

Green Gene GMO Cultivation on the Increase

Editor's Note: In last month's SJ column, we looked at the promising technology associated with the development of genetically modified foods and the increasing global use of transgenic crops. In my column this month, we will look at the very latest available figures regarding the use of GM plants across the globe.

The cultivation of genetically modified plants continues to increase worldwide. In 2008, GM crops rose by a figure of 9.4% to occupy 125 million hectares (308 million acres). GM plants are now employed in 25 countries, of which Bolivia, Burkina Faso and Egypt are the newest.

In all countries with large-scale cultivation, more GM plants were sown in 2008 than in the previous year. One half of the global area under cultivation may be found in the USA (156.8 million acres), which is followed by Argentina (51.8), Brazil (39), India (18.7), Canada (18.7), Paraguay (6.6) and South Africa (4.4). These figures are taken from the yearly report by the agro-biotechnology agency ISAAA (International Service for the Acquisition of Agri-Biotech Applications) on the cultivation of GM plants. The report was published on 11 February in Nairobi (Kenya).

With regard to the four cultivar types that have been in use in farming since 1996, the "gene technology acreage" has increased once again: in the case of soybean, the area occupied by GM varieties expanded to 162.5 mil. acres (2007: 144.7), maize to 92.1 (86.9), cotton to 38.2 (37.0), and rapeseed to 14.5 (13.5). GM cultivars now represent 72% of the global production of soybean and 47% of cotton.

Sugar Beet

For the first time, the ISAAA report also identified areas used for genetically modified sugar beets, the cultivation of which is approved in the USA and Canada. In their second year of availability, herbicide-tolerant GM sugar beets already achieved a share of 57%. They are being grown on almost 642,000 acres.

Newest Countries

Three countries have included GM plants in their agriculture for the first time in 2008: Bolivia planted GM soybeans on 1,482,000 acres, Burkina Faso, GM cotton on 20,000 acres and Egypt, GM maize on 1,729 acres.

In Europe, resistance to GM plants continues (as we have previously reported). the commercial application of GM plants is comparatively insignificant. In seven EU countries, the crop area of Bt maize totals to slightly more than 247,000 acres, approximately 80% of which are in Spain.

Modern biotechnological techniques have rapidly expanded the horizons of plant breeding and crop improvement. Conventional breeding techniques rely on the random rearrangement of existing genes between two closely related parent plants. Now, genetic engineering has opened up new possibilities by allowing the transfer of individual, known genes, even from completely unrelated organisms such as fungi or bacteria. Genetic engineering thus provides a supplement to classical breeding approaches.

Major Breeding Efforts

Herbicide Resistance—Worldwide, herbicide resistant crops are the most widely grown transgenic plants. More than 70% of the GM plants grown today are herbicide resistant.

Pest Resistance—Crops genetically engineered for pest resistance are enabling a shift away from our reliance on broad-spectrum insecticides. Experience has shown that crop yields can be maintained or increased while decreasing spraying.

Disease Resistance—Plant diseases are a major agricultural problem, with losses sometimes reaching 90%. Virus infections can be especially difficult to prevent, and treatments for plant viral infections do not exist.

Altered Composition—Instead of adding new ingredients to foods in the factory, beneficial substances can now be put into the crops themselves. Both industry and consumers have much to gain from crops like "designer oilseeds" or starch crops custom tailored to specific applications.

Pharming—Transgenic plants can be used to produce an array of substances including pharmaceuticals, silk proteins, biodegradable plastics, or industrial enzymes. Such crops are only intended for industrial use and are not to be used as food.

Stress Resistance—More and more research is addressing intensifying global concerns over water scarcity. Salt, heat, and drought resistant crops could play an important role in meeting emergency food needs in the developing world and stabilizing crop yields in industrialized nations.

Elimination of Pollutants—Genetic engineering has given plants the ability to clean-up soils polluted with heavy metals or petroleum products. Such strategies can offer cheap and sustainable solutions to dangerous environmental problems.

'Bioremediation'—A current hot topic in biotechnology is 'bioremediation', or the use of plants or microorganisms to remove toxic pollutants from the environment. Plants and microorganisms can be modified to enhance heavy metal absorption or to break down petroleum products.

Many plants are naturally capable of taking up small amounts of heavy metals. A gene from the bacterium *Escherichia coli* was transferred into poplars, which enables the transgenic trees to produce glutathione.

Glutathione is a phytochelatin, or a small peptide capable of binding to heavy metals, which makes them more mobile and helps mask their toxic effects. Transgenic plants expressing phytochelatin not only become able to take up much more toxin, they also become better suited to growing in heavily polluted soils.

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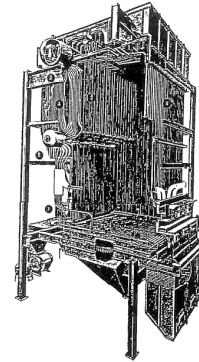
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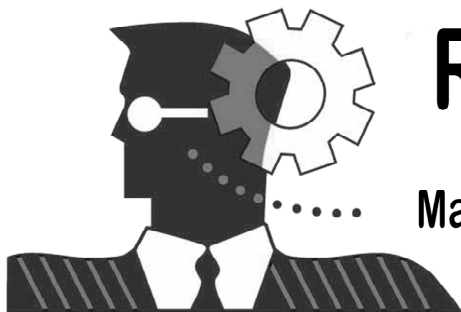
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