

Global pipeline of GM crops out to 2020

Researchers at the Joint Research Centre (JRC) of the European Commission have updated a 2008 JRC study that analysed the global pipeline of genetically modified (GM) crops that were expected in the market in 2015. The paper, published in *Nature Biotechnology*, describes GM crops in the pipeline from 2008 to 2014, and shows the global situation of GM crops in development, with the objective of describing the medium-term innovations in the food, feed, and industrial sectors. The study, authored by Claudia Parisi, Pascal Tillie, and Emilio Rodriguez-Cerezo, also analyses the role of developing countries in the GM crop pipeline. The authors conclude that, although a few arable crops (for feed and industrial use) and agronomic traits will likely dominate commercial varieties for the foreseeable future, with many being stacked together, more quality traits and specialty crops are being introduced into the pipeline. They also note that new technology developers are emerging, particularly in developing countries such as India, China, Brazil, and African developers are showing their willingness to enter the commercial field. (Available at *Nature Biotechnology*)

Growing demand for food, fuel drives global agricultural biotechnology market

A new study published by Transparency Market Research (TMR) entitled *Agricultural Biotechnology Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast, 2013-2019*, reports that the global agricultural biotechnology market was worth \$15.3 billion in 2012, and is expected to double by 2019, growing at a 9.5% CAGR from 2013 to 2019. According to the report, the growing global population has led to the increased demand for genetically modified (GM) crops. Increasing demand for biofuels due to depleting reserves of conventional fuels is further boosting the agricultural biotechnology market. It also states that the benefits of GM crops such as higher yield, resistance to pests, longer shelf life, and high nutritional value, make them widely accepted both in developed

and developing countries. The report notes that North America has faster adoption of GM crops, therefore dominating the global agricultural biotechnology market. Europe has a substantial consumption of GM crops for animal feed, imported from the US and Brazil. (For more information: www.transparencymarketresearch.com)

Researchers discover core set of genes for plant-fungal symbiosis

Land plants get a large portion of their mineral nutrients through their relationship with soil fungi called arbuscular mycorrhizal (AM) symbiosis. Despite decades of research, many of the genes required to form this relationship remain elusive. A new study conducted by researchers at the Boyce Thompson Institute (BTI) has uncovered genes that plants use to form symbiotic relationships with fungi. With the widely available genome sequences, the researchers were able to compare 50 plant genomes to identify 138 genes shared exclusively by plants capable of AM symbiosis. Armando Bravo, a BTI postdoctoral scientist worked with bioinformatics analyst Thomas York to compare the genome sequences of 34 plant species that can form symbiosis with 16 plants that cannot. Then they picked out the genes that are found only in plants that form AM symbiosis and arrived at just 138 genes. Fifteen of these were already known to play a role in AM symbiosis and Bravo tested the accuracy of seven of the unknown genes in the group by growing barrel medic with mutations in those genes and examining their ability to form a successful symbiosis. Mutations in six of these genes resulted in a faulty interaction. Almost all staple crops form AM symbioses, and optimising this interaction through crop breeding could improve yield and reduce the need for fertilisers. (For more information: bti.cornell.edu)

Scientists complete bread wheat genome sequence

The International Wheat Genome Sequencing Consortium (IWGSC) reported that the whole genome assembly of bread wheat, the most widely

grown cereal globally, has been completed. The project consisted of producing a whole genome assembly of the bread wheat variety Chinese Spring based on Illumina short sequence reads assembled with NRGene's DeNovoMAGIC software. It is expected that with these new data available, global research on crop improvement will be accelerated. The information on the whole genome assembly will be combined with physical-map based sequence data to produce a high-quality, ordered sequence for each wheat chromosome that precisely locates genes, regulatory elements, and markers along the chromosomes, providing vital tools for wheat breeders. (For more information: www.wheatgenome.org)

USDA APHIS opens GE creeping bentgrass deregulation petition for public comment

The US Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) released the petition submitted by The Scotts Company and Monsanto seeking deregulation of creeping bentgrass (*Agrostis stolonifera*) with improved resistance to herbicide glyphosate (ASR368). The petition will be available for public review from January 8 to March 6, 2016. The CP4 EPSPS protein present in GE creeping bentgrass is similar to that expressed in Roundup Ready corn and other glyphosate tolerant crops such as cotton, soybean, corn, sugar beet, canola, alfalfa that have been previously reviewed and granted non-regulated status by USDA-APHIS. (For more information: <https://www.aphis.usda.gov>)

Scientists to develop HT sugar beet with three modes of action

Scientists from two seed companies are developing biotech sugar beet to fight weeds better. This new variety is tolerant to three different herbicides: glyphosate, glufosinate, and dicamba. This news was reported by Aaron Hummer, a researcher from Germany-based KWS Saat, during the Snake Rive Sugar Conference held in December 2015.

According to Hummel, the combination of the three traits stacked into one variety should prevent the spread of herbicide-resistant weeds because any weed resistant to any of the three modes of action would be killed by the others. The new variety is being developed by KWS Saat and Monsanto. Trials and development will occur over the next three years and the new variety is expected to become available in the market in 8 to 10 years.

FDA approves second generation Innate potatoes

The United States Food and Drug Administration (FDA) has completed its food and feed safety assessment of the second generation of J.R. Simplot's Innate potatoes. The FDA concluded that the Russet Burbank Generation 2 potatoes are not materially different in composition, safety, and other relevant parameters, from any other potato or potato-derived food or feed currently on the market. The second generation of Innate potatoes contains four benefits to potato growers, processors, and consumers: reduced bruising and black spots; reduced asparagine; resistance to late blight pathogens; and enhanced cold storage capability. These benefits were achieved by adapting genes from wild and cultivated potatoes. The safety consultation was voluntarily requested by Simplot and comes shortly after the US Department of Agriculture also deregulated the same potatoes. These federal clearances involved a thorough technical review and a public comment period that drew the support of leading potato research universities in the US and Europe. (For more information: www.simplot.com)

USDA issues preliminary extended determination of non-regulated status for V11 potatoes

The USDA Animal and Plant Health Inspection Service (USDA APHIS) granted the request of JR Simplot Company to extend the determination of non-regulated status of V11 Snowden Potatoes. The GE potato has low acrylamide potential and reduced black spot traits. Plant pest similarity assessment of APHIS showed that V11 potatoes are unlikely to pose plant pest risk and thus, should no longer be regulated. APHIS also prepared an Environmental Assessment and reached a Finding of No Significant Impact (FONSI). APHIS concluded that V11 potatoes will have no significant impacts, individually or collectively, on the quality of the human environment and will have no effect on federally listed threatened or endangered species, species proposed for listing, or their designated or proposed critical habitats. (For more information: <https://www.aphis.usda.gov>)

USDA extends deregulation to GE corn MZHG0JG

The USDA Animal and Plant Health Inspection Service (USDA APHIS) announced the extension of deregulation of herbicide tolerant corn MZHG0JG developed by Syngenta. The same GE trait has been previously reviewed and deregulated in other GE corn plants. Based on environment assessments conducted by APHIS, it was found that the HT corn does not pose risks. The results were posted under public review from October to November 2015. On December 2, 2015, APHIS announced that the determination of non-regula-

tory status of the HT corn is the most scientifically sound and appropriate regulatory decision. (For more information: <https://www.aphis.usda.gov>)

Swedish Board of Ag: CRISPR-Cas9 does not fall under EU GM definition

CRISPR-Cas9 is a novel technique that allows scientists to make small changes in the genetic material of an organism to occur naturally and precisely. It has a wide potential for use in plant science and breeding. According to the Swedish Board of Agriculture, plants that have been transformed using this new technique do not fall under the GMO definition of the European Union. Thus, the plants can be cultivated without restriction. Countries outside EU like Argentina have announced that similarly edited plants are not covered by their GMO legislation. EU is yet to issue a decision about the matter.

EPA acts to halt approval of Dow's Enlist Duo herbicide

A court has been asked by the US Environmental Protection Agency (EPA) to stop the registration of Enlist Duo, the controversial herbicide produced by Dow AgroSciences. There is new information indicating that 'synergistic effects' between 2,4-D and glyphosate, the two active ingredients of the herbicide, could lead to greater toxicity to non-target plants. A remand was sought by the EPA from the court on 24 November 2015 to reassess the registration. If the court reverses the registration, a cancellation order will be released by the agency to tackle the distribution, use and sale of any products already available. **CBNB**

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