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# Primary Industries Unit

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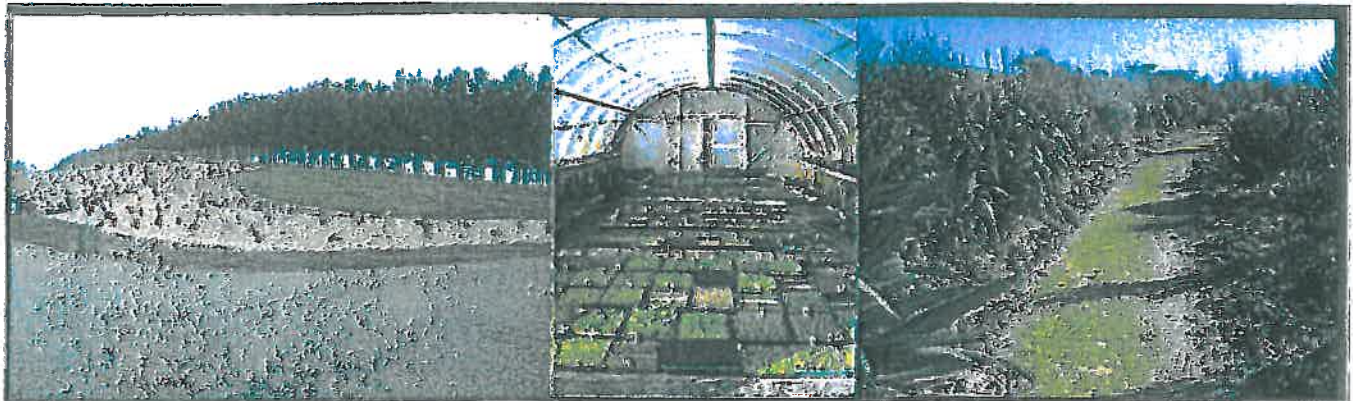
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**MIT Diploma in Horticulture – Level 5**

## **Research Project**

**Use of Mycorrhizae Fungi in the Establishment of Revegetation Plants**

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**John Bidois – December, 2013**

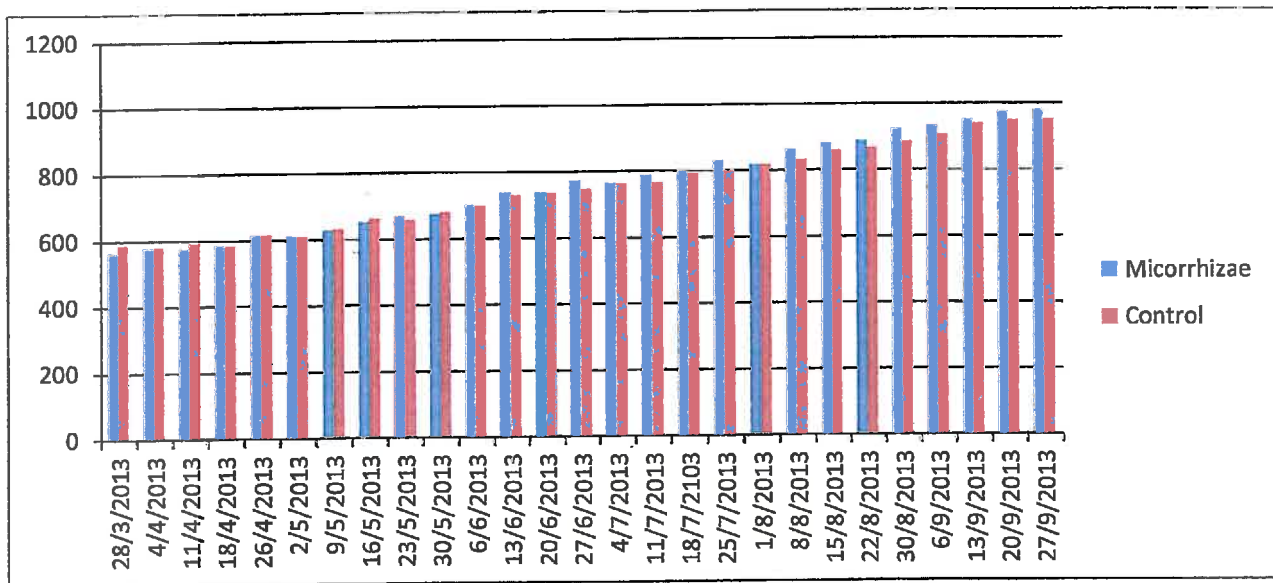


**The Hebe stricta, koromiko**

The koromiko were planted out on the 28/3/2013. These were young plants in Pb3/4 bags. They ranged in height from 450mm to 655mm with an average height of 574.3mm. The 24 plants were split at random into two lots, Control and the Mycorrhizae. After four weeks the koromiko were staked as the wind was taking a toll on the plants with M2 (plant no.2 of the Mycorrhizae lot) double leaders had split so its height had dropped but width measurement increased. Rainy and wet weather gave variations on the measurements regularly. Besides the wind the only other trouble was from looper caterpillars. This was found on both lots but not in great numbers and it was decided not to spray. This decision was taken to see if a) if the pest were attracted to and affected one lot more than the other and b) in a revegetation situation pests are generally not treated for. In any event the caterpillars did not reach a point where they were any threat to the plants.

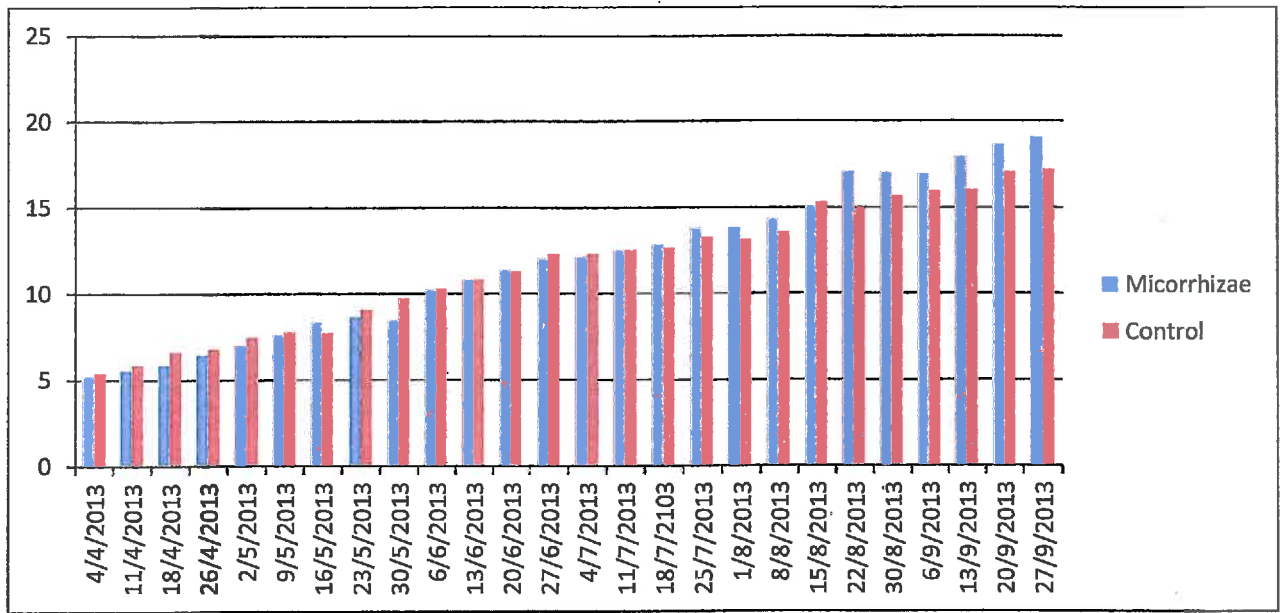
Over 27 weeks the height, width and stem thickness were measured and at the end of the trial the plants were dug up and a measurement of the depth and spread of the roots were taken.

The stem thickness was measured as has been proven in NZ studies to have a direct correlation with root mass development.

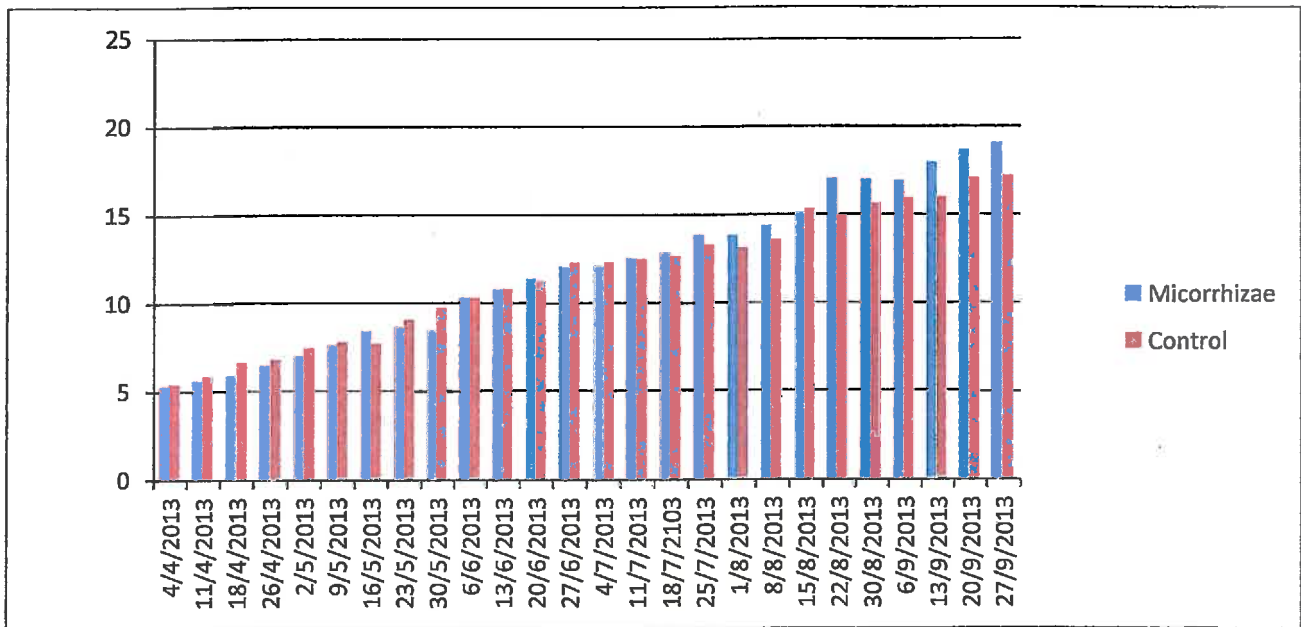


Koromiko Height Weekly Average (mm)

It should be noted that when plant M2 double leaders split it set this plant back and at the end of the trial it was 200mm shorter than the next plant in height in the Micorrhizae lot.



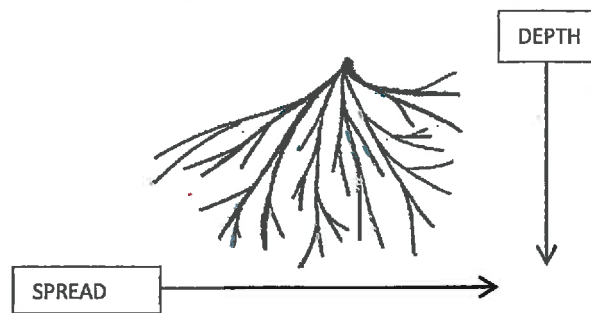
Koromiko Width weekly average (mm)



Koromiko Stem Width weekly average (mm)

Measurement Data Averages (mm)	Start Height	Finish Height	Start Width	Finish Width	Start Stem Width	Finish Stem Width
Control	585.583	951.66	291.66	791.66	5.35	17.19
Mycorrhizae	562.91	980.83	377.50	862.50	5.19	19.05

### Root Measurements



Control	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	Avg.(mm)
Spread	850	830	740	730	760	900	960	800	840	790	830	890	826.6667
Depth	570	560	540	520	580	550	600	500	430	490	540	570	537.5

Mycorr.	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Avg.(mm)
Spread	980	1000	1110	1140	990	1050	1030	1040	1030	960	950	1090	1030.8333
Depth	720	700	540	790	670	630	600	680	620	640	500	900	665.8333

The koromiko were dug up over several days. The soil was washed from the roots and then they were laid out and measured. It was noticeable that the Mycorrhizae lot plants had more surface area roots and the time to wash away the soil from them was longer than that of the control lot as they held more soil and held on to it more persistently.

### Koromiko Summary

The data gathered favours that of the Mycorrhizae lot in plant height, width, stem width and root mass. It was also observed that during the trial the foliage on the Mycorrhizae lot was denser than that of the control lot. Of all three plant trials the koromiko have shown most benefit from the Mycorrhizae.

Koromiko Photos



The 24 Koromiko plants



The Mycorrhizae Plot



One month later 26/4/2013 (Control plot)



Three months after planting 26/6/2013 (M. Plot)



Caterpillar



Mycorrhizae plot 5/9/2013



Surface roots M6



Measuring the root system

### Complete Trial Conclusion

While the results from the tulips and the kale were mixed and a conclusion cannot really be made other than the visual assessment the koromiko I believe benefitted from the Mycorrhizae. The Mycorrhizae lot at the start of the trial were on average smaller in height, width and stem width than the Control lot. Twelve weeks after the trial was started the lots were even in all data measurements. At the end of the trials the koromiko were 3cm higher, 7cm wider and the stem width was 2mm wider. From this I can conclude that the Mycorrhizae lot had a faster growth rate.

Most benefit was seen in the root system. On average the spread was 20cm wider and the depth was 9cm deeper.

The root growth factor is important in revegetation projects as many are on hillsides or on unstable land. Also by observation the Mycorrhizae lot had more root mass and surface area roots. This with the greater root depth and spread will give the plants more water and nutrients making them healthier and more capable of withstanding attack from pests and diseases. It will also help in times of dry periods in the summer.

The interesting factor of the tulip trial is in the fact that the Mycorrhizae lot of bulbs produced a greater number of pup bulbs and a higher weight of bulbs than the Control lot did. This poses the question have the Mycorrhizae lot of bulbs stored more energy than the Control lot and will they produce a better bloom next year? These bulbs have been stored and next year a Level 5 student will trial them to see if this is so.

The kale and tulips being short term crops I do not think had time to see full benefits from the Micorrhizae but the koromiko results show that they did benefit from it. I conclude that native plants will have a faster growth rate and survival rate in revegetation projects with the use of the Mycorrhizae fungi.

