Winter barley agronomy: two and six-row

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It is estimated that 75,000 hectares are planted in winter barley for the 2019 season, a 31% increase on the 2018 season. While factors such as straw price and the "three crop rule" may have influenced this increase, recent high yields are also likely to be a factor. These high yields have been due to improved agronomy and the introduction of high yield potential two-row and hybrid six-row varieties to the market. The management of winter barley has improved significantly in recent years, although the relatively recent introduction of high yield potential hybrid six-row varieties poses important management questions. These questions mainly arise from the dramatic differences in yield components compared to their conventional two-row counterparts, producing more grains ear^{-1}, fewer ears m^{-2}, which combine to produce more grains m^{-2}, while the average grain weight is lower in a six-row variety.

Current fungicide timings on winter barley focus around protecting the canopy during the period when the number of grains m^{-2} is determined, with the most effective timings being mid-late tillering, GS31/32 and GS49, with no benefit from applications in the autumn or post GS49 observed. Currently these fungicide timings are also being applied to six-row varieties, although it is not known if this the correct strategy. The grains m^{-2} produced by six-row varieties are similar to that of a wheat crop. In wheat, fungicide timing is focused on the protection of the top three leaves of the canopy to ensure the canopy is kept clean into grain fill. This begs the question "Should a six-row variety be treated like a two-row variety or possibly more like a wheat crop"?

Six-row varieties are generally taller and have a heavier ear compared to two-row varieties, thus making them a higher lodging risk. Although no study to date has investigated if the requirement for plant growth regulator (PGR) treatment varies depending on row-type.

To investigate if current management strategies for winter barley should be altered depending on row type, field experiments were established investigating the effect of PGR application and fungicide timing on both a conventional two and a hybrid six-row winter barley variety. The variety was grown at the standard recommended seed rate and nitrogen fertiliser application rate plus a higher (+25% above recommended rate) treatment. It must be noted that the seed rate varied depending on row type, as it is recommended to use a lower seed rate in hybrid varieties compared to conventional two-row varieties, while the N rate was the same for both row-types. Field experiments were conducted in 2014/15, 2015/16 and 2016/17 at Teagasc, Oak Park and SRUC, Edinburgh.

Results indicate that current recommendations for seed and N rate in both row-type are correct, as there was no benefit to yields observed from increasing seed and N rate by 25%. Further to this there was no difference observed in the yield of the hybrid six-row and conventional two-row varieties over the six site/season combinations.

Both varieties were tested at both seed and N rates with and without PGR treatment at both GS 30 and GS 37. The results indicated that there was significantly more lodging observed in the six-row variety without PGR particularly in the high seed and N rate treatments. The PGR treatment significantly increased the number of grains m^{-2} and yield, but to a greater extent in the six-row variety. Therefore, when growing a six-row variety closer attention should be paid to PGR treatment with applications at GS30 and GS32-37 advised.

A range of fungicide timings were applied to both varieties, ranging from an untreated programme to a 4 spray (GS 25, 31/2, 39/45, 65) programme. Despite the differences in yield components between two- and six-row varieties, the response to the fungicide programmes was similar over the six site/seasons. Therefore the current timings of GS25-29 (mid-late tillering), GS31/32 (stem extension) and GS49 (awn-emergence) should be utilised to maximise yield for both row-types.

The experiment also highlighted the importance of fungicide in the control of straw breakdown (brackling). Fungicide treatment significantly reduced the level of straw breakdown (figure 1) which occurred in both varieties, with applications at GS31/32 and GS49 having the largest reduction compared to the untreated.

Figure 1. The effect of fungicide treatment on straw breakdown. 1 spray (GS 31/2), 2 spray (GS 31/2, 39/49), 3 spray (GS 25-29, 31/2, 39/49),