

Rate varietal performance in drought-prone soils to boost wheat's value

- New yield 'stability' score could cut field losses
- Influence breeding to buffer against climate change

By Sarah Henly

■ Stability is the stuff of dreams for economists and it could arguably help growers when selecting the right varieties.

Eric Ober of Rothamsted Research believes publishing varietal ratings for yield stability – alongside yield potential on the HGCA Recommended Lists (RL) – would ease planting decisions in our unpredictable climate.

“We could benefit from knowing which varieties tend to perform adequately on drought-prone land and which yield best when moisture is plentiful. It may be pertinent to hedge your bets by sowing some of the wheat area with varieties that yield well under a range of field conditions, rather than opt just for high yielding types that may let you down in a dry year.”

A previous LINK project showed wheat varieties to be fundamentally different in their susceptibility to dry conditions, and that choosing the correct variety for drought-prone land could yield an extra 1.3t/ha in a drought year. Unfortunately, there wasn't sufficient drought in the RL test years to adequately dif-



Aborted florets in a crop of drought-stressed wheat seen in Rothamsted trials.

ferentiate the varieties, so Dr Ober is using similar methods to analyse the 2011 RL trials data to assess current varietal sensitivity.

He acknowledges there is often a trade-off between yield stability and yield potential, such that low-yielding varieties frequently maintain yield in most situations whereas high-yielding types can perform poorly when under drought stress. He aims to quantify the differences to produce a relative ranking across a range of sites differing in water availability.

The 2011 RL trials chosen for the analysis were carried out on 13 sites, mainly in the drier east of the country. Soil type, water holding capacity at four depths down to 700mm, rainfall data and yield figures were collected, and a drought stress index for each site will be derived using

the Sirius wheat growth model.

The Food and Environment Research Agency (FERA) collected samples from 300 random fields across the UK for CropMonitor, and made additional measurements in response to the record dry conditions, of senescence, stunted growth and ear sterility. This will be used to corroborate the variety performance rankings for susceptibility to water deficit.

Dr Ober hopes to identify the traits contributing to yield response under drought stress. For instance, the earlier work suggested moderately tall varieties, not the tallest or shortest, tend to perform better following late summer droughts. He will look at the top and bottom performers to see if their stability comes from such factors as crop height, tillering capacity and mainstem carbohydrate reserves.

He is quick to point out late season drought, which limited grain filling in 2006, is just one area under inves-

CROPS perspective

■ There is untapped information in Recommended List trials that can be used to add value to variety recommendations at relatively low cost. This project should be able to derive a measure of yield stability from the data to help growers select the most reliable types for regions and soils at risk from drought.

Catch up with previous articles in this series at www.fwi.co.uk/researchinfocus

tigation. More recent early season droughts, typical in 2010 and 2011, limited the number of grain sites produced in the developing ears.

This complicates the rating process, which may require caveats, says Dr Ober.

“We need to produce a stable supply of good-quality wheat for millers and other end-users. This project promises a method of buffering against risk that the HGCA can, hopefully, add to the list.”

Furthermore, plant breeders could use drought tolerance knowledge to improve the resilience of future varieties, to mitigate losses likely to come as a result of climate change, he concludes.

crops@rbi.co.uk

HGCA PERSPECTIVE

- An estimated 30% of UK wheat area is drought-prone
- About 10% yield lost to insufficient soil moisture
- Careful variety choice can bring an extra 1.3t/ha in drought years on drought-prone soils
- Using soil, weather and yield data from 2011 RL trials to develop guidance on varieties most suited to dry conditions

Final report available in the spring at www.hgca.com/publications



Summary

■ **Project no. 3766** Adding value to variety trial data: a performance rating for wheat varieties for dry conditions; Rothamsted Research, FERA; from April 2012 to December 2012.