

Final Project Summary

Project title	Updating N fertiliser management guidelines for winter barley		
Project number	216-0006	Final Project Report	PR571
Start date	01/08/2013	End date	28/02/2017
AHDB Cereals & Oilseeds funding	£157,494	Total cost	£157,494

What was the challenge/demand for the work?

The current Eighth edition of the RB209 guidelines for N rate and N timing are based on experiments carried out in the late 1980s. Since then variety yield potential for both feed and malting varieties has increased, hybrid varieties have been introduced and agronomic practices have improved, particularly for disease control. Furthermore, understanding about how barley yield is formed has advanced, such that the crop is known to be sink limited and it is important to maximise ear number. It is likely that these factors will affect the optimum rate and timing of N fertiliser to realise the high yield potential of winter barley, whilst achieving grain quality. At the start of the project there was evidence from several sources including trials by CF Fertilisers and Syngenta that RB209 N guidelines were out of date in terms of both timing and rate. It was estimated that sub-optimal N rates and timings is leading to a significant amount of unrealised farm profit of about £25 million per year for UK winter barley.

How did the project address this?

The aim of this project was to review existing evidence and generate new data in order to produce an AHDB Guide describing N management of winter barley and to provide evidence for updating the RB209 N management guidelines for winter barley. Specific objectives included;

1) Review existing data on optimum N rate and N timing for winter barley.

The review collated and analysed relevant data from 25 N fertiliser experiments to help understand how N timing and N rate influence winter barley yield.

2) Determine experimentally how the optimum N rate varies between different variety types (2-row feed, 2-row malting, 6-row feed and hybrid feed) and compare against older varieties from the 1980s.

3) Investigate the optimum N timing for different variety types (2-row feed, 2-row malting, 6-row feed and hybrid feed).

Seven N rate x variety experiments and nine N timing x variety experiments were carried out during the 2013-14, 14-15 and 15-16 seasons. The experiments were carried out on a range of soil types in Herefordshire, North Yorkshire and Scotland to provide a wide range of testing environments. Measurements of yield, quality, lodging and other physiological traits were made on all experiments.

4) Transfer new knowledge to farmers and agronomists.

To be done through the production of an N management Guide, conference presentations and regular dissemination of project updates.

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What outputs has the project delivered?

The project demonstrated that the 2010 edition of RB209 Fertiliser Guidelines underestimate the N fertiliser requirement for winter barley with a yield of more than the UK farm average winter barley yield of 6.5 t/ha. For each tonne of expected yield above 6.5 t/ha the crop was shown to require an additional 20 kg N/ha. The project showed that higher yielding feed and malting varieties required more N to achieve their full yield potential compared with lower yielding varieties. It was shown that N fertiliser timings should be earlier than recommended by the 2010 edition of RB209. A greater percentage of the total N should be applied before the start of stem extension (GS31). On average applying between 50% and 100% of the N at tillering to GS30 increased yield by 0.3 t/ha compared with applying the RB209 recommendation of about 30% of N before stem extension. All variety types investigated responded similarly to earlier N and there was no evidence that different N timings are required for specific varietal types.

The earlier N strategy described above reduced the grain N concentration by almost 0.1% which, together with the greater understanding of how N rate and N timing affects grain N developed by the project, will help growers to achieve malting specification. Earlier N timing had no negative effects on specific weight. Earlier N increased straw yield by 0.5 t/ha on average and increased height by several centimetres. The increase in height is likely to result in a greater lodging risk and the requirement of a robust PGR programme.

A guide summarising the best practice for N management of winter barley is being produced. The data generated by the project was used in the AHDB review of RB209 Fertiliser Manual. Key messages from the project were presented at the AHDB Agronomists conference, ADAS Farming Associations and the ADAS Technical update.

Who will benefit from this project and why?

Growers will benefit by being able to grow more profitable winter barley. Based on the results of this project it has been estimated that optimising N timing will lead to an increased gross margin over costs of £48/ha, rising to £58/ha where RB209 under-estimated the fertiliser N requirement by 40 kg N/ha, and rising further to £83/ha if the strategy enables the malting premium to be achieved. Agronomists will benefit by having more up to date N management guidance. Plant breeders and variety testers will benefit by understanding optimum N fertiliser management required to achieve yield potential. Maltsters will benefit by growers being able to achieve grain N targets more reliably.

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If the challenge has not been specifically met, state why and how this could be overcome

The project aim was achieved.

Lead partner	RSK ADAS Ltd
Scientific partners	N/A
Industry partners	CF Fertilisers UK Ltd, Syngenta UK Ltd and Scottish Agronomy
Government sponsor	N/A

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