Enhancing milling quality through variety development
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There has been an oat breeding program based in Aberystwyth since 1919 producing varieties primarily for the U.K. Since 2001, over 30 winter and spring oat varieties have been included on the UK National and Recommended Lists. This includes a number of innovative oat varieties including the winter oat, Gerald which won the NIAB Cereals Cup voted as the variety most profitable by farmers and Mascani which is at present grown on the vast majority of the winter oat area. Currently 67% of the oats grown in the UK were bred in Aberystwyth. The general targets are to produce economically competitive varieties which are high yielding, disease resistant, easy to crop and meet end user requirements. In the UK, approximately 70% of oats grown are used for human consumption and the market for cereal products is expanding by 5% per annum. For the milling industry, the goals are high yielding varieties with high specific weight, high kernel content, that are easy to dehull combined with appropriate grain composition. The programme has strong links with the UK milling industry, which provides validation of breeding targets and undertakes analysis of the milling quality of selected varieties.

Producing new varieties is a long process. The first stage is to identify genetic variation for the traits of interest and to incorporate that into U.K. adapted material. Following the initial cross a rigorous selection process is undertaken integrating a range of high throughput phenotypic and genetic tools. In early generations plants are selected for traits such as height, disease resistance, flowering time and maturity. As selections progress through the breeding program, multi-locational field trials are used and grain quality traits (e.g thousand grain weight, specific weight, kernel content, hullability and β-glucan content) are assessed as well as grain yield. Together with the agronomy results these criteria form the basis for variety creation. Quicker and more efficient methods of DNA analysis are allowing the integration of marker technology into the breeding program. This enables a more directed selection approach in which only plants with the desired markers for traits of interest are taken forward into the next generation. The application of these techniques with regards to the development of high quality milling oats will be discussed.

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