Trojan horse.

The second arm of the trial is to inject boron solution directly into the trunk of the tree. Injecting avocado trees is an established technique used for controlling root rot (Phytophthora)

Hypothesis: -

It is thought that the Biomin sprayed / Injected Boron trees will have higher boron levels and a heavy crop.

Method: -

23 Avocado trees that were in two rows were selected; these trees are the same age and have had the same treatments over the last five years.

Row 1 is the control block. This was given the usual boron applications.

Row 2 is the experiment block, sprayed with Biomin boron three times during flowering.

In addition, alternate trees were injected with four injectors each containing 20 mls of boron solution in October 2001. This is the second arm of the trial.

On 25th February leaf analysis of Boron levels were obtained through RJ Hill Laboratories.

A survey of crop loads was undertaken and graded either Low, Medium Heavy or over cropped.

A survey was also taken of the leaf flush (a measure of how vigorously the trees are growing.

Usually a tree with a poor crop will grow with excessive vigor, but some leaf growth is needed to ensure flowering in the next year.) This was graded Inadequate, Adequate or Excessive.

Discussion: -

It can be seen from these results that the trial Boron applications produced more crop and leaf flush.

The control group with only the Boron spray had the lowest crop load and highest leaf flush. The experiment row plus boron injection had the lowest leaf flush and heaviest crop, it also had the highest actual boron level 57, which is one of the highest boron levels that had been achieved on that orchard.

Materials: -

Tractor / sprayer
Tree Injectors
Boron (Biomin Boron, Solubor boron, Headland liquid boron)

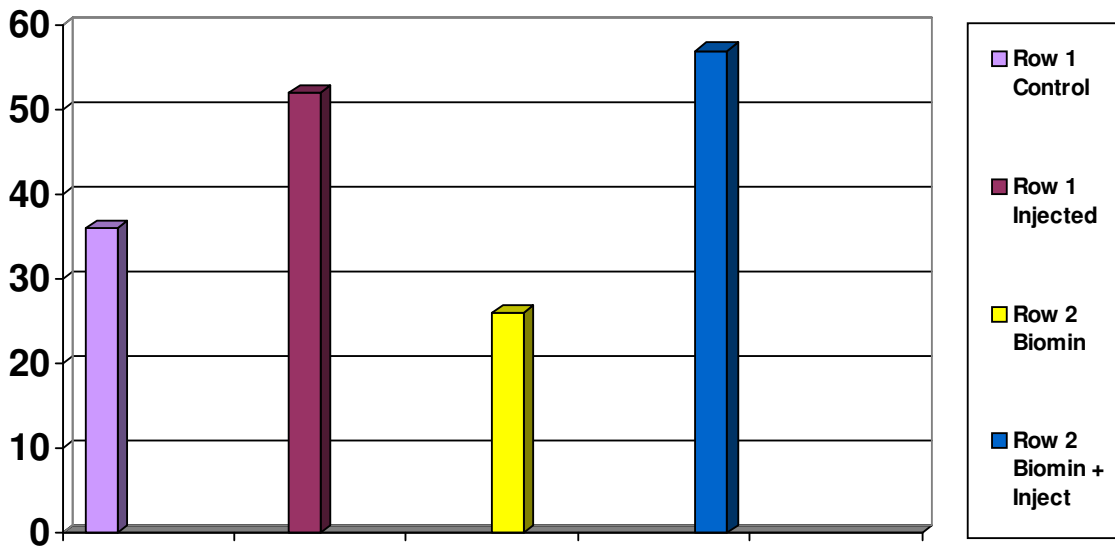
Research: -

Consultation with Dr. Jonathon Dixon of Avocado Industry Council
Advised that crop load / leaf flush could have been measured on a continuum e.g. (1,2,3,4...) instead of light medium heavy.
Discussion of the T Test for probability of results

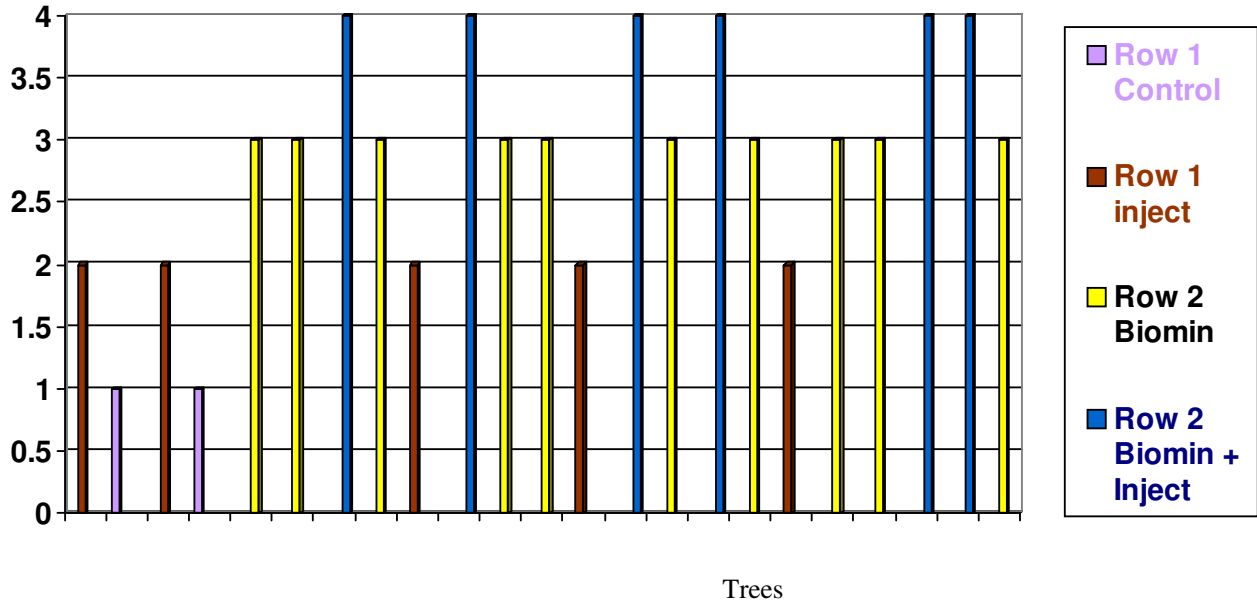
Conclusion: -

The hypothesis was proven correct since Row 2 plus injected had the highest crop loads and the lowest leaf flush. It has also been shown that injected boron makes a difference to measurable boron levels and avocado productivity.
These two techniques could significantly increase production of avocados for many growers in New Zealand.
We were interested to observe that the trees sprayed with Biomin Boron set fruit much more heavily even though the leaf level did not rise. This is due to the fact that Biomin are systemic and the elements will move to the area of need (Flowers in the case of Boron) rather than remaining in the leaf. The trees with Biomin and trunk injection set an especially heavy crop accompanied with a rise in boron leaf level.

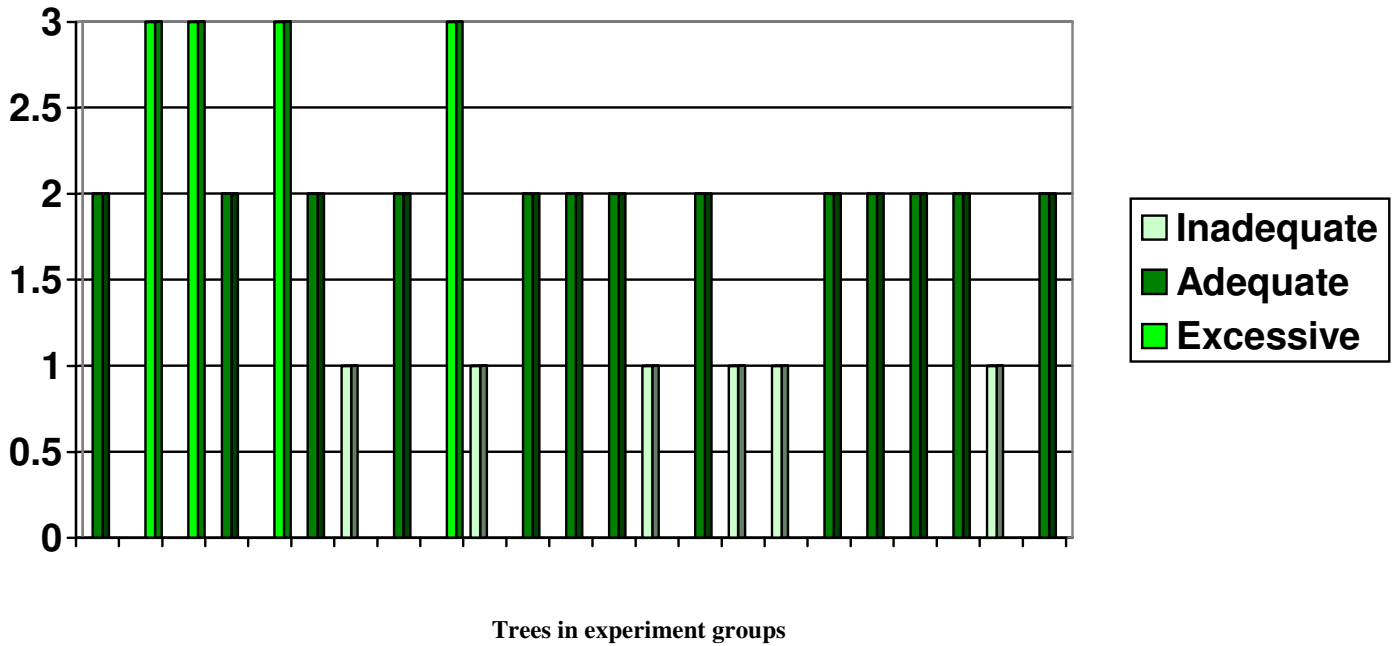
Leaf Boron Levels mcg / gm



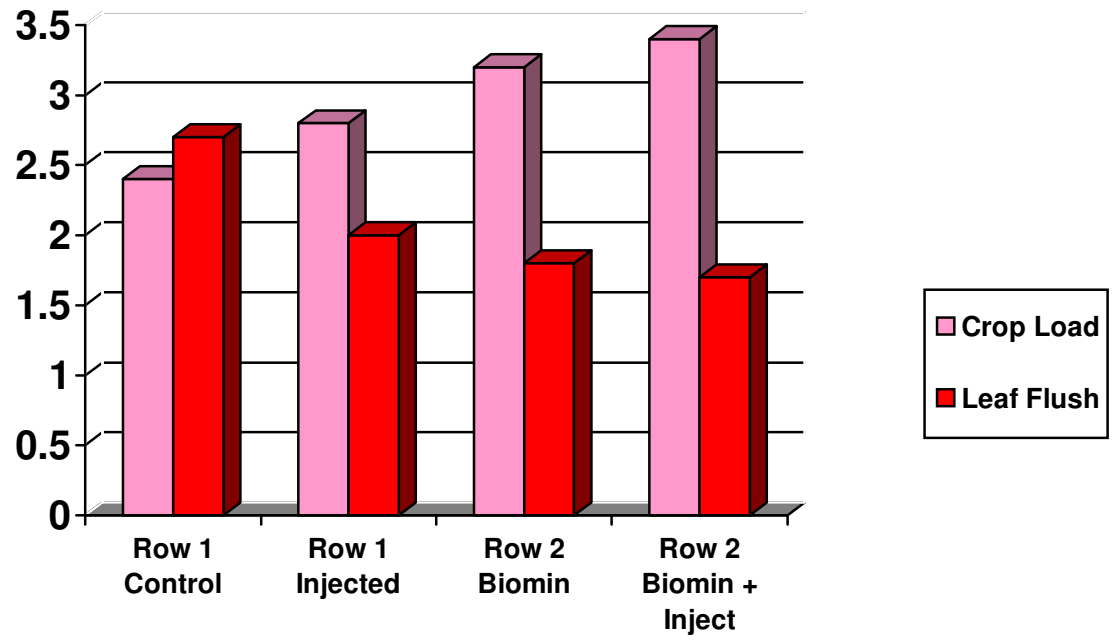
Level of Crop Load



Level of Flush



Means of Crop Load and Leaf Flush



Trees in Averaged Groups