

Plant Breeding Matters

Information from the British Society of Plant Breeders

Autumn 2016

Brexit priorities for UK plant breeders

The UK's decision to leave the EU brings an inevitable period of flux and uncertainty over precisely what the future holds for British agriculture in terms of support policies, trading arrangements, farming regulations and access to labour. The outlook for the plant breeding and seeds sector will depend critically on these discussions and the wider negotiations taking place on the UK's future relationship with the EU and the Single Market.

Given the high level of pan-EU activity in plant breeding, variety registration, seeds marketing and other crop-related research and innovation, these discussions will determine the extent to which UK independence marks a significant departure from current trading, R&D and regulatory arrangements.

Whatever the outcome, Britain's farmers will need continued access to the benefits of improved crop varieties, tailored to UK conditions, to maintain the sector's competitiveness, resilience and sustainability on a global stage.

Since the EU referendum vote in June, BSPB has acted swiftly to assess the specific implications for the UK plant breeding industry, to seek legal advice on how Brexit might affect key issues such as

Plant Variety Rights and variety registration, and to consult widely across the membership.

More than ever, it is vital that UK policy makers – and particularly those responsible for setting and negotiating the conditions of Brexit – understand the value and importance of supporting a vibrant, locally-based plant breeding industry, not only for the competitiveness of our farming and food industries but also for the wider economy, for our health and quality of life, and for the environment.

BSPB has identified five key Brexit priorities, and is engaging proactively with the UK Government, other industry organisations and EU partners to

promote the specific conditions and requirements for a competitive and innovative British plant breeding industry outside the EU.

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BSPB marks 50 years – 1966-2016

It is 50 years since BSPB's predecessor body, the Plant Royalty Bureau, was established to collect seed royalties on behalf of plant breeders. Today, BSPB combines royalty collection with a broader role in industry representation and the organisation of variety trials.

The past 50 years have seen major changes in UK crop production: a doubling of cereal yields and sugar production, and a reversal of the UK's historical dependence on imported bread wheat; oilseed rape established as the break crop of choice, and forage maize adapted to UK growing conditions.

The pace of change continues today, with major advances in

quality wheat yields, healthier varieties of barley, oats, beans and oilseed rape, improved plant architecture in field peas, the development of new herbicide tolerance and hybrid breeding systems, and new sources of pest and disease resistance introduced into UK varieties.

Through continuous investment and innovation, plant breeding has

underpinned these changes by developing improved varieties to meet constantly changing agronomic, market and policy demands.

To mark the Society's half century, this issue of *Plant Breeding Matters* charts a timeline of key developments in the plant breeding sector, alongside significant world news events and statistics.

The next 50 years

As part of its 50 year celebrations, BSPB also hosted a recent seminar in London at which three guest speakers were invited to consider some of the factors likely to influence the plant breeding industry over the next 50 years, from future developments in IP protection to global trends in food production and consumer attitudes towards new breeding technologies.

Specialist IP lawyer Joel Smith was optimistic about the opportunities for the UK's £14.8bn agri-tech sector to harness a rapidly advancing knowledge base in genetics, precision engineering and data science to drive growth and innovation across the £108bn agri-food chain.

In particular, he highlighted the potential for the UK to rebalance R&D investment and reinvigorate the science base in the crop protection and biotechnology sectors, where progress had been stifled by a politicised and over-

precautionary EU regulatory regime.

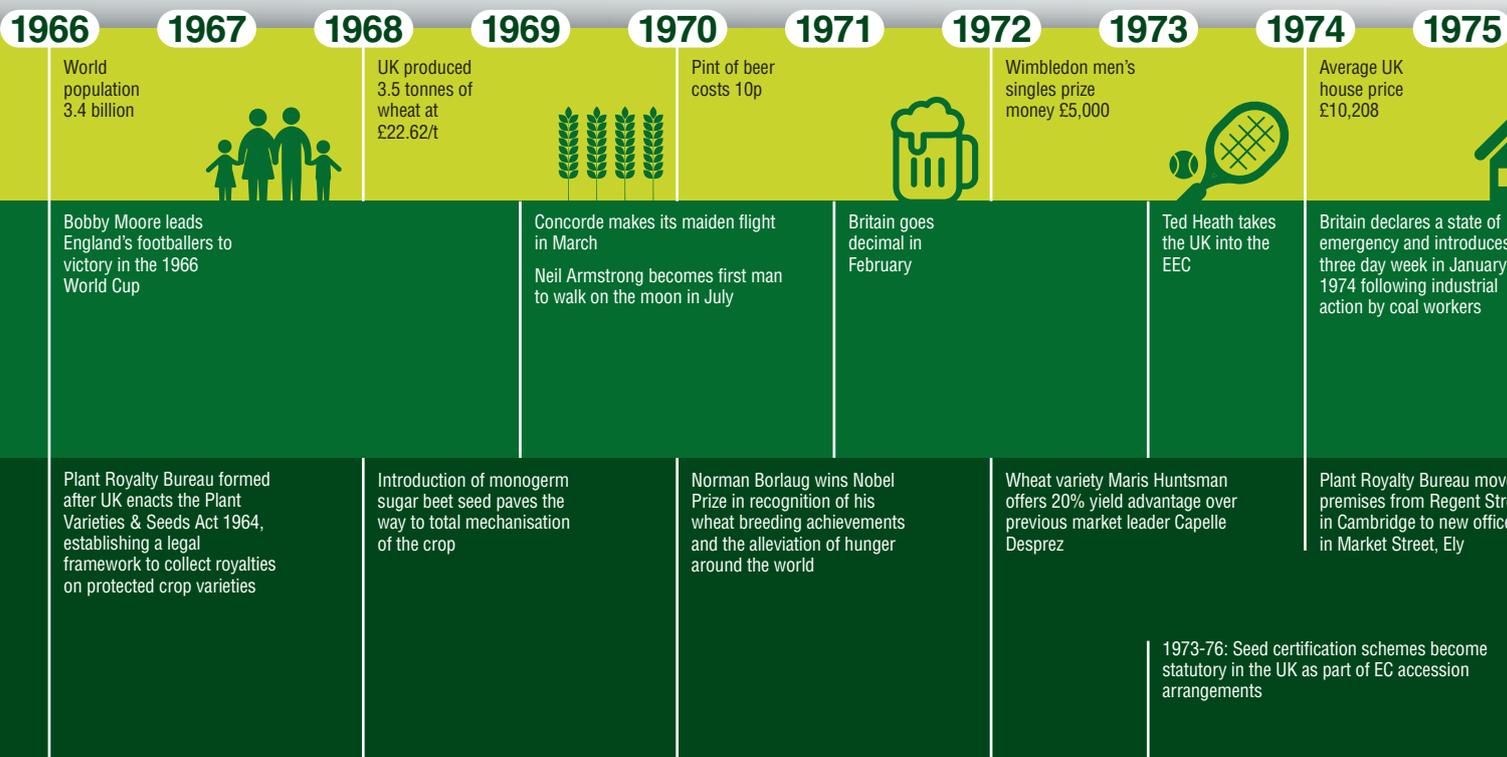
But Mr Smith, a partner at law firm Herbert Smith Freehills, which hosted the seminar, emphasised the need for effective IP protection to exploit these opportunities, particularly in relation to the development of new crop varieties and breeding tools. He identified three key challenges ahead for protecting innovation in the plant breeding sector.

The first, immediate priority was to understand the implications of Brexit and ensure a seamless transfer of Plant Variety

Rights protection from EU to UK level.

Secondly, there was a need to recognise that plant breeding methods are changing and that alternative IP models may be needed to sustain investment and innovation, for example in relation to new genome editing and trait development techniques. This would include identifying potential solutions to ensure compatibility of PVR with other IP rights such as patents, copyright, trade secrets and data protection.

The third challenge identified by





The plant IP landscape is evolving as new technologies emerge; PVR will need to co-exist harmoniously with patents, copyright, trade secret and data protection to incentivise and reward innovation

Mr Smith was the need to resolve the long-term issue of access to plant genetic resources by standardising an increasingly complex web of international treaties and inter-country arrangements intended to promote access and benefit-sharing.

Kevin Gorman, Scientific Affairs Manager at UK-based technology company Oxitec Ltd, described the development and application of GM insect technology to control mosquitoes in areas where they are vectors for

human diseases such as Dengue fever and the Zika virus.

By releasing males of a self-limiting strain of the *Aedes aegypti* mosquito – whose offspring die before reaching adulthood after mating with wild females – he explained that the technology was capable of reducing the wild population below the level needed to transmit disease. Field trials in Brazil, Panama and the Cayman Islands had achieved more than 90% suppression of the mosquito population, a global success story for UK-developed technology.

Mr Gorman indicated that this was a rapidly advancing scientific field, with new techniques allowing genetic segregation of males and the potential application of targeted ‘gene drive’ technology to induce rapid and persistent spread of mortality within a species. He added that Oxitec’s focus over the next five years would include a strong move into agricultural markets, where laboratory examples of game-

changing technologies were just a few years away.

Given the wider controversies surrounding GM technology, Mr Gorman also provided valuable insights into effective public outreach and engagement, which needed to be case-specific, transparent and proactive, focused on the benefits for individual people and communities, and delivered by locally-based champions.

Rounding off the presentations, Allan Wilkinson, head of food and agriculture at HSBC Bank plc, predicted a very positive future for plant breeding innovation in the years to come, as the combined impact of population growth, pressure on finite land and water resources, and a shift in affluence from West to East would place unprecedented demands on global food production and trade.

But while the pace of change in agricultural technologies was set to accelerate, the food supply chain would be subject to increased scrutiny



Game changing technologies like Oxitec’s genetic approaches to controlling mosquito-borne human diseases such as Dengue and Zika may soon have agricultural application

1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1
World population 4.2 billion		UK produced 6.6m tonnes of wheat at £91.98/t		Pint of beer costs 34p		Wimbledon men's singles prize money £41,667		Average UK house price £32,543		
	Virginia Wade wins Wimbledon in the Queen's Silver Jubilee year		Margaret Thatcher becomes Britain's first woman Prime Minister	Who shot JR? The question everyone was asking		Gotcha! How <i>The Sun</i> newspaper (in)famously reported the sinking of the Belgrano as the Falklands conflict dominated the news agenda			Live Aid raised £40 million for famine relief	
Golden Promise, bred in the early 1960s using gamma ray mutation, is the UK's leading spring malting barley variety		Late-1970s: Introduction of 'single-low' oilseed rape varieties supports major UK expansion of the crop in response to CAP support incentives		Development of semi-leafless field peas revitalises an important home grown protein source		Virus-resistant tobacco plant becomes the first GM crop approved for field release in the USA		State-bred varieties command an 80% share of the UK winter wheat market		UK flour millers' usage of home-grown wheat exceeds 80% for the first time

from consumers taking a greater interest in the provenance of their food, and seeking responsible participation by the food industry. Rapidly changing patterns of food purchasing and consumption, such as on-the-go and on-line, as well as the impact of social media, would bring a further transfer of power from retailers to consumers.

In short, science would have a greater role than ever in meeting the world's future food needs, said Mr Wilkinson, but successful innovation would be concentrated in the hands of fewer players, with a much sharper focus on meeting consumer expectations in terms of health, nutrition, labelling and openness.



Plant breeders should be mindful of the growing interest in food provenance and the transfer of power from retailer to consumer

Meet the BSPB team: Tony Richardson, Field Officer

Tony Richardson joined the BSPB Executive in April 2016 as Field Officer for Northern England, Northern Ireland and Scotland, taking over from Henry Taylor who has left the Society after 11 years in the post.

Based in rural North Yorkshire, Tony provides a local point of contact for seed merchants, processors and farmers on all seed royalty and licensing issues. He is part of BSPB's dedicated team of auditors whose role is to check that royalty income collected by BSPB each year tallies with the amount of certified seed produced and sold by licensed seed merchants, and with the farm-saved seed declarations received from seed processors and individual farmers.

Together the audit team covers many thousands of miles each year to carry out inspections at the premises of licensed merchants and seed processors.

A former farm inspector with the Rural Payments Agency, Tony believes there is widespread recognition of the

need to support continued innovation in plant breeding.

“One of BSPB’s main tasks is to collect royalties on certified and farm-saved seed. This is the investment stream breeders and their customers depend on for future crop improvement. Field officers are in the front-line for BSPB in dealing with farmers and the seed trade, and the vast majority of people I deal with are co-operative and supportive of the need to maintain investment in UK-based plant breeding.”

Outside of work Tony pursues a wide range of interests including shooting, fishing and home renovation. Tony is also a lifelong vintage tractor and machinery enthusiast and has completed several large restoration projects.



1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
World population 4.9 billion 	UK produced 11.7m tonnes of wheat at £114.19/t 	Pint of beer costs £1.14 	Wimbledon men's singles prize money £265,000 	Average UK house price £52,114 					
Maradona's 'Hand of God' dumps England out of the 1986 World Cup finals	In October 1987, Met Office weather forecasters failed to spot the onset of Britain's worst storm for over 250 years, which claimed 19 lives and cost £1.5 billion to clear up	Fall of the Berlin Wall in 1989 marks the symbolic collapse of Communism and the Cold War	On 11 February 1990, anti-apartheid campaigner Nelson Mandela was released after 27 years in jail	UK crashes out of the European Exchange Rate Mechanism in September 1992 after interest rates rose to 15%	Britain launches the National Lottery in November 1994	Oil giant Shell caved in to Greenpeace pressure and abandoned plans to dump its Brent Spar oil rig at sea			
EGM of the Plant Royalty Bureau approves merger with BAPB to form the British Society of Plant Breeders	Virus-resistant potato becomes the first GM crop to undergo field trials in the UK Plant Breeding Institute sold to Unilever, marking the end of UK public sector involvement in mainstream commercial breeding	Late-1980s: Introduction of 'double-low' oilseed rape varieties delivers improved end-use quality for food and animal feed	UPOV Convention revised to recognise the right of plant breeders to recover a royalty on farm-saved seed of protected crop varieties	Domestic forage maize area exceeds 100,000ha thanks to breeding success in adapting the crop to UK growing conditions	EU Plant Variety Rights introduced and Community Plant Variety Office established at Angers in France				

FSS rules apply to cover crops

As part of the FAIR PLAY campaign, BSPB is reminding growers that using farm-saved seed of eligible varieties in cover crop mixtures is subject to the same seed regulations and FSS rules as harvested crops.

Interest in the use of cover crops among arable farmers has increased recently in response to CAP greening requirements and as research has demonstrated the rotational benefits of cover crops for soil quality, reduced nutrient losses, and improved weed and disease management.

This renewed interest has been reflected in an increasing number of queries received by BSPB from individual farmers in relation to the use of combinable crops such as peas, oats and barley in cover crop mixtures.

BSPB is therefore advising farmers and their advisers that seeds regulations and farm-saved seed rules apply regardless of whether a crop is taken to harvest, and that when sowing a cover crop mixture which includes seed of PVR protected varieties, farmers must use either new seed purchased from a licensed seed merchant or farm-saved seed produced on their own holding.

Under the FSS rules, farmers cannot sell, barter, exchange or in any other way transfer farm-saved seed between holdings.

In addition, the use of eligible varieties as farm-saved seed in cover crops must be declared to BSPB and FSS payment made according to the proportion of eligible varieties in the mixture and the area sown. A list of eligible varieties and payment rates by crop species is available on the FSS section of the BSPB website, or farmers can contact the BSPB helpline on 01353 653209 for advice.

Farmers purchasing new seed for use as cover crops should ensure that this is certified seed bought from a licensed seed merchant (for peas, oats and barley) or if they are buying a cover crop mixture which may include a combination of regulated and unregulated species, that the bag carries an official green label stating 'mixture of seed for green cover'.

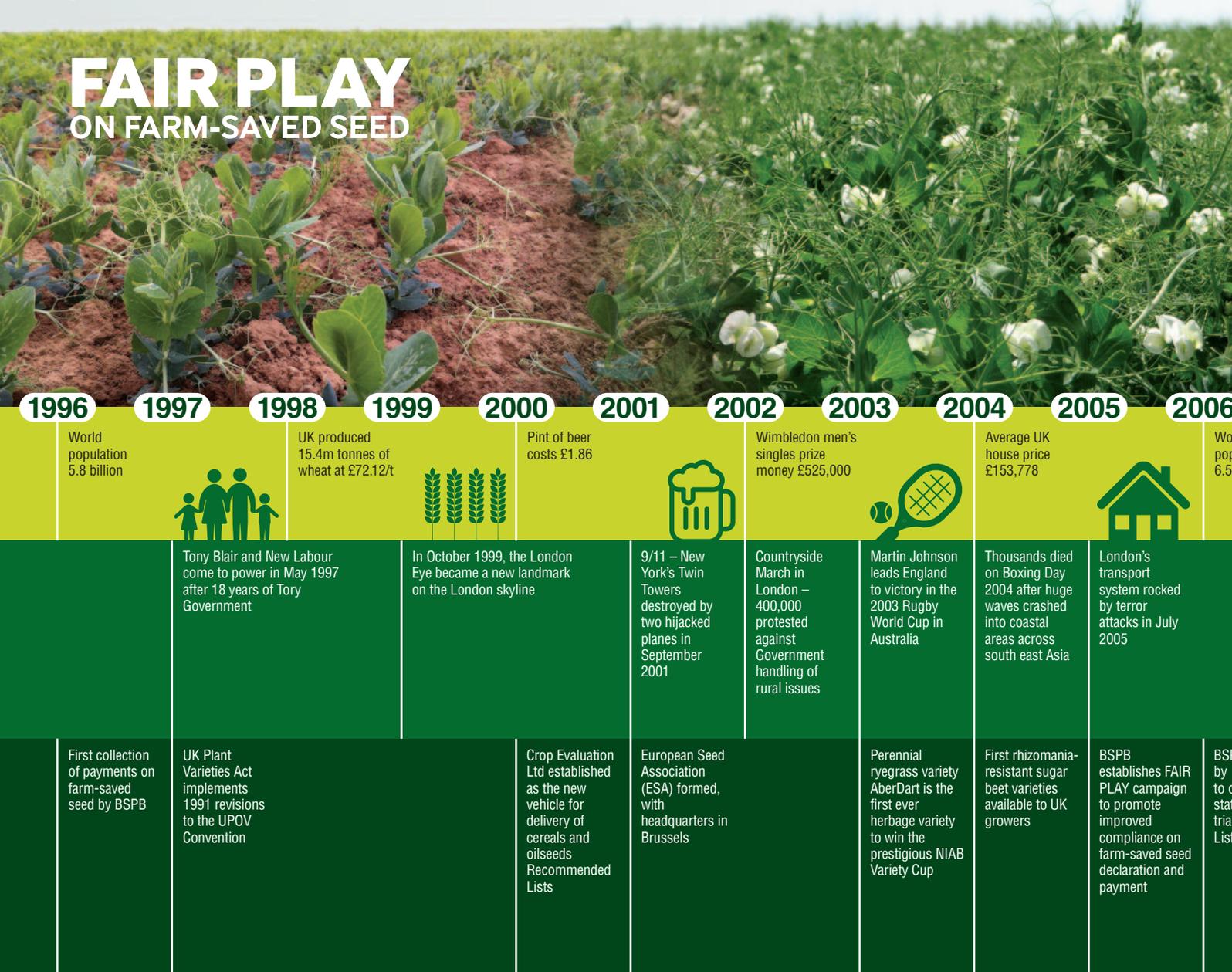
BSPB chief executive Dr Penny Maplestone said:

"The FAIR PLAY campaign was established by BSPB and the farming unions to promote a collaborative, industry-wide approach to ensuring all farmers contribute fairly for the economic benefits of using farm-saved seed.

"By ensuring farmers are clear about the rules on FSS use, the FAIR PLAY campaign has come a long way in tackling the gap in FSS payments and supporting continued investment in UK-based breeding programmes.

"The need for genetic innovation has never been greater to maintain the competitiveness and resilience of UK crop production, and it is vital therefore that all farmers understand their legal obligations on FSS to safeguard the development of improved varieties, bred for UK conditions and markets."

FAIR PLAY ON FARM-MADE SEED





Plant Variety Rights (PVR)

EU Plant Variety Rights were first introduced in 1995 and virtually all seed royalties on UK-grown crop varieties are now collected under this EU-wide system. Continued investment in UK plant breeding will depend on a seamless transfer of all EU-protected varieties to UK-based protection at the point of Brexit, with the same variety name, priority and duration of rights.



Variety registration

A single application under the current EU-wide variety registration system allows new varieties to be listed on the 'common catalogue' and marketed in all EU member states. This system has served the industry well and supports access to crop innovation – BSPB will seek solutions which minimise additional costs and duplication of effort, such as mutual recognition of common catalogue and UK-listed varieties.



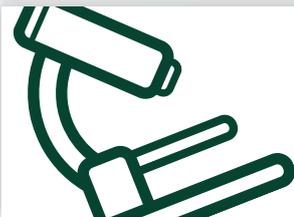
Seeds marketing

UK seeds marketing legislation is already in place, broadly equivalent to EU-wide standards. BSPB is seeking no significant changes to the current system which has served the industry well and provides an independent assurance to growers of the purity, quality and varietal integrity of certified seed. To minimise costs and disruption for all concerned, BSPB will press for mutual recognition of seed marketing standards and free movement of seed to continue without restriction between the UK and EU.



GM and New Breeding Techniques (NBTs)

BSPB has long expressed concerns that research and investment in the development of GM crops and new genome editing techniques have been stifled by a shift towards unscientific or politically motivated regulation at EU level. Leaving the EU presents a fresh opportunity for the UK to demonstrate its commitment to providing an enabling environment for agricultural science and innovation, and that it is a good place to invest post-Brexit.



Research and Development

Our response to the global challenges of food security, climate change and sustainable development will require international scientific collaboration and knowledge exchange. From a research perspective, the UK must safeguard access to EU R&D funding programmes, maintain straightforward research collaboration between the UK and other EU countries, and enable the UK to continue to contribute to and benefit from the shared resources, data and infrastructure of the pan-European agri-science base.



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2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World population 7 billion	UK produced 17.5m tonnes of wheat at £137.87/t		Pint of beer costs £2.80		Wimbledon men's singles prize money £1,150,000		Average UK house price £265,000		World population 7.5 billion
Apple unveils the first iPhone in January 2007	Barack Obama becomes the first black US President in November 2008	Bank of England cuts interest rates to a 315 year low in January 2009 as global banking crisis deepens	Ash fall-out from a volcanic eruption in Iceland suspends all flights in and out of the UK 33 Chilean miners rescued after two months trapped underground	Royal Wedding – Prince William & Kate Middleton were married at Westminster Abbey Osama Bin Laden's death at the hands of US forces	Diamond Jubilee celebrations mark the Queen's 60th year on the throne	Andy Murray wins the 2013 Wimbledon Championships, the first British man to win the men's singles title since Fred Perry, 77 years previously	Scotland votes No in the independence referendum	Paris terror atrocities in November shocked the world, when armed militants killed 130 people in a series of attacks across the capital	Brexit – UK votes to leave the EU
BSPB licensed UK authorities to organise statutory variety trials for National purposes	NIAB report shows around 90% of the increase in UK average cereal yields over the past 25 years can be attributed to innovation in plant breeding	BSPB strengthens presence in Scotland with establishment of a northern office	DTZ economic impact report concludes that every £1 invested in UK plant breeding adds £40 to the wider economy	Foresight report highlights global food security challenge and the critical role of science and technology in delivering the 'sustainable intensification' of agriculture	PVR campaign launched jointly by BSPB and AIC to highlight the role of Plant Variety Rights in supporting investment and innovation in the plant breeding and seeds sector	The Society moves offices to new purpose-built premises at Lancaster Way Business Park on the outskirts of Ely BSPB launches new <i>Plant Breeding Matters</i> website to highlight the value and importance of plant breeding innovation for everyone	Independent report by agricultural consultants ADAS concludes that plant breeding is a major contributor to more sustainable agriculture and food production	BSPB membership of 67 plant breeding companies and organisations is the highest in the Society's 50 year history	
				BSPB hosts ISF World Seed Congress 2011 in Belfast					