



## INDEPENDENT TRIAL OF TwinN IN LETTUCE, CALIFORNIA 2021

### SUMMARY

The trial tested the effects on yield of lettuce grown with 75% and 100% nitrogen rates, with and without TwinN microbial biofertiliser. Reducing the nitrogen rate from 100% to 75% resulted in an 8.25% decrease in yield when no TwinN was applied. When TwinN was applied to 75% nitrogen plots the yield increased to 10% greater than the 100% nitrogen. This translated directly to a 10% increase in dollar returns compared to the Grower Standard (100% N) via the use of TwinN.

### INTRODUCTION

TwinN is a freeze-dried microbial biofertiliser from Australia. It acts to increase yields by a number of mechanisms.

1. The microbes colonise the roots and fix nitrogen from the atmosphere into a steady supply of plant available nitrogen through the season.
2. The microbes produce plant growth factors, particularly auxins, that increase secondary root structure which allows improved capture of applied nitrogen fertilisers. This improves nitrogen use efficiency and also reduces leaching of nitrogen into waterways.
3. The microbes produce several other plant growth factors which stimulate plant growth and yield accumulation.

This trial aimed to test the effects on lettuce yields of using TwinN. The optimum treatment (75% N plus two TwinN applications) increased yields and commercial returns by 10%, reduced nitrogen costs, and improved sustainability of production via reduced nitrogen fertiliser use and reduced carbon footprint of production.

### TRIAL DESIGN

The trial was performed by Holden Research and Consulting, an independent research provider, and was completed in November 2021. The trial site was near Somis, California. The lettuce was transplanted Head lettuce cv Avenger. Trial design was Random Complete Block with four replicates of four treatments. Plots were 5.33 x 20 ft. TwinN was applied once at transplant at the standard rate via tape to deliver the microbes into the root zone. A soil test was done prior to the trial and leaf analysis was performed near the end of the trial.

The plots were harvested on three dates as is standard commercial practice. Only marketable heads were recorded. The average marketable yields were extrapolated to pounds per acre and boxes per acre based on an average of 22-28000 pounds per acre production in California

(<https://anrcatalog.ucanr.edu/pdf/7216.pdf>). Based on this information an extrapolated net return back to the farm was calculated for the time period using an average of \$22 per carton FOB based on the daily market price (<https://www.marketnews.usda.gov>) minus an estimated \$6 per carton for cutting, hauling, packaging, and cooling costs.

## TREATMENTS

Treatment 1 (Grower Standard) 100% fertiliser rate.

CRF 19-5-8 (100%) 500 lb/ac, pre-plant. CAN 17 (100%) 20 gal/ac, 4 weeks post plant. CAN 17 30 gal/ac, 7 weeks post plant. No TwinN.

Treatment 2 Grower Standard plus one TwinN at planting.

Treatment 3 75% N plus one TwinN at planting.

CRF 19-5-8 (100%) 500 lb/ac, pre-plant. CAN 17 (50%) 10 gal/ac, 4 weeks post plant. CAN 17 (50%) 15 gal/ac, 7 weeks post plant. One TwinN at planting and again at 8 weeks post plant.

Treatment 4 75% N. No TwinN.

## RESULTS

SPAD, vigor, and Canopeo were used for in season evaluation of the developing heads of lettuce. No significant differences were found between treatments. Leaf analysis by A&L late and at the end of the season showed no differences except for Treatment 3 which showed the highest leaf nitrogen at both time points.

Table 1. Yield of marketable heads at three time points and in total at seasons end

	Harvest 1	Harvest 2	Harvest 3	Total yield weight lb/ac*	Boxes/ac	\$/ac*
Treatment 1	3899	2398	890	23825 (GS)	529	8471 (GS)
Treatment 2	3375	2351	1111	24150 (+1.4%)	537	8587 (+1.4%)
Treatment 3	3045	2104	2173	26184 (+10%)	582	9310 (+10%)
Treatment 4	2580	2961	755	21873 (-8.25)	486	7777 (-8.25)

\* = Percentage increase or decrease compared to Grower Standard (T1)

The highest yield occurred in Treatment 3, 25% reduced nitrogen plus one TwinN applications which increased both total yield (extrapolated out to yield per acre) and return to producer of a 10% increase over the Grower Standard (100% nitrogen, no TwinN). Treatment 3 (25% reduced nitrogen plus two TwinN applications) is the commercial recommendation for use of TwinN in leaf and vegetable crops. Note that in crops with a longer cycle the standard recommendation is for a second TwinN application midway through the crop cycle.

## SUMMARY

TwinN application, in a trial that followed commercial practices in California, produced a 10% increase in yield and commercial returns to the producer. These increases were achieved in combination with a 25% reduction in nitrogen fertiliser application. Use of TwinN in lettuces and other vegetable crops increases yields and commercial returns to producers. It also increases sustainability of production via reduced nitrogen effects on waterways and reduced carbon footprint of production.

## COMMERCIAL GROWER RECOMMENDATIONS

These are some guidelines for use of TwinN in lettuce production.

- Apply the pre-plant fertiliser at standard rates
- Reduce in-crop nitrogen fertiliser to 75 - 80% of the standard rate
- Make reductions to N as evenly across the season as possible
- Do not cut other nutrients such as P and K
- If TwinN is being applied in organic lettuce crops (TwinN is OMRI certified) do not reduce any organic nutrients. Apply TwinN on top of the organic nutrition program.
- Apply TwinN to the crop via fertigation immediately after transplant to speed early root growth and establishment
- Apply TwinN again at 6-7 weeks after the initial application
- Apply via fertigation. Be sure to avoid doing applications during hot sunny periods if there is a risk that black plastic irrigation lines can become hot in the direct sun.
- Do not co-apply TwinN microbes with agrochemicals including fertilisers. Avoid applying these for 24hrs before and after the TwinN application.
- Ensure the irrigation lines are free of agrochemicals before TwinN application
- Do not expose the TwinN microbes to chlorinated water during application. Chlorinated water can be used for the crop after TwinN application is complete.
- If only chlorinated water is available for application of TwinN de-chlorinate with sodium thiosulfate (STS). See [www.mabiotec.com](http://www.mabiotec.com) for instructions or contact your distributor. For organic methods to de-chlorinate see [www.mabiotec.com](http://www.mabiotec.com).

TwinN is supplied by Mapleton Agri Biotec Pty Ltd, Australia. [www.mabiotec.com](http://www.mabiotec.com)

For information on locating distributors of TwinN in USA contact **DEWHOPS ENTERPRISES, LLC.**

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