

Controlling transplant shock in lettuce

Research undertaken by Applied Horticultural Research shows that drenching lettuce seedlings with potassium nitrate at transplanting can increase yields by 20%.

Introduction

Transplant shock is the reduction in growth which occurs when seedlings are transplanted from a container into the field. Significant transplant shock can cause poor plant stands and a lower percentage cut of good quality lettuce at harvest.

It has been observed that drenching lettuce seedlings with potassium nitrate just before they are transplanted into the field, can help the young plants to establish more quickly. In other words, reduce transplant shock.

Potassium nitrate supplies the plants with both potassium and nitrogen at the same time, and it can be readily absorbed both by the roots and the leaves of the young plants.

AHR wanted to test this observation in properly conducted, replicated field trials.

Investigating transplant shock in lettuce cultivars

AHR researchers applied a potassium nitrate solution to seedlings of Cos (cv. Quintas) and Iceberg (cv. Toscanas) lettuce just before they were transplanted into the field at a commercial lettuce farm in Sydney.

The potassium nitrate was applied as a drench over the top of the plants, at a rate of 40 g per 2.5L of water per 1000 seedlings while the seedlings were still in the trays. The seedlings were then transplanted into field (September 2014) at a density of 44,000 plants per hectare as a randomised complete block trial.

The plants were assessed 4 weeks after transplanting, and then again at 7 weeks (commercial maturity). At each assessment, individual plants were harvested from the centre rows, trimmed as fresh market lettuce with the roots and the base of the stem removed. Head fresh weights were then recorded in grams per plant.

What was found?

Pre-harvest growth responses

Researchers found that potassium nitrate drenching resulted in larger plants, four weeks from transplanting (Figure 1).



Figure 1: Iceberg lettuce 15 days after transplant. Potassium nitrate (left) versus control (right).

The potassium nitrate treatment resulted in a 25 per cent increase in shoot fresh weight compared to the control when applied to Iceberg lettuce (cv. Toscanas) (Figure 2) and a 22 per cent increase in fresh weight in Cos lettuce (cv. Quintus), 4 weeks after transplanting (Figure 3). The pre-harvest shoot weight results were statistically significant ($P < 0.05$) for both lettuce types.

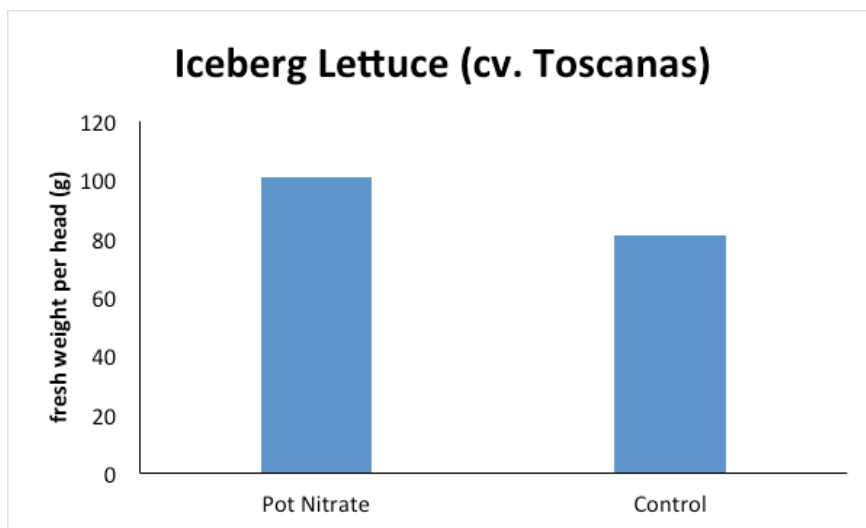


Figure 2: Iceberg lettuce shoot weight 4 weeks post-transplant (pre-harvest).

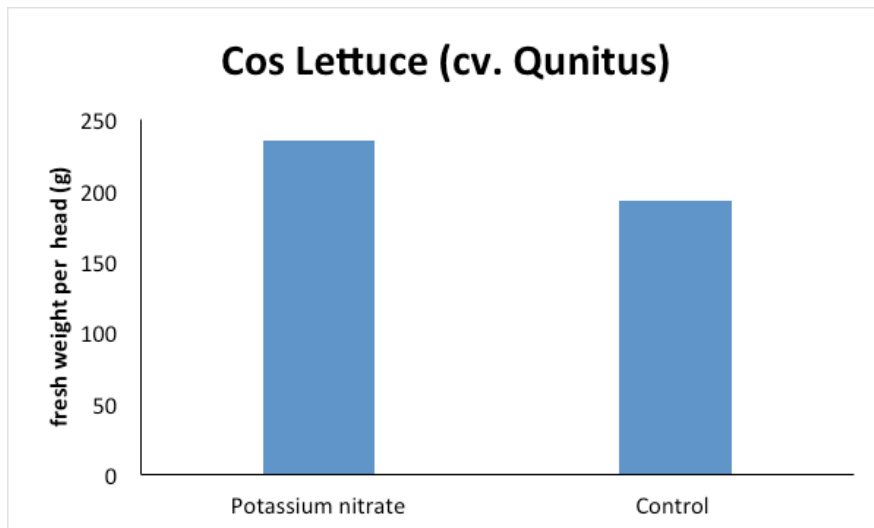


Figure 3: Cos lettuce shoot weight 4 weeks post-transplant (pre-harvest).

Harvest growth responses

Improvement in shoot weight in response to the potassium nitrate treatment was also observed at the harvest stage.

In iceberg lettuce, the head weights of drenched plants were 19 per cent higher than plants which did not receive the potassium nitrate drench (Figure 4).

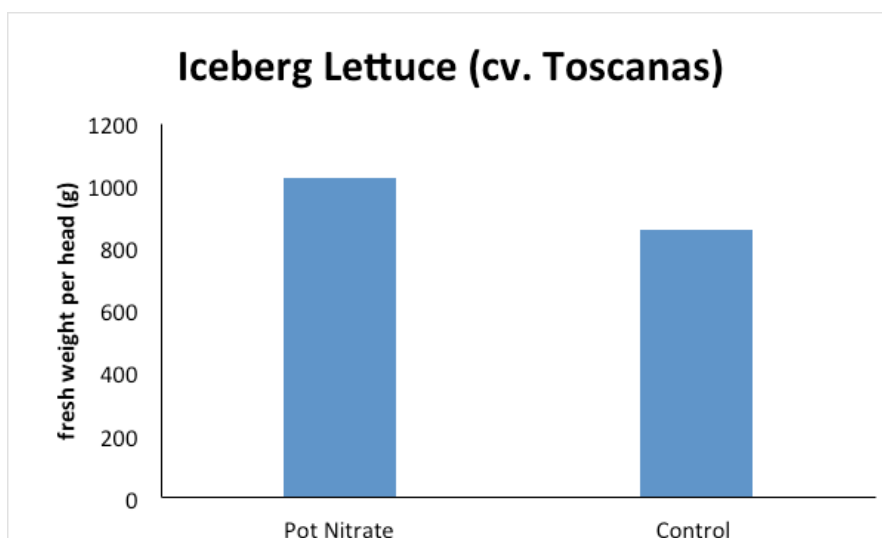


Figure 4: Iceberg lettuce head weights at harvest.

In Cos lettuce, potassium nitrate drenching improved head weights at harvest by 12 per cent compared to the control plants (Figure 5). The harvest yield results were statistically significant ($P < 0.05$) for both lettuce types.

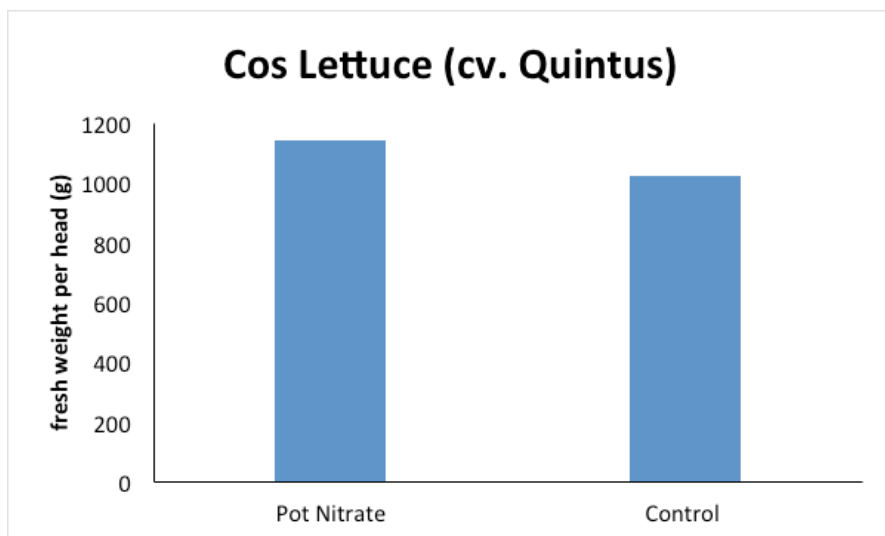


Figure 5: Cos lettuce head weights at harvest

Conclusion

Researchers found that lettuce fresh weight was significantly improved when potassium nitrate was applied as a drench at transplanting at a dilution rate of 40 g per 2.5L of water per 1000 seedlings. Overall potassium nitrate was observed to reduce transplant shock which resulted in 12-19% higher yields at harvest.

Looking ahead, the researchers plan to expand their study to other treatments, such as controlling lettuce pests.

“The next stage is to test the effect of drenching lettuce seedlings with potassium nitrate after Durivo® or Confidor® have been applied in the nursery to control lettuce aphid,” said Dr Gordon Rogers, Applied Horticultural Research.

Project Number: VG12017

This project was funded by Horticulture Innovation Australia (HIA) using the National Vegetable Levy and funds from the Australian Government.

For more information contact Gordon Rogers, Applied Horticultural Research. Email: gordon@ahr.com.au or phone: 0418 51 7777.