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THE FIRST WORD

Bananas and Biotech Consumers

Fungi, viruses, and other pathogens wreak havoc on the world's bananas and plantains. The banana is a major tropical cash crop, bested only by coffee in the marketplace. And plantains—large cooking bananas—are a food staple in many parts of Central and South America and Africa. While the banana market, valued at more than \$5 billion U.S., has been the object of intense manipulation for decades (it is currently at the center of a complicated trade skirmish between the EU and the U.S.), the giant herb itself has proved strongly resistant to genetic alteration for disease resistance or indeed any other trait. It was only two years ago in fact that the Fundacion Hondureña de Investigacion Agricola and Houston-based Agristar announced the development of a pesticide-free, fungus-resistant banana called Goldfinger, designed, via tissue culture methods, to repel black Sigatoka, a banana-destroying fungus.

Now this issue of *BioTechnology* contains two papers detailing the application of two straightforward methods of transforming bananas, opening up a previously inaccessible genome to a host of manipulations. The first of these, from László Sagi and colleagues from the Catholic University of Leuven, details a biolistic protocol that uses embryogenic suspension cultures. The second, from Charles Arntzen and colleagues at Texas A&M University and the International Atomic Energy Laboratories at Seibersdorf, in Vienna, describes an even less technically demanding procedure that will be immediately applicable in micropropagation laboratories currently active in banana-producing countries.

Why has banana transformation been so difficult? The development of disease-resistant banana by conventional breeding has been hampered by long generation times, triploidy, and the sterility of most cultivars.

At present, the only effective method of controlling diseases that attack commercial bananas is massive amounts (hundreds of millions of dollars worth) of aerial spraying. The ability to make disease-resistant bananas and plantains would confer at least two benefits: one to consumers, who don't want massive amounts of fungicide on their bananas, and one to the companies that would no longer need to spray in large quantities, solving their agronomic problem. Another potential benefit for consumers is that it might become possible to augment the standard Cavendish banana with which we are all familiar with the hundreds of other types of bananas that grow in Central and South America. Up to now, many companies have stayed away from banana development because manipulation by tissue culture micropropagation is prohibitively expensive and labor intensive (although, according to Wilson Kidde of International Agritech Resources, that too could change soon with the development of new liquid medium cultures.)

Will these types of transgenic developments help or hinder the countries that host the germplasm? This topic was touched on, among many others, at a symposium called "Consumer Issues in Biotechnology: Genetically Engineered Foods," which was sponsored by the American Institute of Nutrition/American Society for Clinical Nutrition, the Center for Food and Nutrition Policy, Georgetown University, and the Office of Agricultural Biotechnology, U.S. Department of Agriculture at the Experimental Biology '95 meeting held in Atlanta in April.

One speaker, Roger Beachy of the Scripps Research Institute, said that while he thought the ultimate role of biotechnology in the developing world would be relatively minor (compared to political stability, for example), it still had a significant role to play. He described some of the work undertaken by the International Laboratory for Tropical Agricultural Biotechnology (ILTAB), of which he and Claude M. Fauquet are codirectors. ILTAB is a research and training laboratory dedicated to the control of tropical crop plant viruses and is currently involved in projects on rice, cassava, tomato, sugarcane, and yam. An additional goal is to transfer this technology to scientists from developing countries in Central and South America. In the course of his remarks, Beachy said that to take up the challenge in developing countries is an admirable goal for industry. We couldn't agree more.

—SUSAN HASSLER

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