Keeping Hagberg falling number high

Introduction
The Hagberg falling number (HFN) test measures the number of seconds a plunger takes to fall through a mixture of wheat flour in water. The plunger falls slowly if the mixture is thick with starch. It falls more rapidly if some starch has been converted to sugar through the action of the enzyme alpha-amylase.

Bread made from flour using grain with too low an HFN value is sticky and clogs slicing machines, so millers reject it. HFN values below 250 are usually not accepted for breadmaking.

Basis for prediction
Grain alpha-amylase production can be stimulated in several ways between ear formation and harvest, resulting in decline in HFN. Four ways are known - three were known before the project started; the research identified a fourth.

Figure 1 relates grain moisture content to alpha-amylase formation for the four mechanisms.

There was a good relationship between HFN in grain at the dough stage and at harvest provided that:
- the intervening weather was dry and sunny
- there were no late tillers bearing green grains
- there was no orange blossom midge damage.

The scheme in practice
Prediction depends upon assessing HFN after grain moisture content has fallen to 35% (soft to hard dough). Before
Summary

Hagberg falling number is an important test used in the UK to determine whether wheat is suitable for bread-making. An HGCA-funded project involving Harper Adams College, Nottingham University, Aberdeen University and ADAS Bridgets aimed to understand how HFN is reduced in wheat grains. On the basis of this project a prediction scheme was developed to help farmers achieve the milling premium.

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Project Reports 165, 192

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this stage immature grain normally has high alpha-amylase activity, but this declines naturally to be negligible by 35% moisture content.

If HFN from any of the three early mechanisms is low, it is very unlikely to rise again. These crops can be treated as feed wheat and given low harvest priority.

However, if HFN is high at this stage, there is a good chance of getting a high HFN at harvest, either if the weather remains dry until harvest, or if the grain is strongly dormant and less likely to sprout in wet weather (Figure 2). These crops may benefit from early harvest and drying, especially if the weather outlook is poor and dormancy is weak.

Dormancy tests have not been very reliable in predicting which crops can stand wet weather without significant reduction of HFN. It may be worth re-testing crops for HFN after significant rainfall.

NIAB Labtest successfully operated a prototype HFN forecasting scheme in 1998 for 36 commercial crops. Because HFN is a very variable measurement, a forecast is given as the percentage chance of a crop exceeding an HFN of 250.

Some crops are identified as having a high chance of exceeding an HFN of 250. These, therefore, would be considered worth harvesting early and drying if the weather outlook is wet.

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FIGURE 2. Germination of grains from two crops differing in dormancy

<table>
<thead>
<tr>
<th>Time after flowering (days)</th>
<th>Germination (%)</th>
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<tbody>
<tr>
<td>0</td>
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</tr>
<tr>
<td>10</td>
<td>20</td>
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<tr>
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<td>40</td>
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<tr>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>40</td>
<td>More dormant</td>
</tr>
<tr>
<td>50</td>
<td>Less dormant</td>
</tr>
<tr>
<td>60</td>
<td></td>
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</tbody>
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