

Effects of nitrogen on yield in Wairarapa pea crops

Foundation for Arable Research

Key Points

- The application of nitrogen fertilizer on pea crops in the Wairarapa did not result in a significant gain in yield compared to pea crops with no supplementary nitrogen fertilizer.
- Applying nitrogen fertilizer did not show any benefits to the harvest index compared to the harvest index of pea crops with no additional nitrogen.
- From various preceding trials and paddock comparisons, there was furthermore no yield response to applying nitrogen fertilizer to peas. The loss of income from applying fertilizer to pea crops was as high as \$570/ha.

Introduction

For many years the addition of nitrogen to pea crops has been disputed. As various growers comment, applying nitrogen to pea crops has been tradition, adjusts soil nitrogen for following seasons and ensures indemnity for variable environmental conditions throughout the season. Previous research has shown that nitrogen application does not enhance yields. Therefore, thousands of dollars are being wasted on ineffective fertilizer that could have been used elsewhere. Large quantities of nitrogen applied aimed at fixing soil qualities for the next crop can be lost to leaching and atmospheric fixation. Consequently, this form of preparation is devastating to the environment.

This trial was conducted to test the yield response of direct drilled peas to nitrogen in the Wairarapa region to support growers with their crop management plans.

Methods

Three paddocks were set up with two even sized plots (10m x 100-150m), side by side down the centre of the field. One plot had no fertilizer applied and the other had fertilizer applied. Normal paddock management occurred on both plots throughout the season as per usual.

Sampling: Seven 1m² transect samples were taken at random in each plot. Plants were cut at ground level and bagged in light jute bags.

The samples were dried in the lab and grain weights were obtained.

Results

Data from one of the trial sites may have been biased. Samples were only able to be obtained from a small area of the paddock which does not give an accurate representation of the paddock. Results consequently may have been affected.

Means of the treatment yields and harvest index were calculated and analyzed through a Randomized Complete Block ANOVA-all pairwise comparison.

Results concluded that applying nitrogen fertilizer to peas did not produce a yield advantage over peas which had no applied nitrogen fertilizer (P= 0.46) (table 1). There was no statistically significant difference in yields between treatments with the resulting LSD smaller than the difference of the two means (therefore insignificant) (table 1). There was also no statistically significant difference between sample dry weights for the treatments (P= 0.27) (table 1).

Table 1. Sample and grain weights. F- Fertilized, NF- Not fertilized. Sample dry weight (t/ha)- no significant difference was found between treatments (LSD(5%) 1.32)(p=0.27). Grain weight (t/ha)- no significant difference was found between treatments (LSD(5%) 1.05)(p=0.46). Sample dry weight is the weight of the complete sample taken from the 1m² transect.

Treatment	Sample Dry Weight (t/ha)	Grain Weight (t/ha)
F	6.91	3.80
NF	6.46	3.57
LSD(5%)	1.32	1.05
P-Value	0.27	0.46

Furthermore, a comparison of the harvest index obtained from each treatment also concluded that nitrogen fertilizer application on pea crops did not produce an advantage over pea crops which had no applied nitrogen fertilizer (table 2). There was no statistically significant difference in harvest index between treatments with the resulting LSD smaller than the difference of the two means (therefore insignificant) (P= 0.92) (table 2).

Table 2. Harvest index for fertilized and not fertilized treatments. F- Fertilized, NF- Not fertilized. No significant difference was found between the treatments (LSD(5%) 0.0966) (p= 0.9283).

Treatment	Harvest index
F	0.35
NF	0.36
LSD (5%)	0.0966
P-Value	0.9283

Discussion

As outlined above, no significant benefit was demonstrated from the application of nitrogen fertilizer to pea crops for either yield or harvest index (table 1, 2). The yield benefit found in two of the fertilized treatments from the trials this year was not significantly better than that of the unfertilized treatments (table 1). Without even considering the cost of the nitrogen fertilizer and application costs, fertilizer on peas is not advantageous to the grower. This was also the same scenario for harvest index (table 2).

As noted in the FAR Arable Update (Pulses) No. 27, the loss of income from applying fertilizer can be as high as \$570/ha. This figure was obtained from a collection of 25 replicated trials so it has good reliability.

Similar research conclusions

Ksiezak (2006) explored the affect of nitrogen on pea plants and concluded that the application of nitrogen disadvantaged plants physically. It was found that supplementary nitrogen reduced the number of pods per plant, reduced the flowering region of the stem, restricted the construction of knots with pods and caused a higher position of the primary pod on the pea stem (Ksiezak 2006). Clayton (2004) also performed a study on the affect of nitrogen on pea yields and concluded that nitrogen application reduced natural nitrogen fixation therefore reducing yields. Additionally, Fernanes and Pereyra Rossiello(1995) state that nitrogen increases the plants physical ability to ingest water.

References

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