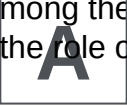


Viewpoint: Seed patent controversy — ‘Does intellectual property in agriculture drive up costs for farmers and restrict access?’ Here are the numbers

mong the many misconceptions about modern agriculture, perhaps one of the most pervasive surrounds the role of intellectual property (IP) in plant breeding.

One of the arguments of those calling for a ‘food system transformation’, is that intellectual property rights give big companies monopoly power over our food supply, drive up costs for farmers, work against the interests of smallholder producers in developing countries, and restrict the use of genetic resources by promoting monoculture and eroding biodiversity.

Instead, there are calls for the unfettered exchange and home-saving of seeds, arguing that no one should claim ownership or rights over Mother Nature’s bounty.

The reality is that intellectual property rights are responsible for generating a diversity of new, high performing varieties for farmers, enabling them to be more successful in meeting the needs of consumers. For any farmers that prefer not to use new plant varieties that are protected by intellectual property rights, there are thousands upon thousands of crop varieties available which are no longer protected by time-limited IP rights and many so-called ‘heritage’ varieties whose seeds can be used free of royalty payment, and without any restrictions on exchanging between producers, or on home-saving as seed for replanting.

Most of these varieties are no longer chosen by farmers on any significant scale because they have become outclassed, and have been replaced by better varieties which are higher-yielding, more resistant to pests and diseases, easier to grow and harvest, or which offer improved end-use quality.

It is a fundamental principle of plant breeders’ rights (PBR), the form of IP protection most widely used by plant breeders today, that a new variety can only be granted time-limited rights, and therefore confer the ability to charge a royalty for using seed of that variety, if it is clearly distinguishable from all existing varieties.

Royalties are the plant breeder’s primary source of return on many years’ upfront investment in research and development. Nor is grant of PBR any guarantee of revenue. Only varieties which succeed in the market-place – i.e. which meet farmer and consumer demands – are rewarded. Farmers decide whether or not to use a particular variety.

The PBR system used in the UK is part of an international system overseen by a Geneva-based intergovernmental organisation known as UPOV (International Union for the Protection of New Varieties of Plants).

Having recently retired as Vice-Secretary General of UPOV, after a career almost exclusively focused on plant breeding and the role of intellectual property in delivering benefits for all, I feel it’s important to counter the damaging claims and misinformation often perpetuated around the issue of IP.

Because by fostering investment and supporting improvements in the performance, quality and sustainability of modern crop varieties, IP protection in agriculture is unquestionably a force for societal

good in both developed and developing economies.

In addressing the misleading claims about the role of IP in agriculture, it's worth considering the 'food system transformation' that is often talked about.

The implication is that our food system is broken, and not fit-for-purpose.

But most people are unaware of the remarkable transformation that has taken place in food productivity over the past 60 years, in which scientific plant breeding has been the key driver, allowing farmers to produce much more food from the same amount of land, so sparing huge swathes of the natural environment.

For example, UK wheat yields were stable at around 2 tonnes per hectare throughout the 1800s and first half of the 20th century. Wheat yields then increased dramatically to 8 tonnes per hectare by the end of the 20th century. It has been calculated that at least half of the yield increase was due to the advent of science-based plant breeding and the introduction of new varieties of wheat. The remaining contribution came from other input factors, such as increased mechanisation and use of pesticides and fertilisers.

Faced with the need to produce more food for a rapidly expanding population while increasing sustainability by reducing inputs such as fertilisers and pesticides, the unique contribution of modern plant breeding is set to become even more significant. Indeed, a recent [economic impact](#) study by HFFA Research GmbH showed that improved crop varieties accounted for not half, but two-thirds of the productivity improvements enjoyed by UK arable farmers over the 20-year period 2000-2020.

The UK was one of the countries that first identified the need to introduce plant breeders' rights (PBR), becoming one of the founder members of UPOV in 1968. It is no coincidence that the remarkable progress in agricultural yields in the UK corresponded with the introduction of the UPOV system of plant variety protection and the UK Plant Varieties and Seeds Act in 1964. This legislation triggered a rapid expansion of plant breeding as a commercial enterprise in its own right.

But just in case there are any doubts about the transformative nature of IP rights in plant breeding, or their enduring relevance to modern food system challenges, consider the following more recent case studies of PBR introduction.

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For example, an independent [study](#) conducted in Viet Nam demonstrated that in the 10 years before UPOV membership (1995-2005), yields in Viet Nam's major agricultural crops (rice, maize) increased but the increase was achieved by increasing inputs such as pesticides and fertilisers, not through plant breeding. In the 10 years after UPOV membership, annual crop productivity increased as a result of plant breeding (rice 1.7%, maize 2.1%) and Viet Nam's farmers maintained the same rate of agricultural productivity growth even while inputs were reduced. The income of Vietnamese farmers increased by 24% during the 10-year period, and the study calculated that the value added to the Vietnamese economy as a result of plant breeding after UPOV membership was around \$5 billion annually (more than 2.5% of the country's GDP).

The dramatic success in Viet Nam contrasts sharply with the experience in neighbouring countries (Indonesia, Philippines, Thailand) that are not UPOV members and do not have such an effective system of plant variety protection – and where the number of new plant varieties is considerably lower (and has not increased – or has even declined).

The success in Viet Nam is based not only on the development of a domestic plant breeding sector but also on increased availability of the best varieties from around the world. No country can be entirely self-sufficient in giving farmers access to the best varieties. A powerful example of this can be seen in Kenya.

In the 1990s, Kenya started to produce cut flowers, particularly roses, primarily to develop an export market. However, at that time Kenya did not have access to the high-quality varieties needed to meet the needs of export markets such as the European Union – because the breeders of those varieties would not release their varieties without protection. In 1997, Kenya introduced a plant variety protection system and became a UPOV member in 1999. This encouraged plant breeders to release their high-quality varieties in Kenya, after which exports grew dramatically and enabled Kenya to develop a \$1 billion cut flower industry that now employs around 500,000 people in the rural sector.

These examples from Viet Nam and Kenya certainly refute the claims of some that IP protection in agriculture works against the interests of smallholder farmers in developing countries.

The Viet Nam case study also challenges the claim that IP systems restrict genetic resources and promote reliance on fewer varieties. In fact, farmers in Viet Nam now have many more new varieties to choose from than their neighbours in Indonesia, Philippines, Thailand, which do not operate such effective systems of plant variety protection.

It is a frequent misconception that the success of modern plant breeding has led to an erosion of biodiversity. In fact, quite the opposite is true. Maintaining genetic diversity is central to the process of crop improvement. It is in every breeder's interest to ensure that the gene pool from which new traits are selected remains as extensive as possible. Around the world, plant breeders are actively engaged in a range of national and international programmes to identify, classify and conserve the valuable genetic biodiversity within cultivated crop varieties, landraces and wild plant species.

IP protection systems also provide the basis to build partnerships between the custodians of plant genetic resources and plant breeders. An example of this can be seen in [Argentina](#) where plant breeders share royalties from new plant varieties with custodians of native plant flora that were used in the breeding programme. The income from seed royalties supports the conservation work, and the availability of

commercial plant varieties also reduces erosion of natural habitat through plants being collected from the wild.

And perhaps most importantly, let's not forget that scientific plant breeding allows farmers to produce much more food from the same amount of land, so avoiding the need to convert vast tracts of natural habitats for agricultural production. This increased productivity has resulted not from vast monocultures, as claimed by some, but from thousands of new varieties with a range of farm to fork characteristics including enhanced pest and disease resistance, higher yield, improved harvestability, better storability and increased consumer acceptance.

Two further claims to rebut.

First, that IP rights give big companies monopoly power over our food supply. Let's set that in context. The total seed royalty income of the UK plant breeding industry is in the order of £40 million per year. In a £120 billion UK food supply chain, that equates to 0.03%, hardly control over our food supply! But more fundamentally, the UPOV (and UK) PBR system was specifically designed to prevent monopolies by incorporating the 'breeder's exemption', which allows open access to use any protected variety in a breeding programme without needing the permission of the owner of the variety. Ironically, many of the most vociferous opponents of the UPOV system refer to the UPOV system when arguing that the patent system should not be allowed for plants in Europe because there is no breeder's exemption.

Second, that IP drives up costs to farmers. Turning again to the HFFA Research GmbH study cited earlier, this shows that without the past 20 years of plant breeding innovation, the current annual income of a UK arable farmer would be £17,000 lower – approximately half the current average income. In terms of the agricultural value added, around £800 million would be missing today from the UK agricultural economy without access to improved varieties.

I am extraordinarily proud of the contribution that UPOV and its unique system of IP protection has made in transforming the agricultural economies of both industrialised and developing countries. In the [words](#) of Jack A. Bobo, Director of the Food Systems Institute, University of Nottingham: "Things are not bad and getting worse, they are good and getting better".

Far from demonising IP in agriculture, we should be celebrating and championing the role of plant variety protection in supporting prospects for a more productive, resilient and sustainable global food system.

Peter Button recently retired as Vice Secretary-General at the International Union for the Protection of New Varieties of Plants (UPOV), based in Geneva, an intergovernmental organisation whose mission is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants for the benefit of society. Follow Peter on X [@PeterJohnButton](#)

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