

Plant Breeding Matters

Information from the British Society of Plant Breeders

November 2010

More farmers declaring on-line

FAIR PLAY
ON FARM- SAVED SEED

The number of farmers completing and returning their farm-saved seed declarations electronically is increasing year-on-year. More than 10% of farmers are now taking advantage of the simplified on-line option – accessed via the farm-saved seed section of the BSPB web-site at www.bspb.co.uk – which takes a matter of minutes to register, complete and submit declarations, saving paperwork, form-filling and postage.

“On-line declaration saves farmers time and effort, and also improves the efficiency of the farm-saved seed collection process by allowing automated data entry and invoicing,” says BSPB’s new IP Enforcement Manager Grahame Stephens. “Keeping administration costs to a minimum allows more of the income received to be re-invested in future breeding programmes.”

“We are constantly seeking ways to make the declaration process as cost-effective as possible. From next autumn, for example, we hope all farmers who have given BSPB their e-mail addresses – currently around 20% of the total – will agree to receive their declaration forms electronically, saving paper and postage costs.”

BSPB welcomes any feedback from farmers on how the farm-saved seed declaration process could be further improved at enquiries@bspb.co.uk.

Change of BSPB bank details

Farmers submitting FSS payments by electronic transfer are reminded that BSPB has changed its bank details. The new bank details are:

Bank: NatWest
Account name: British Society of Plant Breeders Ltd
Sort code: 52-41-19
Account No: 43075452

Plant breeding vital to food security and economic growth



Nigel Moore, a Director of KWS UK, is the new chairman of BSPB. Here he sets out his priorities for the Society, and the UK plant breeding industry, over the next three years.

My overriding priority as BSPB chairman will be to raise the profile of commercial plant breeding. We need to ensure key decision makers understand the vital contribution of our industry, and recognise that new sources of public sector investment must focus on the right priorities to deliver continued progress in crop genetic improvement.

By developing new crop varieties with improved yields, agronomic performance and end-use quality, plant breeders provide the essential foundation for the UK’s £86 billion food production chain. A recent study by DTZ’s life sciences group found that the annual contribution of plant breeding in wheat, barley and forage maize exceeds £1 billion in additional value within the UK agrifood supply chain and helps safeguard a further £1.2 billion of economic activity that would otherwise be lost to overseas competition.

Crop genetic improvement is not only important for economic growth, but also as part of a sustainable global response to an acknowledged food security crisis. Demand for food is set to increase by 50% over the next 20 years. The only realistic prospect of producing enough food for a growing world population is through productivity growth – producing more crop per hectare on land that is already farmed.

The increased investment needed to exploit our rapidly advancing

knowledge-base in plant genetics is a serious challenge for breeding business models. Despite the UK’s strong plant science research base, BSPB remains concerned that there is no consistent mechanism within the public sector to ensure that important research discoveries in basic plant science are taken through to practical application at the farm level.

Without improved sources of investment and closer collaboration between public and private sector research, current rates of genetic yield gain deliverable from the limited royalty income available to plant breeders will fall short of the food security goals set for 2030 and beyond.

Commercial plant breeders provide the only route to market for crop genetic improvements, and we believe there is an urgent need to develop more coherent public research strategies to meet those objectives. Optimising the productive potential of UK crop production is vital. It will be essential for the whole supply chain to work together with policy-makers and regulators within the UK and EU to create a stimulating environment for crop science, plant breeding innovation, and delivery of improved varieties to farmers.

Building and strengthening those links is a priority for BSPB and we look forward to working more closely with all stakeholders to achieve these aims.

New varieties deliver £1 billion in

Headline findings of major new economic impact study suggest that the annual contribution of plant breeding exceeds £1 billion in additional value within the UK farming and food supply chain – equivalent to a 40-fold return on the seed royalty income received by breeders to improve the yield, quality and performance of home-grown crop varieties.

The work, which focused on three key crops – wheat, barley and forage maize – also estimates that the benefits of plant breeding help safeguard an additional £1.2 billion of economic activity in the UK which would otherwise be lost to overseas competition.

The BSPB-funded study, conducted by independent economists from DTZ's life sciences group, builds on the results of earlier research by NIAB which found that over 90% of the increase in national average cereal yields over the past 25 years is due to innovation in plant breeding.

Economic benefits of improved varieties identified in the DTZ study range from increased yields and input savings at the farm level through to import substitution, export earnings and enhanced processing efficiency within the food and drink manufacturing sector.

Based on the findings, DTZ confirmed

that the 40-fold return on investment associated with plant breeding significantly outperformed other research-based sectors, which averaged between 5:1 and 15:1.

BSPB chairman Nigel Moore welcomed the study as a compelling demonstration of the economic contribution made by the UK plant breeding industry.

“Over a long period of time, commercial plant breeders have delivered incremental improvements in the yield and output value of key UK crops. This study is the first of its kind to place an economic value on those benefits, and clearly demonstrates that plant breeding provides high returns on investment up to and beyond the farm gate, with value added at all stages of the food supply chain.”

The full DTZ report is available on the BSPB web-site – www.bspb.co.uk

DTZ Report – Key Findings:

Wheat

Yield increase

Between 1982 and 2008, the wheat yield increase attributed to plant breeding is valued at between £373 and £445 million per year at 2010 prices.

This takes into account a 33% increase in national average wheat yields, from 6.2 t/ha in 1982 to 8.3 t/ha in 2008, around 90% of which is due to the contribution of plant breeding (NIAB, 2009).

Import substitution

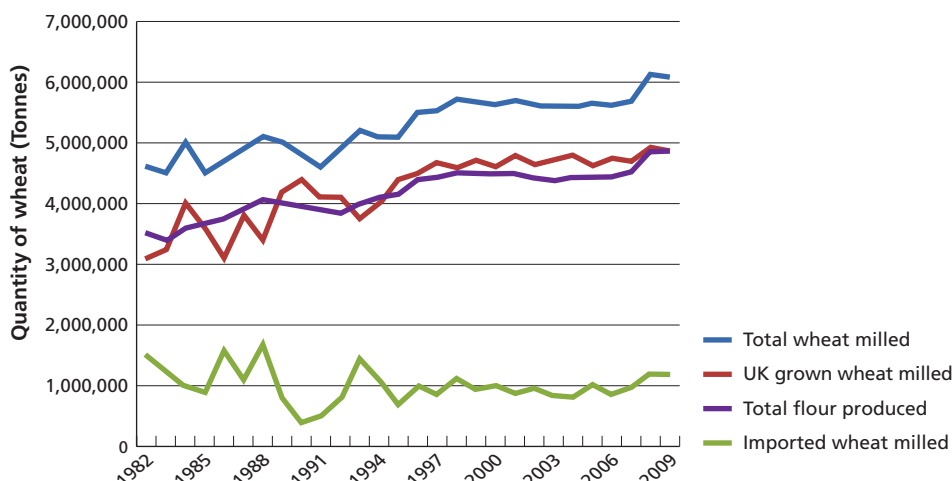
The development of high protein, hard-milling UK wheat varieties suitable for breadmaking enabled home-grown wheat used for flour milling to increase by 57%, or 1.7 million tonnes, between 1982 and 2009.

This has helped safeguard up to 750 jobs and £300 million of annual turnover in the UK flour milling industry.

UK branded bread market

The development of improved breadmaking varieties is supporting a trend to use 100% home-grown wheat in the £2.9 billion UK branded bread market. For example, Hovis has set a 9% turnover growth target over the next three years, worth £33 million and based on UK provenance claims. Meeting this target would not be possible without the efforts of plant breeders.

Wheat milled and flour produced 1982–2009



additional value to UK economy

Barley

Yield increase

Although total UK barley production declined by 44% between 1982 and 2008, average yields increased by 1 tonne per hectare over the same period, of which 90% is attributed by NIAB to the contribution of new varieties.

Based on an average barley price of £79.70 per tonne, the gross value of the barley yield increase due to plant breeders is £75.6 million per annum.

UK malting sector

By delivering continual improvements in the malting quality of home-grown barley varieties, plant breeders have helped secure the viability of the UK malting industry – worth £511 million per year and employing 2,000 people – in a highly competitive international market.

Brewing & distilling

The additional alcohol extracted from each tonne of malting barley as a result of varietal improvements has increased UK whisky distillers' annual production potential by up to 66.8 million bottles, with a retail value on the export market of £483 million per year.

Improved barley varieties have also delivered processing benefits by reducing beta glucan content, allowing significant gains in productivity worth £105 million per year in reduced staff costs to the UK brewing industry.

The development of low GN barley varieties has also helped safeguard key UK whisky export markets – USA and Canada – from the impact of potential future regulatory change. These markets were worth £466 million in 2009.



Forage maize

Suitability for UK cultivation

Plant breeders have adapted this sub-tropical crop to thrive under our maritime growing conditions, providing an important home-grown forage option for UK farmers.

Historically the UK climate restricted maize growing to southern England. By shortening the crop's growth period, new varieties have allowed forage maize to be grown further north.

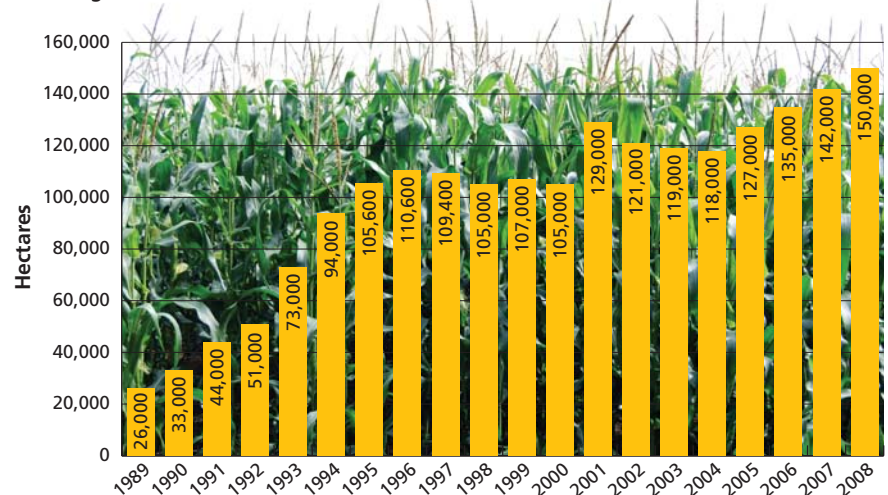
Farmers have rapidly recognised and adopted the benefits of early maturing, higher yielding varieties, and between 1989 and 2008 the UK forage maize area increased six-fold from 26,000 ha to 150,000 ha.

Milk production benefits

Adding maize to grass silage helps improve the gross margin per dairy cow. Research comparing diets of grass silage alone with maize silage fed in combination with grass silage has identified the following advantages:

- **Higher ration intake** – the addition of maize silage improves dry matter intake by 3.8kg per day to 13.6kg relative to grass silage alone.

UK forage maize area 1989–2008



- **Lower production costs** – maize silage typically costs £73 per tonne of dry matter versus grass silage at £85 per tonne. The cost differential reflects the higher dry matter content of forage maize.

- **Higher milk yield** – forage maize has been found to deliver an increase in milk yield of 2.4kg per day, as well as increased protein and fat.

Based on the area of forage maize grown in 2008, plant breeders have supported the provision of improved dairy rations worth £66 million per year in reduced feed costs and increased productivity to 96% of UK intensive dairy herds.



R&D Briefing

Dr Richard Summers, BSPB Vice Chairman



Wheat genome research

The recent announcement that a UK team of researchers has published the first draft sequence of the wheat genome was rightly heralded in the national and international media as a major scientific breakthrough.

For wheat breeders, it is an important first step towards the development of a new set of advanced markers, known as single nucleotide polymorphisms, or SNPs, which will help increase the speed and accuracy of breeding programmes, allowing early targeting and selection of a much broader range of valuable traits.

While it is likely to be a number of years before this raw sequencing information can be used in practice, a particularly encouraging feature of this BBSRC-funded project has been the close interaction between public and private sectors in planning and designing the research.

As the project continues into the next phase, for example, the researchers will reproduce this sequencing information for a number of elite UK wheat varieties – possibly as soon as next spring – providing comparative data which could be invaluable to commercial breeders in targeting key traits of interest, such as durable resistance to rusts and other problem diseases.

Collaboration between the project scientists and British wheat breeders is positive in ensuring the outcomes of this groundbreaking research not only advance our fundamental understanding of wheat genetics but are also delivered in the most relevant and accessible format to benefit UK wheat breeding programmes at the earliest opportunity.

Loss of global plant diversity

News that one-fifth of the world's plant species are at risk of extinction is a major source of concern for plant breeders, and highlights the importance of collaborative efforts at a national and international level to protect the world's biodiversity.

Of an estimated 380,000 plant species around the world, a recent analysis by the Royal Botanic Gardens at Kew, the Natural History Museum and the International Union for the Conservation of Nature concluded that 22% should be classified as 'threatened'.

This is bad news for the business of crop improvement. The success of modern plant breeding is often portrayed alongside a loss of varietal diversity, but in fact maintaining biodiversity is central to plant breeding's aim to improve the performance, quality and utility of crop plants. It is in every breeder's commercial interest to ensure that the gene pool from which traits of potential interest can be identified and selected remains as extensive as possible.

That's why plant breeders were among the first to highlight the need to maintain plant genetic resources for use in food, agriculture and medicine, and the first to set up gene banks more than 70 years ago.

Breeding companies continue to support a range of initiatives to classify and conserve existing biodiversity in the form of wild plants, primitive crop species, landrace varieties and obsolete varieties. These latest findings add urgency to the significance of these efforts.

BSPB strengthens royalty collection team



Grahame Stephens recently joined BSPB as IP Enforcement Manager, taking over primary responsibility for the farm-saved seed collection system.

His experience combines a strong background and knowledge of the agricultural sector with project management and auditing experience.

Brought up on a family farm in Kent, Grahame studied at Shuttleworth Agricultural College before moving permanently to East Anglia nearly 25 years ago.

He was a farm manager for 21 years and has spent the past five years working in the environmental sector, controlling Japanese Knotweed and most recently in oil spill and land remediation for a specialist national

company. This latest role involved operations and project management, with an emphasis on managing ISO quality and health and safety, with internal auditing.

Grahame holds the Basis Certificate in Crop Protection and is currently working towards re-joining the Professional Register. He is also a member of the Institute of Agricultural Management.



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