



Concerto barley: the poor sample on the left contains grains with signs of skinning while on the right is a good sample.

# Weak barley husks cost both farmers and maltsters

Everyone in the supply chain loses out when grain skinning occurs in malting barley. *Sarah Henly* finds out from researcher *Steve Hoad* what plant breeders and growers can do about it

■ The most popular malting barley varieties have a weakness, they are weak hulled, to varying degrees.

That increases the risk of skinning, where the husk loses its grip on underlying tissues. Detachment may be partial or whole, and may be the result of a lack of cementing material of some kind, says Steve Hoad of Scotland's Rural College (SRUC) in Edinburgh.

The condition matters to maltsters for several reasons. An exposed endosperm is less protected during grain handling and can lead to irregular germination during malting.

This makes water uptake and conversion of starch into sugars more variable. At worst, germination may not occur in some grains, explains Dr Hoad.

"Essentially, poor adhesion between the husk and the embryo reduces the efficiency of the malting process. Maltsters score the condition at intake and this harvest growers could be penalised to the tune of about £30/t if the grain has to go for feed instead."

If newer barley varieties continue to have poor husk adhesion, the whole supply chain – from plant breeders through to maltsters, brewers and distillers – will be adversely affected, he stresses.

## CAUSES

Skinning appears to be linked to unfavourable weather at early grain fill or during grain ripening.

It appears intermittent wetting and drying can cause tension in the grain and affect the adhesion process, so increasing the risk of skinning at harvest. It is exacerbated by damage during combining and subsequent handling, explains Dr Hoad.

"Skinning was bad across the country in 2012, when the majority of crops had poor grain fill because of the wet weather. Some crops were rejected for skinning; even lower-risk varieties were problematic."

He fears that as grain yield and quality have improved through plant breeding, so by chance has

the vulnerability to husk loss.

A concurrent project funded by the Biotechnology and Biological Sciences Research Council's (BBSRC) Crop Improvement Research Club is screening many new and older UK and European varieties to identify those with improved resistance, in which a better cementing layer could be crucial.

SRUC's Maree Brennan has identified several consistently resistant lines. By characterising the genes affecting husk quality and adhesion, the team from SRUC and the James Hutton Institute hope to pinpoint breeding lines that could be used to make new varieties less vulnerable.

"We hope to find genetic markers to aid selection in future plant breeding programmes," says Dr Hoad.

Working with the HGCA, information on varietal risk could be made available to growers through the Recommended Lists. Regional differences will be recorded, and Dr Hoad would welcome grain samples, particularly from the South, where skinning symptoms might appear unexpectedly.

## REDUCING RISK

Until less-susceptible varieties become available, growers can help guard against loss of premiums by modifying harvesting practices, he suggests. Combining and handling can cause weak husks to rub away.

"We have evidence that growers

## Research reasons



This HGCA work supports BBSRC research on the genetic control of grain skinning by identifying risk factors that cause poor husk adhesion and developing a protocol for scoring varieties. It should allow the industry to evaluate and manage barley better suited to malting

**Project:** Supporting UK malting barley with improved market intelligence on grain skinning

**Timescale:** October 2013-October 2016

**Researchers involved:** SRUC and Scottish Agronomy

**Funders:** HGCA and IBD (in kind)

**Cost:** £98,366 from HGCA

## Key points

- Understanding variety differences that could be exploited to prevent husk adhesion related losses
- Highlighting agronomic decisions that affect the risk of grain skinning
- Improving ways to score the condition

can reduce the risk of skinning by adjusting combine settings, namely by slowing the drum speed and opening the concave to reduce abrasive effects on weak varieties."

Trials are being undertaken by SRUC and Scottish Agronomy to assess whether fungicide and nitrogen fertiliser use may affect risk.

"Early indications are that routine crop management does not appear to have any significant effect on skinning. But there's a suggestion that higher levels of nitrogen supply could worsen the condition. We will produce guidelines at the end."

Until then, risk can be reduced by growing more than one barley variety. But this needs to be done in consultation with the maltsters, he urges. As in a difficult year, consider separating damaged crops, he says.

One complication is that grain skinning can be difficult to measure. Dr Hoad aims to change that by improving consistency in laboratory scoring.

"It is quite difficult to see where the husk has been damaged because the layer underneath is a similar colour. In future, we would like to reduce subjectivity by using an automated image analyser for rapid and reliable assessment of malting intakes."

## HGCA perspective by Dhan Bhandari

Research and knowledge transfer manager, HGCA

■ "Grain skinning is a major quality issue affecting the malting process, sometimes leading to rejections. This project should improve our understanding of grain skinning to help malting barley growers secure market premiums. It should also create an industry standard laboratory procedure for scoring the condition."

