China Breeds Success

The Country’s Head Start in New Breeding Techniques

Summary

- On 25 July, the European Court of Justice will make a decision on the regulation of new breeding techniques. The introduction of these techniques, such as CRISPR/Cas, creates various opportunities in plant breeding, mainly because it allows for faster and more precise breeding. But while application of new breeding techniques is hampered in the US and Europe by uncertainties to do with regulation and consumer acceptance, China is moving fast when it comes to this technology and is currently in the lead regarding patent applications for plant traits bred using new breeding techniques.

Regulatory uncertainties pose a risk for EU breeders

Innovative new breeding techniques (NBTs) such as CRISPR/Cas are a type of biotechnology that enables users to change plant traits by precisely editing its DNA or without even changing the DNA at all. The fundamental difference between genetically modified (GM) plants and NBT plants is that NBT yields results that could also be obtained through natural processes, while this is not the case for GM plants.

Due to the more natural character of NBT, the applicable regulations are vague and currently being debated by the European Commission, creating uncertainty over the approval of NBT plants for the EU consumer market. The US has recently decided not to define and regulate NBTs as GM (see our recent article No Copy-Pasting), which is advantageous for breeders that are using NBTs, as it leads to lower costs for meeting regulatory requirements as well as faster market entry. Other countries, such as China, have taken a similar approach. The regulatory uncertainties in Europe pose a risk to the breeder and grower as access to the end market might be limited.

China is the big player in the NBT industry

Some EU and North American companies are hesitant when it comes to patenting NBTs for plant breeding. The majority (73%) of patent applications come from Chinese players, who are way ahead of Europe (12%) and the US (11%) (see Figure 1). The Chinese are especially dominant in terms of research and patent applications for CRISPR/Cas (95%).

Figure 1: China dominates NBT plant patent applications, 2007-2017

Note: Patent applications of angiosperms (classification A01H5 or A01H6) created with NBTs (CRISPR/Cas, ZFN, ODM, meganuclease, reverse breeding, RdDM and grafting on GM)
Source: EPO Espacenet, Rabobank 2018
Chinese governmental interference is driving research and plant breeding

Chinese patents are mainly filed by the public sector (universities and institutes), and the patented features are predominantly related to improving specific plant traits in rice. This makes sense considering Chinese concerns about food security and the importance of rice for China.

Although the production of rice is slowly increasing, the fast increase in China’s population has made the country into a net importer of rice ever since 2011 (see Figure 2). To feed China’s increasing population, the government has introduced the largest publicly funded research programme in the world. As outlined in the programme’s goals, Chinese patent applications are mostly filed for specified plant-crop species, predominantly in the main staple food rice (see Figure 3).

The effect of China’s immense breeding activity is not a direct competitive threat to European and American breeders, as the patents are predominantly in rice, which is not a focus crop for most US and European breeders. However, Chinese breeders are currently able to quickly gain experience and knowledge on NBTs, gaining further advantage over breeders in other countries.

Figure 2: China went from rice exporter to rice importer, 1992-2016

Figure 3: China is patenting applications for a variety of plants, predominantly in rice, 2007-2017

* ‘Plants’ refers to applications which have been applied to all species of plants instead of being specific to only one plant species.

Source: EPO Espacenet, Rabobank 2018
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