

# Plant Breeding Matters

Information from the British Society of Plant Breeders

May 2010

## Apologies for FSS disruption

The nationwide postal disputes in November 2009 brought significant problems to the distribution of autumn farm-saved seed mailings and BSPB wishes to apologise for any inconvenience this disruption may have caused to farmers.

As a result of the industrial action by postal workers, many FSS declaration forms arrived late or were not delivered at all. Indeed, the response rate from the first mailing was so unusually low that BSPB took the exceptional step of sending out a second form with a reminder letter to all non-respondents.

Even this second mailing was affected by the disruption, since a number of farmers subsequently sent final reminder notices by BSPB had yet to receive a copy of their declaration form. We can only apologise for the frustration and concern this may have caused to individual growers.

Of course, farmers submitting their farm-saved seed declarations on-line can avoid the risk of postal disruption altogether. Electronic notification is sent out in advance of the postal mailing, enabling growers to complete and return their on-line declarations in a matter of minutes.

To find out more, visit the farm-saved seed declarations section of the BSPB web-site at [www.bspb.co.uk](http://www.bspb.co.uk)

## Older varieties scheme helps secure a fair deal



As part of the FAIR PLAY campaign to promote industry-wide compliance on farm-saved seed payments, new arrangements for the declaration of older varieties as farm-saved seed were introduced from autumn 2007. Three seasons on, *Plant Breeding Matters* reports that the system is proving highly effective in targeting mis-declaration and reducing FSS evasion.

When the original farm-saved seed legislation was first introduced in the mid-1990s, it included a time-limited provision allowing farmers to continue saving older varieties – known as ‘zero-rated varieties’ – without payment for a period of seven years. By law, these older varieties are now eligible for FSS payment and their use as farm-saved seed must be declared to BSPB.

Under the FAIR PLAY campaign, however, BSPB and the farming unions reached an agreement allowing genuine use of older varieties as FSS to continue free of charge via a 100% instant refund, subject to verification by BSPB.

The main objective of the scheme is to prevent the false declaration of royalty-bearing varieties as zero-rated, which was identified as a potential route for evasion of farm-saved seed payments.

The refund scheme requires growers sowing older varieties as farm-saved seed to provide evidence on request to BSPB of genuine use of the declared variety – for example through the original certified seed invoice, agronomy records,

seed sample or field inspection.

Three years into the new system, overall FSS declarations of previously zero-rated varieties are down by more than 50% for winter wheat, and by more than 90% for winter barley. Many varieties which have not been sold as certified seed for a number of years have finally disappeared altogether.

James Miles, BSPB’s Farm-Saved Seed Investigator, is encouraged by the scheme’s performance and the positive response from growers:

“The quantities declared as farm-saved seed today more closely reflect the levels of genuine use and certified seed market share of older varieties such as Riband and Hereward. Since the scheme was introduced, the number of farmers opting to re-submit their declarations has also reduced each year, and the verification process is now picking up very few cases of mis-declaration. With the support and co-operation of growers, I am confident that the scheme is proving effective in closing this off as a route to evasion,” he said.

## FIVE WAYS TO DECLARE

Don't forget there are five ways to declare farm-saved seed use to BSPB, using the FSS reference number on your declaration form:

- By post (SAE provided)
- E-mail [sara.seekings@bspb.co.uk](mailto:sara.seekings@bspb.co.uk)
- Online at [www.bspb.co.uk](http://www.bspb.co.uk)
- Fax 01353 661156
- Phone 01353 653209



# Top breeder calls for UK wheat yield probe

With productivity gains now firmly back on the policy agenda to meet food security objectives, a leading UK breeder has called for a two-pronged research effort to boost UK wheat yields. Speaking at a recent meeting of the All-Party Parliamentary Group on Science and Technology in Agriculture, BSPB Board Member Dr Richard Summers highlighted the need for new research to target yield increases and to investigate the emerging yield gap between wheat trials data and on-farm performance. Here he explains why.

To meet a predicted 50% increase in global food demand by 2030, UK wheat yields will need to increase by around 2% per year. Such gains will need to be realised in the face of stricter regulations on nitrogen use, pesticide availability, grain quality and biodiversity requirements.

Commercial plant breeding has played a key role in establishing wheat as the UK's principal arable crop, with improved varieties – of which 95% are UK-bred – supporting sustainable gains in productivity through higher yields, better pest and disease resistance and enhanced nitrogen use efficiency.

Over the past 60 years, national average wheat yields have increased from 2.8t/ha in 1948 to more than 8t/ha today. A recent NIAB study found that while improvements in machinery, agronomy, fertilisers and crop protection have all played an important part, 57%

of this yield increase has been due to plant breeding.

The contribution of new varieties over the past 25 years is even more striking. Since 1982, NIAB attributed 93% of wheat yield gain to plant breeding. This suggests that the current value of wheat breeding to UK farm-gate production is in the order of £500m per year, funded from an annual royalty income pot to breeders of around £14-15m – a 33-fold return on investment.

Recently, however, the rate of wheat yield increase at a national level has stalled. While trials data indicate that the yield potential offered by new varieties is continuing to advance by 0.5% per year, these yield increases are not reflected in average on-farm yields, which have remained static at around 8t/ha for the past 10 years.

Different explanations have been offered for this emerging yield gap.

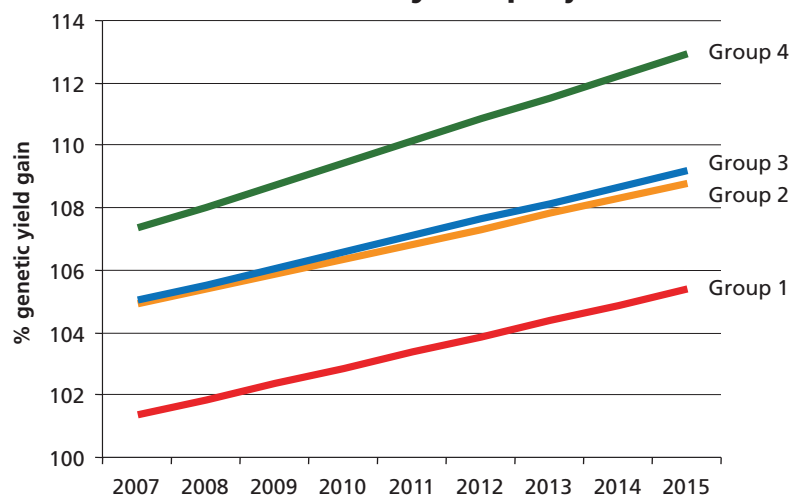
Some have raised concerns over declining soil fertility and poor agronomy, while others point to the impact of economic pressures on the farming industry, with fewer people working much bigger machinery forcing compromises in the timing of key operations.

It may be one or a combination of these factors, but in truth we do not know. Ensuring farmers are able to exploit the genetic yield potential of current varieties will go a long way to boosting the productive capacity of UK agriculture, highlighting the urgent need for an in-depth agronomic investigation to help understand the causes and identify the measures needed to close the yield gap.

But the current rate of increase in yield potential still falls short of the 2% annual yield gain required to meet 2030 targets, and wheat breeders will need



### UK winter wheat yield projections



Extrapolated from HGCA/CEL Recommended List Data

# Midge resistance saves UK wheat growers £60m per year – Defra



**Defra recently confirmed that the successful development of wheat varieties with resistance to orange wheat blossom midge is estimated to have saved the UK farming industry up to £60m per year in spray savings and prevention of losses to yields and quality.**

The orange wheat blossom midge is a common pest of wheat which first came to prominence when it caused extensive damage to UK crops in 1993. Since then severe attacks have occurred in some regions of the country each year. The larvae of the midge attack ripening grain, affecting yield, grain quality and introducing disease.

Until resistant varieties became available, fear of midge damage was the main driver for growers spraying summer insecticide on around 250,000 ha of wheat each year.

## **Collaborative research**

Defra's Evidence Investment Strategy document, published in January 2010, has highlighted the success of collaborative research in identifying a durable source of genetic resistance to orange wheat blossom midge which has since been introduced across virtually all commercial wheat varieties in the UK.

The Defra-sponsored project, *Integrated control of wheat blossom midge*, involved a range of organisations within the plant breeding and crop research sectors. Its stated aim was not only to identify resistance in wheat varieties, but also to develop methods for pest monitoring and integrated pest control to reduce pesticide use.

"The example highlighted by Defra underlines the importance of continued public sector investment in near-market collaborative research if UK agriculture is to play its part in raising global food crop productivity by 50% over the next 20 years – an objective set out in the Government's recent Food 2030 Strategy," said BSPB chief executive Dr Penny Maplestone.

## **Resistant varieties**

"It also demonstrates the vital role of commercial plant breeding in delivering varieties with in-built resistance to new pest and disease threats. This is set to become even more critical as climate change takes effect and new EU legislation places tighter restrictions on the future availability and use of crop protection products.

"At £60m per year, Defra's estimate of the value to growers of this single genetic trait is around four times the total annual seed royalties of £14-15m paid to UK wheat breeders, highlighting the significant return on investment available from the development of improved varieties," added Dr Maplestone.



Midge larvae attack ripening grain, affecting yield, grain quality and introducing disease

new sources of genetic variation to deliver radical advances in the physiology and performance of the wheat crop.

This will require major new programmes of public sector research and support, combined with longer-term, joined up thinking to ensure commercial breeders can access the novel breeding methods, marker systems and adapted genetic material needed to deliver step-changes in UK wheat yields.

As a first step, high priority should be given to establishing an independently chaired strategy group, charged with the single objective of identifying and enabling prospective UK wheat yield increases using a range of novel approaches including genomic selection and hybrid breeding systems, and targeting key traits such as increased photosynthetic rate, Nitrogen fixation, and climate change adaptation.

We must also bear in mind that a parental cross made today takes at least seven years to become a commercial variety. The timescales involved in plant breeding are such that we need to act now to deliver on the targets envisaged for 2030.



## CIRC – key themes:

### To support research leading to improved crop productivity

Sustainable improvements in crop productivity are important for increasing the volume of food the UK can produce, for limiting the land needed to produce this food and for improving the efficiency with which resources are used in crop production.

### To support research leading to improved crop quality

Improving quality can help to improve the processing, safety and nutritional value of crop products whilst also improving resource use efficiency. By understanding quality traits better there will also be scope for generating greater consistency in quality against a background of variation in growing conditions.

A new £6m collaborative research initiative has been launched to accelerate the development of crops with higher yields and improved quality. Led by BBSRC, the Crop Improvement Research Club (CIRC) also includes the Scottish Government and 13 companies representing plant breeders, farmers and food processors. The Club will focus on research to improve oilseed rape, barley and wheat for human and animal consumption.

Food security is now a major strategic priority for BBSRC. In particular, BBSRC has identified crop improvement as an area where increased investment in research activity would underpin the needs of the crop production and processing industry to address the global challenges of climate change and population growth.

The new Club will make £6m of funding available over the next five years to help researchers improve our understanding of yield and quality traits in these three crops and the genetic and

environmental factors that affect them. Both public sector and company members of the Club are contributing to the total research fund.

Specific challenges the Club aims to tackle include increasing the efficiency of nutrient use, investigating seed structure and the processes involved in germination, and improving our understanding of the factors that lead to crop spoilage.

Welcoming the Club's establishment, BSPB chairman Dr Thomas Jolliffe said: "Ensuring the UK plays its part in delivering food security will require effective partnerships between public research funders and private sector R&D.

"There is enormous potential to use advances in our basic scientific understanding of plant biology and genetics to drive yield and quality improvements in the wheat, barley and oilseed rape varieties that farmers will be growing in the future.

"Seven BSPB member companies have signed up to the Club, which will offer

an important route for commercial plant breeding companies to work closely with scientists in the public sector to ensure the strategic direction of the Club's research reflects commercial needs and priorities."

## Farmers say plant breeding is key to future agricultural production

A survey of 600 farmers, presented at this year's Oxford Farming Conference, singled out plant breeding as the most important scientific development for future agricultural production.

While pesticides were seen by farmers as the most significant scientific advancement of the past, plant breeding was identified as the most important future production development, with GM technology also seen as playing a key role.

The research was conducted by the National Farm Research Unit. Increased yields and improved disease and pest

resistance were highlighted by farmers as key plant breeding priorities for the future.

"There is clear evidence that crop genetic improvement – delivered to the market through commercial plant breeding programmes – will be the single most important factor in boosting future agricultural productivity. This research provides an encouraging indication that farmers recognise the urgent need to support continued investment in UK-based plant breeding," said BSPB chairman Dr Thomas Jolliffe.

In what areas of your business will scientific advancements be most needed for the future? Combinable crops

