



Grower Summary

FV 437

Maximising yield through optimal establishment and agronomy of modern asparagus crops

Annual 2015

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HDC is a division of the Agriculture and Horticulture Development Board.

Project Number: FV 437

Project Title: Maximising yield through optimal establishment and agronomy of modern asparagus crops

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Previous report/(s): None

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End Date: 31 March 2017

Project Cost: £190,179

GROWER SUMMARY

Headlines

- Two field experiments were successfully set up at a single site in Lincolnshire in 2014 to identify the optimum nitrogen and phosphorus fertiliser treatments that are necessary at establishment in order to achieve maximum yields from new asparagus plantations.
- To date the crop, pest and disease assessments showed no significant statistical differences between treatments. In addition there were no visual symptoms of nutrient deficiency and fern tissue analysis showed macro and micro nutrient concentrations to be within the range reported in HDC factsheet 14/13 'Asparagus nutrient management'.

Background

Asparagus is a high value crop to which the land is committed for ten years or more. Soil structure, pH and nutrient indices all have to be ideal or corrected at the time of establishment to enable optimum returns to be obtained for the duration of the plantation. Correct levels of nitrogen (N) and phosphorus (P) need to be applied at planting to ensure good growth and establishment. There has been little work on nutrition of the asparagus crop since HDC project FV 152 (1996; study of N responses) and HDC project FV 153 (1996; study on P and potassium (K)). Phosphorus has been shown to be an important nutrient for root growth and mass and it can influence later yields, as shown in work carried out on asparagus by Dan Drost in the USA.

The aim of this project is to identify optimum N and P fertiliser treatments at establishment which will result in maximum yields from new asparagus plantations. The specific objectives are to:

- a) Establish a field experiment to investigate the optimum rate of N at establishment in Year 1,
- b) Determine the appropriate rate of N at or above current RB209 recommendations for Year 2 using the plots established in Year 1,
- c) Establish a field experiment to investigate placement of P in Year 1,

- d) In each experiment, assess plots annually for spear yield (except year 1), nutrient concentrations in the fern, pest and disease incidence, root biomass, and canopy size.

Summary

Two field experiments were established in 2014 at a single location near Boston (Lincolnshire) to assess (i) the effects of N fertiliser rate, and (ii) the effect of placement of P fertiliser close to the crown in a new plantation. The site was planted with 'A' grade crowns of the variety Guelph Millennium on the 13/05/2014. Soil samples were taken prior to planting in February 2014; the site was SNS index 0 (37 kg/ha SMN), P index 4, K index 2 and Mg index 2.

The N response experiment included 5 application rates plus a control: 0, 50, 100, 150, 200 and 250 kg N/ha (applied as ammonium nitrate, AN). There were 4 replicates of each treatment arranged in a randomized block design.

A second factor will be studied in the second year to determine if current RB209 recommendations of applying 120 kg N/ha in the first year following establishment are sufficient for modern asparagus varieties, or if a 25% higher rate is needed. These will be arranged as sub-plots within the main plots in year 2.

The P response experiment included 4 treatments:

1. Control – no P fertiliser
2. 'Placed' P – 58 kg/ha P_2O_5 (as Di-ammonium phosphate - DAP)
3. 'Corrective' P (i.e. RB209 recommended rate) – (75 kg/ha P_2O_5 as Triple superphosphate - TSP)
4. 'Placed' P (58 kg/ha P_2O_5 as DAP) plus 'corrective' P (75 kg/ha P_2O_5 as TSP)

The P response experiment included 3 replicates of each treatment arranged in a randomized block design. 'Corrective' P application rate was based on RB209 recommended rates for establishment year at soil P index 4 (75 kg/ha P_2O_5) and was broadcast as TSP prior to planting. Placed P was applied as DAP during ridging following planting using a modified Horstine applicator (as shown in the image below):



Horstine applicator, modified to place fertilizer in the furrow with the asparagus crowns © ADAS

The N and P experiments were monitored during 2014 for:

- Pest and diseases,
- Canopy size (i.e. fern cover) by surface reflectance measurement (CropScan),
- Crown population, spear numbers per crown and average thickness of spears per crown,
- Fern tissue analysis (N, P, K, Mg, Ca, B, S, Cu, Zn, Fe and Mn),
- Soil nutrients – topsoil and SMN (0-90 cm) from across the site prior to treatment application in February 2014, and additional SMN (0-90cm) samples from each N treatment in November 2014,
- Root biomass production (0-90 cm soil cores taken in January 2015).

The crop, pest and disease assessments from the first year of the experiments showed no significant statistical differences between treatments. There were no visual symptoms of nutrient deficiency and fern tissue analysis showed macro and micro nutrient concentrations were within the range reported in HDC factsheet 14/13 'Asparagus nutrient management' (Drost, 2013).

Root cores were taken in January 2015 to assess root biomass; laboratory analysis is ongoing and the results will be presented in the annual report for year 2 of the project.

Soil mineral N sampling from the N response experiment in November 2014 showed a statistically significant linear increase in SMN with increasing fertiliser N rates. Soil mineral N on the zero N control treatment in November 2014 was 165 kg/ha N, increasing to 247 kg

N/ha on the 150 kg N/ha fertiliser N rate (i.e. RB209 recommended rate) and to 344 kg N/ha on the highest fertiliser N rate of 250 kg N/ha; indicating that the majority of fertiliser N applied was not taken up by the crop and remained within the soil at the end of the growing season and at risk of loss via nitrate leaching.

The crop, soil and root assessments taken in this establishment year have provided comprehensive baseline information for comparison with subsequent years. Measurements in years 2 and 3 of the experiment will assess the impact of N and P treatments at establishment on subsequent asparagus yields.

Financial Benefits

None to date, harvesting will take place from 2015 onwards.

Action Points

None to date.