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US Bt maize growers follow the rules

Billy Skaggs, Gainesville Times, 11 Dec 03. From AgBioView 11 Dec 03. (Billy Skaggs is Hall County Extension Agent. (shortened) http://www.gainesvilletimes.com/news/stories/20031211/localnews/15453.html

The percentage of maize growers adhering to insect resistant management requirements rose significantly in 2003, marking the 4th year of an upward trend in compliance. According to results of an annual survey required by the US Environmental Protection Agency, 92% of farmers met regulatory requirements for management refuge size, while 93% met refuge distance requirements. That's an increase from 87% and 82% respectively reported in 2000 when the survey began.

These results demonstrate the vast majority of farmers growing Bt maize borer resistant maize are adhering to management requirements. EPA requirements established in 1999 obligate growers to plant at least a 20% refuge, or maize that does not contain a Bt gene, for controlling maize borers. Also, every Bt maizefield must be located within one half mile of a refuge. In certain maize or cotton areas of the South, growers are required to plant at least a 50% maize refuge. These management refuge requirements were enacted to help prevent maize insect pests from developing resistance to Bt technology. More than 550 growers responded to the survey conducted during the 2003 growing season among Bt maize users in the Maize Belt and Cotton Belt. The survey was conducted by an independent research firm for the Agricultural Biotechnology Stewardship Technical Committee, in conjunction with the National Maize Growers Association.

The recent Compliance Assurance Programme is another factor that has contributed to increased awareness of management in the grower community. Introduced by the seed industry in response to EPA requirements in 2002, the programme was developed to further inform growers about the management requirements and how to implement them on their farms. Under the programme, registrants of Bt maize borer resistant maize must conduct on-farm visits with growers to check for

management refuge compliance. Growers who do not meet their management refuge requirements in 2 consecutive years can be denied access to Bt maize borer resistant maize in the 3rd year. "We're clearly seeing the fruits of this comprehensive education effort and will continue to work hard to meet our industry's stewardship responsibility around this technology. Being good stewards benefits our customers, industry and agriculture," said Dick Crowder, CEO and president of the American Seed Trade Association. Not only did the majority of survey respondents indicate they were aware of management requirements, but 94% of Bt maize growers said they received enough information to implement a refuge properly in 2003, which is 20% higher than 2001 survey results. What's more, the survey indicates that 72% of growers who used insecticides regularly before the introduction of Bt maize borer resistant maize (4 or 5 of the previous 5 years) decreased their insecticide use to control maize borers.

Smart GM plants win CSIRO's top award

From AgBioView 11 Dec 03 (shortened)
http://www.csiro.au/index.asp?type=mediaRelease&id=PrMedal03

Research that has led to new cotton varieties with increased yield and reduced pesticide use has won this year's CSIRO (Commonwealth Scientific and Industrial Research Organisation) Chairman's Medal. Dr Gregory Constable and Dr Danny Llewellyn from CSIRO Plant Industry won the medal for their contributions to the development and delivery of GM insect and herbicide resistant varieties for the Australian cotton industry. CSIRO Chairman, Ms Catherine Livingstone presented the medal at Discovery in Canberra.

The scientists introduced Monsanto gene constructs into CSIRO cotton varieties which are marketed by the Australian company Cotton Seed Distributors. Since its introduction in 1996, INGARD cotton has reduced insecticide use by 50% where it is grown, and a new 2-gene variety Bollgard II planted this season is expected to reduce chemical use by a further 30%. "This medal recognises an outstanding contribution that has helped make our valuable cotton industry more sustainable," Ms Livingstone said. "Cotton growers now have varieties that offer substantial benefits to the environment and local communities as a result of needing less pesticide, while at the same time increasing yields."

Established in 1991, the CSIRO Chairman's Medal honours the very best in CSIRO research. It is awarded to scientists who have carried out research and development of national or international importance in the advancement of scientific knowledge, technology application or commercialisation. To be considered, the work must have been completed or gained scientific or industrial recognition during the past 5 years and have been carried out predominantly within CSIRO. Australian Government Science Minister Peter McGauran presented the CSIRO Medals for 2003. More information: Rosie Schmedding, CSIRO Media, 02 6276 6520

Research looks at environmental impact of GM crops

Checkbiotech, 12 Dec 03. From BioSciNews 15 Dec 03.

Almost a decade after GM crops were first approved for widespread planting in Canada, the Government is trying to find out if those crops are harming the soil in which they grow, says the Canadian Food Inspection Agency. A study on the source of the toxin Bt in the environment started in 2000 and should be completed by March 2006. The Agency said the research results are preliminary but encouraging. "The scientific community suggests that the results of these studies do not warrant the need for any policy changes," said the CFIA response. "In fact, scientists suggest that there are no extreme environmental consequences of the biotechnology-derived crops they are testing." But instead of satisfying Greenpeace, a campaigner for the anti-GMO organization said the Government response proves its point that Canadians have been guinea pigs in the use of GM crops.

The Government Agency reported that preliminary results from the Environment Canada study showed the presence of GM crops did not appear to diminish the presence of microbes in the surrounding soil. It said the University of Saskatchewan and the National Research Council concluded there is "a very low incidence of cross-pollination in transgenic pea plants." A study by the university in co-operation with the Canadian Seed Growers Association also found that cross-

pollination in wheat has a range of 0.1-5.6 %. As well, a "large-scale gene flow experiment in spring wheat" was started last year and will be completed in 2006. In response to Greenpeace citing several studies that reported the presence of GM crops containing the Bt gene damaged local earthworms, the CFIA said insecticides containing Bt have been used for decades without evidence of damage to surrounding soil creatures. "Scientific knowledge is based on a body of work, not just one or two studies," said the agency, which insisted there is nothing to fear in Canada's regulation of biotechnology products. "Canada has one of the safest, most effective regulatory systems for biotechnology products in the world."

Over-regulation smothering biotech industry

SABC Media Release, 8 Dec 03. From BioSciNews (shortened)

Biotechnology is being starved of the opportunity to show its real worth, according to Western Australia scientists gathered at an address by the Swiss developer of golden rice, Professor Ingo Potrykus, during 10th anniversary celebrations at the Murdoch University-based WA State Agricultural Biotechnology Centre (SABC). Professor Potrykus developed golden rice as a humanitarian project to deliver vitamin A to people in developing countries, where rice is the staple diet. Vitamin A deficiency is believed to be responsible for 3000 deaths per day and 500 000 cases of infant blindness per year.

“Although the necessary biotechnologies were discovered in the 1980s and golden rice was finalised by 1999, the crop has still not made it to farmers in developing nations that need it because of regulatory obstacles based on undue paranoia. “The cost in human life resulting from the prevention of its use far exceeds any hypothetical or imagined risks associated with GM organisms (GMOs),” Professor Potrykus told the assembled scientists. “Regulators are unable to cope with the concept of a new variety in which a metabolic pathway has been deliberately added, and so they have prevented even controlled planting of small scale field plots to generate enough seed for further testing,” Professor Potrykus said.

SABC Director, Professor Mike Jones said over-regulation also stymied the technology in Australia where local research has yielded tremendous advances in crop development only to be shelved because the release of GMOs was not feasible in the current political climate. “SABC based company, Grain Biotech Australia, for example, is developing salt tolerant wheat varieties which could open up one million hectares of saline WA land to profitable crop production,” Professor Jones explained. “That could have tremendous social ramifications in rural WA by returning industry to marginal areas and bolstering WA’s wheat harvest by more than 25%. The new wheat promises to remove salt from the soil to help ameliorate salinity, while delivering a profit to growers.” Professor Jones said that while most of the biotechnological research conducted at the SABC was not transgenic, it was this field that delivered the novel results and made otherwise impossible advances viable, as was the case overseas with Professor Potrykus’ golden rice.

An expert panel of biochemists assembled by the Rockefeller Foundation in 1991 had rated the chances of developing golden rice (containing provitamin A) at less than 0.5%, but nonetheless supported the project for its humanitarian potential. Professor Potrykus adopted transgenic technologies because provitamin A was not present in any of the 80 000 known rice accessions, and so the pathway for its production had to be introduced into rice. Within 9 years, he and his team had developed rice plants of which 200 grams per day is believed sufficient to deliver the necessary vitamin A requirements of people in developing nations.

Regulation must be scaled back to reasonable scientific levels to help recognise the potential of such GM crops, according to Professor Potrykus, who said everyone knew the regulations were wrong, but were afraid to say so for fear of criticism. “Should those who oppose GM technologies for political advantage or self-interest be held responsible for the unnecessary suffering of millions of people with vitamin A deficiency who would benefit from golden rice?” Although efforts were underway to augment golden rice with higher iron and protein levels, Professor Potrykus had been told that there was no chance of regulators clearing such a crop for release. The global death toll due to dietary deficiencies of vitamin A, magnesium, protein and iron is 24 000 per day or 8.76 million per year.

Bioengineering for development

BioSciNews 15 Dec 03. Guest Editorial, 15 Dec 03
Channapatna S. Prakash (prakash@tuskegee.edu) is a professor of plant biotechnology at Tuskegee University in Alabama and the president of AgBioWorld Foundation based in Auburn, Alabama www.agbioworld.org. Gregory Conko (conko@cei.org) is director of food safety policy at the Competitive Enterprise Institute in Washington and vice-president of AgBioWorld Foundation.

The use of bioengineering technology for the development of new plant varieties has been endorsed by dozens of scientific bodies, has increased crop yields and food production and reduced the use of synthetic chemical pesticides in both industrialized and less developed countries. These advances are critical in a world where natural resources are finite and where hundreds of millions of people suffer from hunger and malnutrition. Critics dismiss such claims as nothing more than corporate public relations puffery. However, while it is true that most commercially available bioengineered plants were designed for farmers in the industrialized world, the increasing adoption of transgenic varieties by under-developed countries over the past few years demonstrates their broader applicability.

Globally, transgenic varieties are now grown on more than 58.7 million hectares (145 million acres) in such countries as Argentina, Australia, Brazil, Canada, China, India, Mexico, the Philippines, South Africa and the US. Nearly one-quarter of that hectarage is farmed by over 5 million resource-poor farmers in less developed countries. Why? Because they see many of the same benefits that farmers in industrialized nations do. The first generation of transgenic crops, approximately 50 different varieties of maize, cotton, potato, squash, soybean, rapeseed, and others, were designed to aid in protecting crops from insect pests, weeds, and plant diseases. As much as 40 % of crop productivity in Africa and Asia and about 20 % in the industrialized countries of North America and Europe is lost to these biotic stresses, despite the use of large amounts of insecticides, herbicides and other agricultural chemicals.

Poor tropical farmers may face different pest species than their industrial country counterparts, but both must do constant battle against these threats to their productivity. That's why South Africa and Filipino farmers are so eager to grow transgenic maize resistant to insect pests, and why South Africa and Chinese farmers like transgenic insect-resistant cotton so much. Indian cotton farmers and Brazilian and Paraguayan soya growers didn't even wait for their governments to approve transgenic varieties before they began growing them. It was discovered in 2001 that Indian farmers were planting seed obtained illegally from field trials of a transgenic cotton variety then still under governmental review. Farmers in Brazil and Paraguay looked across the border and saw how well their Argentine neighbours were doing with transgenic soybean varieties and smuggling of bioengineered seed became rampant. Recent studies in India have shown that transgenic cotton reduced pesticide spraying by half or more, delivering a 30-40 % profit increase. Another report showed that the farm area under Bt cotton in India tripled in just 1 year to 216 000 hectares from 72 682 hectares last year. In Brazil, it is estimated that about 3 million hectares of biotech soybean were being grown illegally until now when the government has just made it legal.

As the saying goes, the proof of the pudding is in the eating. There are few greater testaments to the benefits of biotechnology than the fact that thousands of poor farmers are willing to acknowledge having committed a crime just to gain access to the improved varieties. Where transgenic varieties become available (legally or not), farmers themselves are eager to adopt them. There is even evidence that transgenic varieties have literally saved human lives. In less developed nations, pesticides are typically sprayed on crops by hand, exposing farm workers to severe health risks. Some 400 to 500 Chinese cotton farmers die every year from acute pesticide poisoning because, until recently, the only alternative was risking near total crop loss from voracious insects. A Rutgers University study found that transgenic cotton in China has lowered the amount of pesticides used by more than 75% and reduced the number of pesticide poisonings by an equivalent amount. The productivity gains generated by transgenic crops provide yet another important benefit: They could save millions of acres of sensitive wildlife habitat from being converted into farmland. The loss and fragmentation of wildlife habitats caused by agricultural development in regions experiencing the greatest population growth are widely recognised as among the most serious threats to biodiversity. Thus, increasing agricultural productivity is an essential environmental goal, and one that would be much easier in a world where bioengineering technology is in widespread use.

Top 10 scientific breakthroughs in 2003

Royal Society News, 19 Dec 03, via BioSciNews 19 Dec 03 (shortened) www.sciencemag.org

The 10 most important scientific breakthroughs of 2003, according to Science magazine:

1. Proof that all the galaxies and other bodies in the universe are moving away from each other at an accelerating rate, pushed by a force that astronomers now call "dark energy." Two studies that analysed light and radiation from an era just after the Big Bang proved that the universal expansion is real. One study also narrowed the age of the universe to about 13.7 billion years.

2. Identifying the workings of certain gene variants that increase the risk of schizophrenia, depression and other mental illnesses that tend to run in families. Researchers found that one gene increases the risk of depression, but only when a person is also exposed to severe stress.

3. Growing evidence that global warming is beginning to affect the climate, ocean currents and animals and plants. There is new evidence tying global warming to ice melting, droughts, falling plant production and changes in plant and animal behaviour.

4. The role of RNA in plants and animals. RNA was once thought to act only as a messenger that followed the instructions of DNA in making proteins within a cell. But new studies show that forms of RNA can also direct and alter the expression of genes, influencing stem cells and embryonic development.

5. Expanded ability to monitor and manipulate single molecules. Powerful new imaging systems enable scientists to observe the actions of individual protein molecules within cells and membranes.

6. Confirmation that gamma ray bursts, one of the most powerful releases of energy in the universe, are linked to supernovas, the explosion of massive stars. Observers connected a supernova explosion with a bright burst of gamma rays.

7. Discovery that mouse embryonic stem cells can be prompted to transform into either sperm or egg cells, a finding that could advance the understanding of some types of infertility problems. But the discovery also raised the possibility, ethically troubling to some, that human embryonic stem cells one day could be used as a source of human eggs that could be used for cloning and other studies.

8. Some high tech materials can bend light opposite to the direction that is normally seen. The discovery could lead to making higher quality lenses.

9. The Y chromosome, which is the smallest of the human chromosomes and the one that determines the male gender, has duplicate genes that can be used if a new gene copy is required. This is unlike other chromosomes.

10. A cancer treatment once hailed as the ultimate cure for the killer disease registered its first proven success in 2003. A drug called an antiangiogenesis prevents tumours from building blood vessels needed to nurture cancer growths. The drug was found to prolong the lives of patients with advanced colon cancer. Some 60 different forms of antiangiogenesis drugs are now in clinical trials.

People in rich countries will live much longer. Americans, Swedes and Japanese can expect life expectancies of more than 100 years on average. And in China people are expected to live until 85, Chamie said.The good news, according to Chamie, was a trend toward smaller families seen in a variety of nations. He noted that two children were the norm in such countries as Iran, Brazil, Indonesia, Mexico and Thailand. "Men and women are attaining some control over the number and spacing of children," he said in an interview. But in Europe, Japan, Australia or Canada, the families are too small. The report warns that at current levels of 1.4 children per family and no increase in immigration, there would only be 232 Europeans in a 100 years for every 1,000 today.

Reuters, Dec 10, 2003. From AgBioView 10 Dec 03

Scientists decode bioremediation & energy source bacteria

Life Sciences World News, 13 Dec 03 via BioSci News 22 Dec03 (shortened)
http://www.bioscinews.com/files/news-detail.asp?newsID=5669

US Department of Energy-funded researchers have decoded and analyzed the genome of a bacterium with the potential to bioremediate radioactive metals and generate electricity. In an article published in the Dec 12th issue of Science, researchers at The Institute for Genomic Research (TIGR) and the University of Massachusetts, Amherst, report that *Geobacter sulfurreducens* possesses extraordinary capabilities to transport electrons and "reduce" metal ions as part of its energy-generating metabolism. "The genome of this tiny microorganism may help us to address some of our most difficult cleanup problems and to generate power through biologically-based energy sources," Secretary of Energy, Spencer Abraham, said.

"*Geobacter* is an important part of Nature's toolbox for meeting environmental and energy challenges. This genome sequence and the additional research that it makes possible may lead to new strategies and biotechnologies for cleaning up groundwater at the Department of Energy (DOE) and at industry sites." The contamination of groundwater with radionuclides and metals is one of the most challenging environmental problems at the DOE former nuclear weapons production sites. Researchers at the University of Massachusetts have previously found that *Geobacter* species can precipitate a wide range of radionuclides and metals (including uranium, technetium and chromium) from groundwater, preventing them from migrating to wells or rivers where they may pose a risk to humans and the environment. The analysis of the genome sequence revealed a number of capacities that had not been previously suspected from past research on this microbe. "We've provided a comprehensive picture that has led to fundamental changes in how scientists evaluate this microbe," said Barbara Methe, the TIGR researcher who led the genome project and is the first author of the Science paper. "Research based on genome data has shown that this microbe can sense and move towards metallic substances, and in some cases can survive in environments with oxygen." *G. sulfurreducens* was previously thought to be an anaerobic organism.

The other main project collaborator was Derek Lovley, a professor of microbiology at the University of Massachusetts, Amherst, who discovered the *Geobacter* family of bacteria and has led projects to assess their biology and their potential for bioremediation. Lovley said, "Sequencing the genome of *Geobacter sulfurreducens* has radically changed our concepts of how this organism functions in subsurface environments." The genome analysis, he said, "revealed previously unsuspected physiological properties" of the bacterium and also gave scientists insight into the metabolic mechanisms that the organism uses to harvest energy from the environment. *Geobacter* reduces metal ions in a chemical process during which electrons are added to the ions. As a result, the metals become less soluble in water and precipitate into solids, which are more easily removed. Small charges of electricity are also created through the reduction process. *Geobacter* is also of interest to the DOE because of its potential to create an electrical current in a "bio-battery." *Geobacter* microbes are widely distributed in nature and are commonly found in subsurface environments contaminated with radionuclides and metals.

Researchers have demonstrated that if they "feed" the microbes simple carbon sources such as acetate they will grow faster and precipitate more radionuclides and metals. These findings are now serving as the basis for a test of a bioremediation strategy aimed at removing uranium from groundwater at a Uranium Mill Tailings Remedial Action site near Rifle, Colorado. The Natural and Accelerated Bioremediation Research (NABIR) and Microbial Genome Programs in the department's Office of Science funded the $800 000 *G. sulfurreducens* sequencing project. The genome sequence is now serving as the basis for detailed investigations, supported by the department's Genomes to Life programme, into the ability of *Geobacter* to reduce radionuclides and metals and to generate electricity.

The NABIR programme's mission is to provide the fundamental science that will serve as the basis for development of cost-effective bioremediation and long-term stewardship of radionuclides and metals in the subsurface at DOE sites. The focus of the programme is on strategies leading to long-term immobilization of contaminants in place to reduce the risk to humans and the environment. The NABIR programme encompasses both intrinsic bioremediation by naturally occurring microbial communities, as well as accelerated bioremediation through the use of biostimulation, addition of inorganic or organic nutrients.

France provides incentive for companies

CropBiotechNet 22 Dec 03 (shortened)

The French government recently adopted Jeunes Enterprises Innovantes (JEI), a special incentive status for young innovative companies. Starting 2004, innovative companies will be exempt from tax and social contributions for 8 years. Adeline Farrelly of EuropaBio, the European associations of bioindustries, says this incentive will make France a leading player in attracting innovative companies. France Biotech, the national biotech association, was the first to propose the initiative to the French government last year. Farrelly added that biotechnology, one of the most research-intensive industries in Europe, will greatly benefit from the JEI.

In the UK, the first major review of the biotech sector, a joint government-industry initiative, has generated a comprehensive White Paper, BioScience 2015. It aims to keep the UK biotech industry in a strategic position in Europe. It also included a recommendation on tax incentives for young innovative enterprises.

Additional information from Adeline Farrelly at a.farrelly@europabio.org. A copy of "What is the Young Innovative Company Status?" is available at http://www.europabio.org/pages/ne_papers.asp?btype=7.

Food safety virus

Food Navigator.com, 22 Dec 03 (shortened)

An innovative new food safety technique using a virus is set to win an exclusive worldwide licence. This marks the first step towards the commercialisation of this unusual process, a technique that a UK scientist claims can explode deadly food-poisoning bacteria.

Professor Mike Gasson from the Institute of Food Research in Norwich discovered the potential of viruses while researching flavour development in cheese in the early 1990s. And with the help of Profos, an international company specialising in bacterial viruses and antimicrobial agents, and PBL, technology transfer experts on the Norwich Research Park, Gasson was able to develop a practical technique. "Viruses can infect bacteria as well as humans. A virus invades bacterial cells, multiplies and then produces an enzyme to burst the cell wall, enabling it to escape and infect more cells," said professor Gasson. "We targeted an enzyme with this fire-power, to develop its potential in combating pathogenic bacteria."

Viruses that infect bacteria are called bacteriophages. The bacteria-bursting enzymes that caught Gasson's attention are called lysins. Different lysins attack specific bacteria, so could be used as a diagnostic tool as well as an antimicrobial therapy in people and animals. The bacteriophage lysins covered in the licence can be used to detect or selectively kill *Listeria* and *Clostridium*. They could even provide an alternative to antibiotics in some applications. Rapid detection is particularly important for some of the more virulent bacteria, such as *Listeria monocytogenes*. *Listeria* exists naturally in the soil and general environment, but in some soft mould-ripened cheeses and pâtés can be present in higher numbers. When listeriosis takes hold, it is often severe and life-threatening. The US government operates a zero tolerance policy of *Listeria* in food. But there is no other simple rapid test available for large scale use by food manufacturers. "*Listeria* is the food industry's nightmare. Professor Gasson had the vision to spot the potential of using a virus to destroy it. With the expertise at Profos we're turning that investigative science into a significant food safety tool to benefit the public," said PBL managing director Jan Chojecki.

The licence also covers lysins that destroy *Clostridium*. This bacteria forms hardy spores, resistant to heating and drying. In poultry, *Clostridium* perfringens causes necrotic enteritis, currently cured with antibiotics. In humans, *Clostridium difficile* causes diarrhoea in patients receiving antibiotic treatment the bacterium seizes the opportunity to infect provided by disruption to naturally-occurring bacteria of the bowel. "The demand for commercial alternatives to antibiotics is growing, in response to the need to tackle bacterial antibiotic resistance. As well as providing a new tool to combat bacteria now, there is interest in developing bacteriophage lysins to replace antibiotics in some applications in the future. Unlike antibiotics, this technology provides a precision tool, designed to kill specific bacteria while leaving other micro-organisms intact," said Gasson.

Debunking GMO patent nonsense

Gregory Conko, The Wall Street Journal Europe, 22 Dec 03. From AgBioView 24 Dec 03 (shortened)
(Mr. Conko is a senior fellow with the Competitive Enterprise Institute in Washington, D.C.)

It may now seem daring to say, but in a decade's time GM foods are likely to be as widely accepted in kitchens as margarine and microwave ovens are today. When that happens, we may look back and view 22 Dec 03 as a landmark date in the rehabilitation of biotechnology's currently soiled public image. On that day, one of the anti-GM movement's most compelling criticisms will begin to crumble irreparably as the first European patent on a GM crop is set to expire.

The debate over GMOs usually focuses on their safety. But, as study after scientific study continues to find that no unique or inherent risks arise from biotechnology, people will slowly but increasingly come to accept GM foods. Earlier this month, for example, the European Food Safety Authority announced that a particular variety of GM maize was perfectly safe for human consumption. Many other similar announcements are expected to follow.

Still, GM opponents have tried to slow the growing public confidence in biotechnology, for example, charging that it would lead to global corporate control of the food supply or that resource-poor farmers in less developed countries would be bankrupted by patent-wielding multinationals. Even many biotechnology supporters worry that intellectual-property rights mean that GM crops might forever remain the plaything of large agribusinesses and wealthy farmers in industrialized countries. Many of us seem to have forgotten that only diamonds are forever; patents are temporary.

The first GM plants were developed in 1982 and 1983 by 4 research teams working independently, one at the State University in Ghent, Belgium, the others in the US After nearly 2 decades of dispute, the European patent was recently granted to the Belgian team, but it expires today. Two more European patents, held by Monsanto, will expire in Jan 04. Over the next few years, many other important patents will also expire. Of course, even technologies still under patent have been put to productive use in poorer countries. Today, over 5 million farmers in SA, China, India, the Philippines and elsewhere already happily grow patented GM varieties because they have higher yields, require fewer inputs and raise income.

Public research labs are creating other products for developing-world farmers. These include potatoes, rice, maize and oilseeds with added or enhanced nutrients, crops engineered to grow better in the acidic soils of the tropics, and varieties improved to grow better in extremes of heat and drought. The researchers involved almost invariably have access to patented technologies under liberal exemptions. But these truths have never stopped anti-biotechnology activists. When Switzerland's Ingo Potrykus and Germany's Peter Beyer invented a rice variety with beta-carotene, they needed permission from several different holders of more than 70 patents before they could begin testing their Golden Rice.

Critics use this fact in their campaigns against GM. What they repeatedly neglect to tell their audiences, however, is that those patent holders did indeed grant Mr. Potrykus and Beyer exemptions for Golden Rice. Mr. Potrykus says that, while obtaining those exemptions was time consuming, the primary reason Golden Rice and other bio-fortified crops have not yet begun to help resource-poor farmers is not patents but "regulatory obstacles based on undue paranoia." He has argued that "those who oppose GM technologies for political advantage or self-interest [should be] held responsible for the unnecessary suffering of millions of people with vitamin A deficiency," which Golden Rice could help address.

The purpose of intellectual property is not, as is often believed, to provide financial protection to those investing in product development or to encourage research into new technologies. This is a valuable outcome of patents, but it is not the primary goal. Rather, the chief purpose of patent laws has always been to encourage the dissemination of information so that new technological knowledge could be introduced into the public domain more quickly. Innovators have long tried to keep the benefits of new processes, using various contractual methods and "trade secrets." The contribution of patent law to society was to offer innovators a financial inducement, in the form of a limited period of exclusivity, in exchange for them making their inventions public.

To qualify, inventors must provide a written description of the invention and the process used to make it so that anyone skilled in the field can reproduce the technology once the patent expires. This requirement is the root of all patent systems and, combined with the financial rewards of protection, has tended to accelerate the movement of new technologies into the public domain. Biotechnology's critics and advocates alike should remember that, while the wealthy are often first to adopt new products, in time we have all come to rely on once-patented technologies as varied as automobiles and antibiotics. Perhaps this year's best holiday gift will be the knowledge that, if we permit it, the whole world will also benefit from GM foods.

Panning for golden genes

Food Navigator, 19 Dec 03 (shortened)
http://www.foodnavigator.com/news/news-NG.asp?id=48673

Food products made with GM maize could soon be on the European supermarket shelves despite the cynical consumer if policy-makers, soon to take a decision on the sale of Syngenta's Bt11 GM maize, take a yes vote. A recent breakthrough in analysis used on maize genomes could bring the seeds to market earlier. Researchers in the US recently used 2 complementary methods that remove from analysis vast stretches of DNA that do not contain genes, thereby dramatically speeding up the process of decoding. The approaches, applied jointly in efforts to determine the gene sequences in maize and carried out by 2 groups of researchers at The Institute for Genomic Research (TIGR) in Rockville, and Cold Spring Harbor Laboratory in New York, are described in the 19 Dec 03 issue of the journal Science.

Only about a quarter of the maize genome codes for genes, and these are found in small clusters scattered through a mixture of non-coding DNA and transposons (mobile DNA segments). Two different methods tested by the TIGR group successfully captured parts of the maize genome containing genes. The gene-sequences are of most interest because they provide the specific blueprint for an organism's development, structure and physiology. With so much non-gene sequence to deal with, it has not been feasible to sequence and assemble the whole maize genome with current technologies. "Collecting the maize genes for sequencing is like panning for gold," said Jane Silverthorne, programme director for NSF's plant genome programme. "Just as gold can be separated from the surrounding rock because it is denser, maize genes can be separated from the surrounding DNA by their chemical and sequence properties."

The 1st method tested called methylation filtration, developed by a team led by Robert Martienssen and Richard McCombie at Cold Spring Harbor laboratory, removes sequences that contain a chemical modification (methylation) found on most of the repeated sequences and transposons, leaving behind the proverbial gold of genes. The 2nd method, developed by researchers at the University of Georgia, removes the repeated sequences by separating the DNA into "high-copy," gene-poor segments and "low-copy," gene-rich segments. Led by Cathy Whitelaw, the research team at TIGR compared sequences obtained by the 2 methods. About one fourth of the genes in each collection matched known gene sequences. About 35% of the genes were represented in both collections. As both methods yielded short stretches of sequence, a major challenge was to reassemble these into complete genes, report the researchers. To do this, the Cold Spring Harbor group lined up the sequence pieces from maize along the rice genome sequence, a deep draft of which was completed in 2002 by an international consortium. The researchers then reassembled selected sets of sequence fragments into complete genes. "Together, these findings suggest that scientists could be able to sift out the approximately 450 million base pairs of DNA containing the genes from the maize genome and then reassemble the sequence,' said Silverthorne. Such a comprehensive genomic resource would provide growers and breeders a wealth of tools to improve maize, as well as other cereal crops, he added.

Earlier this month, a divided Europe saw member states failing to support the Commission proposal to authorise the first GM foodstuff - Bt11 sweetmaize, a strain of GM sweetmaize developed by Swiss firm Syngenta, since the *de facto* moratorium began 5 years ago. The vote now passes to Europe's agriculture ministers and is expected to take place in early 2004. Widespread opposition to GM foodstuffs in Europe has seen a food industry reluctant to take on board GM ingredients into their final food products.

Filipino farmers welcome Bt maize

Anchalee Kongrut, Bangkok Post, 26 Dec 03. From AgBioView 26 Dec 03 (shortened) http://www.bangkokpost.com/News/26Dec2003_news22.html.

Farmer Roger Narvarro used to pray each year that his maize crop would remain free of maize borer, a major pest in the Philippines. But since switching to GM Bt maize, he sleeps much better. "This Bt maize is a breakthrough. It gives farmers a choice. It frees us from worries,'' Mr Navarro said. His family is also happier. They worry less about the chemicals he formerly had to spray to keep the pests away. The Bt seed has been modified to contain a gene that makes a toxin deadly to maize borer, so he uses less pesticide. Mr Narvarro is among the first group of farmers in the Philippines to grow Bt maize on a commercial scale. In May last year the Philippines became the first country in Southeast Asia to allow commercial farming of GM crops. Open-field trials of GM papaya are planned for 2005, followed by commercial planting.

Farmers like Mr Narvarro expect to earn extra income growing Bt maize during the off-season, when the maize-borer plague is at its peak but the price of maize is also at its highest. Mr Navarro still grows non-GM crops the rest of the year, when there are fewer pests. Bt maize brings its benefits, but the seeds are more expensive and can only be obtained from a supplier. Commercial GM maize planting in the Philippines is being hailed as a milestone by advocates of genetic engineering such as biotechnology companies and biotech scientists. Mr Navarro's farm has become a showcase that pro-biotechnology groups use to promote GM crops. Early this month, farmers from Thailand, Indonesia, Vietnam, and Malaysia were invited to visit Mr Narvarro's farm. They showed keen interest in trying GM crops. But many were also warned that Bt maize may not be suited to countries that have no maize-borer problem.

Le Viet Dung, of the College of Agriculture at Catho University in Vietnam, said GM seeds would be cost effective only for large-scale cropping - 50 hectares (300 rai) or more. Thai farmers expressed enthusiasm for Monsanto's Ready Roundup maize seeds which contain a gene resistant to weed-killing chemicals. Somkid Chompoowong, of Pak Chong district in Nakhon Ratchasima province, said he spent at least 100 000 baht each season hiring workers to spray and remove weeds from his 1 000-rai farm. Ready Roundup maize would allow him to spray herbicide without worrying the maize would die along with the weeds. Raul Montemeyor, of the International Federation of Agriculture Producers (IFAP), said farmers needed to maintain a responsible image and should look at ways to improve the certification system instead of trying a new product just to boost yields and cut costs. "The more pro-biotechnology groups try to sell GM products, the more susceptible consumers will become,'' he said.

IFAP, which represents 500 million farmers in 68 countries, issued a statement in 1998 saying biotechnology was capable of bringing real progress in meeting food demand, reducing pollution and improving the quality and quantity of farm products. The organisation has asked for strict precautions to avoid adverse affects on human health, the environment and farmers' livelihood. Mr Montemayor said the high cost of GM seeds could well put them beyond the means of most farmers in developing countries.

New educational resource on African agricultural biotechnology

From AgBioView 26 Dec 03. http://www.africabiotech.com.

The African Biotechnology Stakeholders Forum (ABSF) announces the creation of its new outeach website, http://www.africabiotech.com. The site provides relevant and updated information on ag-biotech issues across Africa to various stakeholders and also provides a forum for discussion on these topics.

"In its first projection of how the world's population will have evolved in three centuries from now, the UN Population Division forecast an increase from the current 6.3 billion people to about nine billion, providing the trend toward smaller families continues."

Reuters, Dec 10, 2003. From AgBioView 10 Dec 03

Publications

African Journal of Biotechnology. The African Journal of Biotechnology has released its Nov 03 issue. Abstracts and full articles are available for free at: http://www.academicjournals.org/AJB/contents/2003contentlist/ November%202(11).htm. Authors may also submit their papers for posting to ajb_acadjourn@yahoo.com.

Workshops

9 - 10 March 04: **Biotechnology, the public and the media – towards informed decision making**. Pretoria This working conference will bring together a range of biotechnology stakeholders and the media to clarify South African policy about biotechnology, to update the media on developments in this field and look at what is being done to address the concerns of the consumer. Presented by the Public Understanding of Biotechnology Programme in the interest of informed debate on biotechnology and its applications. (www.pub.ac.za)