Updating N fertiliser management guidelines for winter barley

Project Partners: CF Fertilisers, ADAS, Syngenta, AHDB

CF Fertilisers are working with ADAS and Syngenta on a 3 year AHDB funded project to update N management guidelines for winter barley. RB209 N guidelines for winter barley have not been updated for about 30 years. Since then variety yield potential for both feed and malting varieties has increased and hybrid varieties have been introduced. There is now substantial evidence from several sources that RB209 N guidelines are out of date in terms of both N timing and rate.

Research being carried out within this project includes:

1) A review of existing data on optimum N rates and N timings for winter barley.
2) Experiments to determine the optimum N timing for 4 modern winter barley varieties.
3) Experiments to determine the optimum N rate for 4 modern varieties and comparing how this differs to 2 old varieties.

A meta-analysis of historic data from 17 experiments provided by CF Fertilisers, Syngenta, ADAS and Scottish Agronomy has indicated that for winter barley crops with a yield of >8t/ha, each additional tonne of yield requires 27kg/ha more N than is currently recommended by RB209 (Figure 1). A meta-analysis has also been carried out to understand the effect of N application timing on yield. This analysis, using historic data for N application timing from 25 experiments provided by CF Fertilisers, Syngenta and ADAS, indicates that there are yield benefits from applying N earlier than is currently recommended by RB209. On average, yield was improved by 0.6t/ha when more than 50% of the total amount of N was applied before the start of stem extension in comparison to less than 30% being applied before the start of stem extension (Figure 2).

Figure 1. Crops with a yield potential of >8t/ha require more N than recommended by RB209. An additional 27 kg N/ha is required for each tonne above 8t/ha

Figure 2. Significant increase in yield (P=0.037) when more than 50% of the total amount of N was applied before the start of stem extension in comparison to when less than 30% is applied before the start of stem extension.
Trials were carried out in Herefordshire, North Yorkshire and Scotland in 2014 & 2015 to investigate what the optimum N application timing and rate for winter barley is and further trials will be done in 2016. The N timing treatments were designed to test the effects of applying autumn N, applying 60% of the N by the end of February and applying 30% of the N by the end of February compared to RB209 recommendations. The results showed significant benefits of applying a greater proportion of N earlier than is currently recommended for two of the experiments, with yields generally improved by early application of N in the other experiments, although statistically not significant. Earlier application of N tended to increase early ground cover (Figure 3). Benefits of applying N in the autumn have not been seen in experiments so far. The N rate trials have provided evidence to suggest that higher yielding varieties require more N than is currently recommended and that modern varieties tend to have a greater N requirement than older varieties (Figure 4).

Figure 3. Early (left) and medium (right) N timings, Volume, High Mowthorpe (N. Yorks), 2013-14.

Figure 4. N response curve from Rosemaund (Herefordshire) in 2014-2015. Red triangles indicate the economic optimum N rate.