New Project

FV 350a

Quantifying over-winter nitrogen requirements of the leek crop

Project Number:	FV 350a
Project Title:	Quantifying over-winter nitrogen requirements of the leek crop
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Start Date:	01 March 2013
End Date:	30 September 2014
Project Cost (total project cost):	£82,009

Project Summary:

In recent years, our understanding of the nitrogen (N) requirements of leeks has improved through HDC funded work. Project FV350 broadly validated the revised fertiliser recommendation for modern F1 hybrid leeks within the 2010 version of the Fertiliser Manual (Defra 2010). The responses to additional N were variably affected by both harvest date and season.

The two seasons where FV350 was carried out were affected by severe winters. Results from FV350 justified the application of additional fertiliser N in August and September to early maturing crops harvested in the autumn, but no crop survived to the spring. Given the increased scrutiny on N applications during the closed period under NVZ rules, there is a need to better understand the requirement of leeks for N particularly from October through to harvest the following spring.

For over-wintered crops in FV350, when summer N requirements were met, additional N sometimes led to yield reductions due to frost damage. Further work is therefore required to investigate the precise requirements for N in over-wintered leeks, in early, mid and late maturing crops, and to assess the value of measuring crop N status and soil N supply, on the need for additional applications of N fertiliser.

The work under FV350 was carried out on a single experimental site, whereas in the project proposed, all work will be carried out in commercial leek crops. Moreover, studies will be carried out on light sandy soils which are most likely to show

responses to late applied N without complicating factors such as mineralization of N from soil organic matter.

Field experiments will be established in the 2013/14 season, to assess the responses to both the rate of N applied (up to 150 kgN/ha) and timings (fertiliser N applied in 50 kg/ha increments) on marketable yield, non-marketable crop fractions, and total N offtake (and hence N requirements). In addition at each site, a treatment will be included in the experimental design, to examine the effect of nitrification inhibitor (applied with a rate of 100 kgN/ha).

The information from these experiments will provide guidance on how to match fertiliser applications to crop N requirements of over wintered leeks, based on assessments of crop N status, and soil mineral N prior to application of fertiliser.

Such principles may be applied more generally to crops of leeks grown on other soils when other sources of N supply are taken into account.

Aims & Objectives:

(i) Project aim(s):

To identify the over-winter nitrogen requirements of leek production systems and provide growers with guidelines for closer matching of nitrogen fertiliser applications to maximise production of quality produce with minimal impact on the environment.

(ii) Project objective(s):

Objectives are to:

a) establish three field experiments within commercial leek crops, representing early, mid and late maturity crops,
b) study the effects of timing and rate of N applied as well as the effect of a nitrification inhibitor during the over-winter period on leek yield,
c) assess the usability of crop N status and SMN measurements as tools to predict the benefits from overwinter applied fertiliser N,
d) measure the marketable yield, biomass and total N uptake by the three leek crops in the 2013/14 winter period,
e) measure return of crop N to field in non-marketable fractions and hence value to following crops,
f) measure residual SMN after harvest, and hence assess use of additional nitrogen applied and its potential benefit to following crops.

Benefits to industry

The current project will test tools which can be used by growers to decide whether or not, and if so when, to apply the additional late N. If the tools are robust then it will be possible to increase yields, reduce the severity of frost damage, and reduce

fertiliser use when crop and soil N supplies are sufficient to meet demand.

Based on a marketable yield of 27.1 t/ha, the price of N at £1/kg N, and trimmed produce in trays ex-packhouse at £850/t, the financial consequences of applying an additional 100 kg/ha N to leeks can be variable but significant. For example, in experiments carried out in the 2009/10 season, there was a yield increase of 20% at the November harvest in response to 100 kg/ha additional N applied in August and September, which resulted in a theoretical financial benefit of £4,500/ha.

However excess N in the autumn could cause a crop loss equivalent to £23,000/ha based on the figures above, or the need to harvest the crop rather sooner than expected

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