Beyond GM Food:

New Cutting Edge MAS Technology Makes GM Food Obsolete

by Jeremy Rifkin

For years, the life science companies—Monsanto, Syngenta, Bayer, Pioneer, etc.—have argued that genetically modified (GM) food is the next great scientific and technological revolution in agriculture, and the only efficient and cheap way to feed a growing population in a shrinking world. Non-governmental organizations (NGOs), including my own, The Foundation on Economic Trends, have been cast as the villains in this unfolding agricultural drama, and often categorized as modern versions of the English Luddites, accused of continually blocking scientific and technological progress because of our opposition to GM food.

Now, in an ironic twist, new cutting edge technologies have made gene splicing and transgenic crops obsolete and a serious impediment to scientific progress.

The new frontier is called genomics and the new agricultural technology is called Marker Assisted Selection, or MAS. The new technology offers a sophisticated method to greatly accelerate classical breeding. A growing number of scientists believe that MAS— which is already being introduced into the market— will eventually replace GM food. Moreover, environmental organizations, like Greenpeace, that have long opposed GM crops, are guardedly supportive of MAS technology.

Rapidly accumulating information about crop genomes is allowing scientists to identify genes associated with traits like yield and then scan crop relatives for the presence of those genes. Instead of using molecular splicing techniques to transfer a gene from an unrelated species into the genome of a food crop to increase yield, resist pests, or improve nutrition, scientists are now using Marker Assisted Selection to locate desired traits in other varieties or, wild relatives of a particular food crop, then cross breeding those plants with the existing commercial varieties to improve the crop. With MAS, the breeding of new varieties always remain within a species, thus, greatly reducing the risk of environmental harm and potential adverse health effects associated with GM crops. Using MAS, researchers can upgrade classical breeding and reduce by 50% or more the time needed to develop new plant varieties by pinpointing appropriate plant partners at the gamete or seedling stage.

While MAS is emerging as a promising new agricultural technology with broad application, the limits of transgenic technology are becoming increasingly apparent. Most of the transgenic crops introduced into the fields express only two traits, resistance to pests and compatibility with herbicides and rely on the expression of a single gene- hardly the sweeping agricultural revolution touted by the life science companies at the beginning of the GM era.

Of course, MAS researchers emphasize that there is still much work to be done in understanding the choreography, for example, between single genetic markers and complex genetic clusters and environmental factors, all of which interact to affect the development of the plant, and produce desirable outcomes, like improved yield and drought resistance.

Enthusiasm notwithstanding, a word of caution is in order. It should be noted that MAS is of value to the extent that it is used as part of broader, agroecological approach to farming, that integrates new crop introductions with a proper regard for all of the other environmental, economic, and social factors that together determine the sustainability of farming.

The wrinkle is that the continued introduction of GM crops could contaminate existing plant varieties, making the new MAS technology more difficult to use. A landmark 2004 survey conducted by the Union of Concerned Scientists, found that non-GM seeds from three of America's major agricultural crops—corn, soybeans, and canola—were already "pervasively contaminated with low levels of DNA sequences originating in genetically engineered varieties of these crops". Cleaning up contaminated genetic programs could prove to be as troublesome and expensive in the future as cleaning up viruses that currently invade software programs.

As MAS technology becomes cheaper and easier to use, and as knowledge in genomics becomes more dispersed and easily available over the next decade, plant breeders around the world will be able to exchange information about "best practices" and democratize the technology. Already, plant breeders are talking about "open source" genomics, envisioning the sharing of genes just as Linux and other open source IT organizations currently share software. The struggle between a younger generation of sustainable agriculture enthusiasts anxious to share genetic information and entrenched company scientists determined to maintain control over the world's seed stocks through patent protection, is likely to be hard fought, especially in the developing world.

If properly used as part of a much larger systemic and holistic approach to sustainable agricultural development, MAS technology could be the right technology at the right time in history.

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