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Monsanto's "Submarine Patent" Torpedoes Ag Biotech

Monsanto & Syngenta Monopolize Key Gene Marker Technologies

Note: RAFI's concern about monopolization of gene marker systems and other basic research tools should not be interpreted as support for the technology or for genetic engineering. RAFI is not fundamentally opposed to biotechnology, but we have profound concerns about the way it is being foisted upon the world. In the current social, economic and political context, genetic engineering is not safe, and involves unacceptable levels of risk to people and the environment. For RAFI, the fundamental issue is control. Monopolistic control of marker gene systems, as discussed below, illustrates how a handful of Gene Giants are using intellectual property as a powerful market tool to stifle innovation, shackle public sector research and foster ever-increasing industry consolidation.

A new US patent, awarded to Monsanto on 16 January 2001, has blind-sided biotech scientists and threatens to knee-cap public sector research because it gives Monsanto exclusive monopoly rights on a crucial method of identifying modified plant cells in the laboratory.

US Patent No. 6,174,724 covers all practical methods of making transformed plants that employ antibiotic resistance markers. The technique, though controversial, has been used in virtually all commercial GM crops. The patent is valid only in the United States.

"The technique is so widely used that it could be a nightmare for biotech researchers," says Hope Shand, Research Director of RAFI, "It's as if Monsanto had just patented the yellow pages as a method for finding a telephone number. A technique that everyone thought was in the public domain is now the exclusive property of Monsanto – and the only practical alternative is patented by Syngenta."

"It appears to be just another nail in the coffin of public sector researchers' ability to produce transgenic plants with freedom to operate," observes Gary Toenniessen, Director of Food Security for the Rockefeller Foundation.

Monsanto's controversial patent, "Chimeric genes suitable for expression in plant cells," is described by patent experts as a particularly sinister "submarine patent." The term refers to a patent claim on a technology that is already widely used by competitors. When the surprise monopoly surfaces, the patent holder is positioned to demand licensing fees and royalties from its competitors – or to deny access to the technology altogether. It's not the first time that Mighty Monsanto has torpedoed its competition. For example, industry analysts speculate that AgrEvo's herbicide tolerant soybean program was stopped dead in the water after Monsanto's CaMV 35S promoter patent issued.

Monsanto originally applied for its patent on antibiotic resistance markers in 1983; a series of delays kept the patent under wraps until it surfaced recently without warning – long since the technology has been routinely used by researchers around the world.¹

“It raises very sharply the question of what we should do about patented research tools,” remarks Professor John Barton, an intellectual property specialist at Stanford Law School. Barton refers to Monsanto’s new patent as only the most recent in a line of extremely broad patents covering biotech’s most basic enabling technologies.

Breeding Controversy: Why are antibiotic resistance marker genes so widely used? And why are they controversial?

Genetic engineering is an imprecise technology. Antibiotic resistance markers, or selectable markers, are routinely used by genetic engineers because they provide a cheap and easy way to find out whether a new gene has been successfully transferred to a plant cell.

Scientists commonly introduce antibiotic resistance marker genes along with the primary gene of interest. To identify the cells that have been successfully transformed, scientists simply expose all the cells to the antibiotic and only the cells that have the antibiotic resistant marker gene will continue to grow. If the marker gene is present, so is the new gene. The technique is known as “negative selection.”

The use of antibiotic resistance markers is controversial. If the marker gene remains in genetically transformed plants that are released in the environment, there is concern that the presence of antibiotic resistance markers in soils and food may decrease the efficacy of widely used antibiotics, or increase the speed with which disease-causing pathogens become resistant to antibiotics. Last year the European Union proposed new rules banning antibiotic resistance genes in GM crops. Government regulators are thus forcing the biotech industry to phase out the use of antibiotic resistant genes in commercial GM crops. But marker genes are still widely used in transgenic (GM) crops and in laboratory research.

Syngenta’s Alternative - Patented Positech: In March 2000 Syngenta unveiled a new marker gene system called “Positech,” that enables plant cell transformation and selection *without* the use of antibiotic resistance marker genes. The Positech marker system gives plant cells the ability to digest mannose, a carbon source. Only the plant cells that can digest the mannose-based food source will be able to grow – all the others (the non-transformed plant cells) will die. The Positech system is an example of what is known as a “positive selection” technique. According to scientists interviewed by RAFI, Syngenta’s broad patent covers, in effect, the entire concept of positive selection. (The Positech technology – US Patent 5,767,378 and WO9420627A1 - was originally claimed as an invention by scientists at Denmark’s Danisco (a sugar company), who then sold the patent outright to Sandoz, which later became Novartis, which last year became Syngenta.)

Syngenta claims that it will make Positech “widely available” to both industry and academic researchers through “simple licensing procedures.”² It also boasts that it will provide Positech “royalty-free for subsistence farmers in developing countries” through local institutes or companies.

“The reality is totally different,” explains RAFI’s Shand. “Public sector researchers who seek to license Syngenta’s marker system must abide by a Material Transfer Agreement (MTA) that gives Syngenta first rights to any results and prohibits the sharing of resulting materials with third parties. By licensing Positech under this type of MTA, Syngenta has a significant number of public sector researchers who are, in effect, doing research for Syngenta!” Will Monsanto follow suit in the licensing of its broad submarine patent?

Like all of the Gene Giants, Syngenta is desperately seeking moral legitimacy, especially in the wake of its Golden Rice misfire. The company thus claims to make Positech available royalty-free to subsistence farmers in the developing world. But the reality is that many poor countries do not recognize Syngenta's patent. Governments (or companies) have every legal right to utilize any technology not patented within their territories.

With the power of monopoly patents, Monsanto and Syngenta have essentially "locked up" all currently viable marker selection techniques. In addition, MTAs are being used as a powerful market weapon to control potentially lucrative scientific advances.

Scientific Apartheid: "The biotech industry perpetually promises that it will deliver for the public good, but the biotech research agenda is virtually monopolized by corporate science in service to the Gene Giants – not to poor farmers or the environment," states RAFI's Shand.

All methods of producing genetically modified crops are covered by multiple and overlapping intellectual property constraints. All methods of delivering DNA to plant cells are also proprietary, usually covered by multiple patents. The irony is that many of these "inventions" were made at public institutions with public funding and then exclusively licensed to companies who use them to capture more public sector research results.

Consolidation Countdown: 5-4-3-2-1: Armed with obscenely broad patents on basic enabling technologies, a handful of Gene Giants are legally empowered to determine who gets access to proprietary science, and at what price. Not surprisingly, today's GM harvest is characterized by uniformity and concentration on a global scale:

Five major Gene Giants - Pharmacia (Monsanto), DuPont, Syngenta, Aventis, Dow - dominate agbiotech.

Four industrial crop commodities (soybeans, maize, cotton, canola) accounted for 100% of the commercial GM crop area in 2000.

Three countries (US, Argentina and Canada) accounted for 98% of the global transgenic area in 2000.

Two genetically engineered traits – herbicide tolerance and B.t. insect resistance – accounted for virtually all of the 44.2 million hectares devoted to GM crops last year.

Two patents controlled by Monsanto & Syngenta have "locked up" currently viable marker selection techniques – a basic enabling technology for agbiotech.

One company's GM seed technology (Monsanto's) accounted for 94% of the total world area devoted to commercial GM crops last year.

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RAFI (the Rural Advancement Foundation International) is an international civil society organization based in Canada. RAFI is dedicated to the conservation and sustainable use of biodiversity, and to the socially responsible development of technologies useful to rural societies. RAFI is concerned about the loss of biodiversity, and the impact of intellectual property on farmers and food security.

¹ US patent law was amended recently to curtail submarine patent tactics. For example, US patents filed after 29 November 2000 will automatically be published 18 months after they are filed.

² Syngenta, News Release, "Positech breakthrough offers alternative to antibiotic resistance marker genes for genetically enhanced crops," 23 May 2000. Available on the Internet: www.info.novartis.com/media/index.html