

# Genetically engineered corn passes field tests

The first field-grown ears and stalks of genetically engineered corn indicate that inserting new genes into the nation's biggest farm crop is practical. Biotechnology companies last

year achieved a long-sought goal of inserting new genes into laboratory-grown corn plants. This summer they planted their first field plots of genetically altered corn to make sure that the new genes would function and that genetic manhandling didn't

cause any unwanted changes in the plants. "It's a bit too early (to assess the field test in detail) since we just harvested our plots three weeks ago and the samples are still in the lab being analyzed," says Charles H. Baker, president

of BioTechnica International Inc. in Overland Park, Kan. "But it looks like everything turned out as expected," he says.

**Resistance**  
Genetic engineers ultimately

aim to increase the corn crop's resistance to insects, drought and chemicals and to improve its nutritional value as livestock feed. If successful, the corn experiments could have an economic impact that would dwarf most other genetic engineering feats.

Since the seven billion to 7.5 billion bushels of corn that U.S. farmers harvest each year are worth \$18 billion to \$20 billion, new genes that can increase per-acre yields by only a few percent or add a few cents per bushel to prices of corn for cattle, swine and poultry feed are worth hundreds of millions of dollars to farmers.

The stakes also are high for the half-dozen companies now racing to market genetically modified corn. Besides BioTechnica these companies include Monsanto Co., Pioneer Hi-Bred International Inc., DeKalb Genetics Corp. and Ciba Geigy Corp. All are fierce competitors for the \$1.5 billion that U.S. farmers spend each year on hybrid corn seed.

**Cross-breeding**  
Plant geneticists have been improving corn plants since the 1920s, but only through tedious years of cross-breeding corn strains that have desirable genes.

The breakthrough last year, announced by one company after another, was the ability to insert new genes directly into embryonic corn plants without cross-breeding. The new technology allows plant scientists to add almost any new gene to a corn plant, including genes from bacteria and from other plants.

The new gene-inserting technology being used by most of the companies was pioneered by Cornell University and was perfected by Du Pont Co. Known as "microprojectile bombardment," it is literally a gun that shoots new genes into the germ cells of corn plants.

While some of the companies experimented only with so-called marker genes that confer resistance on an antibiotic or insecticide, Monsanto tested a gene that it hopes will end up in a new commercial strain of corn.

Its experimental corn plants this summer carried a bacterial gene that produces a natural insecticide, which interferes with the digestion of corn leaves eaten by the European corn borer, said Michael Fromm, the chemical company's project leader for corn genetics. Corn borers chomping into leaves of corn plants with the new gene should get a lethal dose of the insecticide, he said.

**Laboratory**  
Monsanto tested gene-altered corn plants in an area already infested with the corn borer. The inserted gene functioned in the field-tested plants, Fromm said, but he conceded "it didn't work as well as in the laboratory." That is because "the way the insects grow in the field is different" from in the laboratory, he said.

BioTechnica also tested a gene that it hopes to insert into commercial strains of hybrid corn, Baker said. The gene boosts the corn's content of methionine, one of the essential amino acids that are vital components of proteins.

Today's corn, Baker says, falls short of supplying a chicken's daily requirements of methionine. BioTechnica hopes to produce a high-methionine corn that will enable poultry breeders and growers to reduce or eliminate the need to add synthetic methionine to their birds' diets, he explains.

**Pioneer**  
Pioneer hopes to begin field tests next season of corn carrying commercially important genes for resistance to insects and diseases, says John Howard, the company's director of biotechnology.

How long it will be before farmers can plant genetically engineered corn is unknown. Pioneer's Howard guesses it may take three more years to get new genes into commercial strains of corn. It then will take four to five years to parlay the new plants into a seed crop large enough for the company to begin selling seed to farmers. "My guess is that the farmer won't see (genetically engineered corn) before 1998," he says.



**Milk strike:** Steve Pereira, aided by his mother, Ana, gets a cup of milk from the stream pouring out of a milk truck on his father, Luis Pereira's, farm in Deerfield, N.Y. The milk was dumped by area farmers there last week to protest low milk prices.

## Cornell Ag Connection

# Role of cows in global warming exaggerated

To counteract global warming due to the release of gases into the atmosphere, the simple act of replacing incandescent light bulbs with fluorescent bulbs would be cheaper and more effective than trying to curb how much methane cows emit, say two Cornell University resource economists.

Furthermore, recently published estimates that cows give off as much as 15 percent of the methane released into the atmosphere are exaggerated, they assert, because the estimates ignore the effect of carbon's biological and chemical cycles. When such cycles are considered, the net effect of gas emissions from ruminant animals may be less than five percent of total emissions. Further, with proper handling of manure, ruminants in fact could become an overall sink for carbon dioxide.

"We believe that there is a tendency to overemphasize cows and agriculture in general, as well as rice paddies in develop-



**Beth Spough**  
Extension Agent

ing countries — which are reported to emit 20 percent of the methane each year — as causes of global warming. This diverts attention away from the much more urgent need to reduce fossil-fuel consumption in industrialized nations," said Duane Chapman, a professor of resource economics in the College of Agriculture and Life Sciences at Cornell.

"In our view, cows and agriculture are not the hazard to the atmosphere that some scientists have made them out to be,"

said Chapman. "We've got to face the fact that fossil-fuel consumption by industrialized nations is the culprit and therefore must be the focus of any international agreements slated to reduce greenhouse-gas emissions."

His work, done in collaboration with doctoral student Thomas Drennen, will be published in the proceedings of the November 1990 conference, "Global Change: Economic Issues in Agriculture, Forestry, and Natural Resources," by Westview Press.

"The present estimates have ignored how livestock recycle carbon. They don't just emit methane; they also utilize hay and grain, which remove the greenhouse-gas carbon dioxide from the atmosphere through the photosynthesis process. Further, if properly managed, manure from cows can return carbon to the soil," Chapman explains.

Some government officials, scientists, and others have proposed that methane, which traps infrared radiation from escaping from the Earth's atmosphere, should be included with carbon dioxide when international agreements to limit emissions of climate-changing greenhouse gases are considered. However, Chapman and Drennen contend that such concern is unjustified and that an agreement aimed at reducing carbon dioxide would be an important first step.

As further support for their emphasis on carbon dioxide, they note that carbon dioxide will account for as much as 90

percent of the problem once the chlorofluorocarbons, now used as aerosols, refrigerants, and foam plastics, are phased out by the year 2000.

As for the cows, each adult cow releases up to 106 gallons of methane per day through belching. Scientists calculate that the 1.2 billion cattle worldwide release some 60 million tons of methane annually.

To consider limiting cattle production as a way to reduce global warming is "absurd," Chapman and Drennen point out. One cow, they say, has the same global-warming effect as a 75-watt light bulb operating for an entire year. "Replacing incandescent light bulbs in industrialized countries with new 18-watt fluorescent bulbs that provide the same amount of light would go much further in reducing future climate-change impact than trying to regulate bovine emissions in developing countries, which have 53 percent of the world's cows," Chapman said.

Furthermore, Chapman and Drennen point out that ruminant animals and rice paddies both recycle carbon, unlike fossil-fuel consumption which releases new carbon into the atmosphere. Methane's impact on the global climate from cows and agriculture is simply not the same as methane from fossil-fuel use, they assert.

Chapman and Drennen's work, supported by Cornell, is part of a larger ongoing project to evaluate the magnitude of emissions from the biological versus energy sectors.

## Parathion banned for most uses

WASHINGTON (AP) — Makers of the pesticide parathion agreed to tough new restrictions recently, but the Environmental Protection Agency said it will seek to go further and ban the chemical blamed for killing dozens of farm workers.

EPA and the producers agreed to limit the highly toxic insecticide to use on nine crops, out of about 90 on which it is currently applied. The action is expected to cut parathion use by at least half from the recent levels of about 3 million to 6 million pounds annually.

Environmentalists said the dangers of parathion have been known for decades and should have prompted faster and more decisive government action. EPA Administrator William K. Reilly said the deal "will result in a dramatic reduction in the number of workers who annually are poisoned by exposure to this pesticide." He said, "Those uses which pose the greatest dangers to workers will be prohibited almost immediately and the agency plans to cancel the other uses soon."

Officials said they expect the proceedings on a total ban to be contested and to last about 18 months.

Meanwhile, after Dec. 31 parathion will be allowed on only nine crops: alfalfa, barley, canola, corn, cotton, sorghum, soybeans, sunflower and wheat.

Those nine, which are all harvested mechanically rather than with hand labor, account for about 40 percent to 50 percent of the total use of parathion, said Linda Fisher, the

government agency's assistant administrator for pesticides and toxic substances.

Crops on which parathion will no longer be allowed to be used include apples, almonds, oats, peaches and peanuts.

Fisher said there was no evidence that parathion residues on food pose any hazard to consumers.

The only manufacturer of parathion is the Danish firm Cheminova, with American headquarters in Bloomfield, N.J. Eight American firms have licenses to use the chemical in producing pesticides, so they also were involved in the agreement with EPA.

Kurt Halling, president of Cheminova's U.S. subsidiary, said the company had no comment.

Al Meyerhoff, a senior staff attorney in San Francisco for the Natural Resources Defense Council, said more than a dozen countries, including Britain, Ireland and the Soviet Union, have banned parathion.

**JUMBLE**  
Answer:  
CROTCH DISCUS BOILED FUTURE ARTFUL GENIUS  
A home is usually brightened up by youngsters probably because they're always forgetting this—  
**TO TURN OFF THE LIGHTS**

Jumble, Page C-7

## SOLUTION TO PUZZLES

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Crossword, Page C-7

## P-R Business Guidelines

The Press-Republican is committed to business coverage. Here's a brief explanation of how we categorize business news:

• **New-business photos** run, on a space-available basis on the business pages, Monday through Saturday. New businesses should telephone or write to make an appointment for a photo.

• **Established businesses** that have a significant news development — new owner, new location, expansion or anniversary — may be eligible for a business profile. Published under the heading "People in Business," these medium-length features run in the Sunday paper. Businesses must be locally owned, cannot be franchises and cannot be professionals.

• **Other business news** items are usually classified as business briefs. Called "Spotlight on business" and published in the Sunday paper this feature includes abbreviated news items on contest and award winners of less than \$5,000, new employees, employee promotions, charitable contributions of less than \$5,000, seminars, conventions, and training. We do not announce the hiring or promotion of employees below management level, or longevity awards for fewer than 25 years.

Please address all press releases or inquiries to Sunday Editor Jack Downs, Press-Republican, 170 Margaret St., Plattsburgh, N.Y. 12901.

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