

PROJECT TITLE

Genome wide association mapping in winter barley towards adaptation to wetter winter periods

CONSORTIUM

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SUMMARY OF THE REPORT

Spring barley is Ireland's most widely grown tillage crop, providing valuable feedstock for the animal- feed and malting industries. However, winter cereals are inherently higher yielding than spring cereals due to a longer growing season, but their use is limited by waterlogging. Wet soils during the winter and spring (i.e. when vernalisation occurs) result in crop damage or even death in both row crops and forages (Förster et al 2018). The already high occurrence of winter rainfall in North Western Europe is predicted to increase as a result of changing climate, with extreme precipitation and flooding events becoming more prevalent. The development of winter barley lines that offer the yield advantages, but exhibit enhanced resistance to waterlogging, could mitigate against climate change in Ireland and elsewhere in Europe.

The access used a large association mapping population of winter barley assembled originally assembled by the James Hutton Institute and previously used for plot studies under Irish conditions under flooding and submergence. These field trials indicated there is substantial variation in the tolerance across the population in terms of final yield response to waterlogging at early growth stages. The access studied the early emergence of the population at different soil moisture levels and the recovery of the population from wet soil conditions during vernalisation.

This access provides the information with which to better understand waterlogging tolerance and identify germplasm tolerant to specific soil conditions and reveals genotypes resilient to a range of conditions. Ultimately, we will use this quantitative phenotypic data to identify genomic regions associated with traits that contribute to plant resilience to cold wet conditions.