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Maine may finally let Bt corn be grown, sold

The state could make a decision this month on the genetically modified corn with a built-in pesticide.

By JOSIE HUANG

Staff Writer

July 13, 2007

Over the past decade, a particular type of genetically modified corn has taken the farming world by storm with a built-in pesticide that wards off bugs from seed to harvest.

The exception has been Maine, the only state where corn engineered to produce the Bt toxin cannot be sold or grown. But that may change soon.

The biotechnology industry is trying to break into the Maine market again. And with science that protects against a wider array of pests and growing demand from Maine farmers,
opponents of Bt corn are worried that the state won't say no this time around.

Dow AgroSciences, Pioneer Hi-Bred International and Monsanto have applied to sell seven Bt corn products that would be grown for animal feed.

The Maine Board of Pesticides Control could make a decision as early as its next meeting on July 27 in Waterville, according to agency officials.

Maine's organic farmers have spoken out against Bt corn at a past board meeting, warning that overuse of the crop would create insect resistance to the Bt toxin, a naturally occurring
pesticide that is widely sprayed on organic crops. Another concern is that the pollen from Bt corn would contaminate crops that are not bioengineered.

Spencer Aitel, who is one of the 250 corn growers in Maine, said there would be no recourse for him if pollen from Bt corn drifted to his land.

"If your dog comes over in my yard and bites my kid, I can come back at the dog owner," said Aitel, who grows corn to feed 150 Jersey cows on his dairy farm in China. "It's not so with
genetically engineered corn."

But Tom Cote, a dairy farmer in Pittsfield and an advocate for Bt corn, said he can only see benefits.

He said Bt corn is worth the additional $3 to $8 it would cost to plant per acre because it solves the conundrum of which type of pest will attack his corn in a particular year. Bt corn provides insurance against multiple pests, so Cote can avoid exposure to powerful pesticides while saving money from having to use them, he said.

"I've got a daughter who is doing more work on the farm, and if she doesn't have to handle the pesticides, then I don't have to worry about it," Cote said.

Biotechnology firms last made a bid to sell Bt corn in Maine in 1997. As part of the application evaluation, the pesticides agency determined that Bt corn did not pose a risk to human
health. The pesticidal protein in Bt corn attacks the digestive system of larvae that eat the corn, but is destroyed by the acids in people's stomachs, according to staff toxicologist Lebelle
Hicks.

The board, however, rejected the applications from Novartis Seeds and DeKalb Genetics by a 4-3 vote on the basis that

growers in Maine did not demonstrate a need for the product,
which at the time only protected against corn borers – a bug that farmers were not spraying against to begin with.

In the years since, the technology has advanced to where some Bt corn varieties can protect against combinations of pests, such as caterpillars, rootworms and cutworms.

Board member John Jemison, who leads its Bt Corn Technical Committee, said there still are mixed feelings about Bt corn on the board. But Jemison, who said he is abstaining from voting
because he has accepted seeds from the applicants for his work as a water and soil specialist, could picture at least some applications getting approved.

"We're in a bit of a different place than we were in 1997," he said. "Today the biggest difference is that I've seen fields that have been mowed down by cutworms, and farmers have had to go and re-seed the fields. That costs a lot of money, especially if they're using a high-end hybrid variety seed."

Bt corn would not be the first genetically engineered crop grown in Maine – the Roundup Ready line of canola, corn and soybeans, which has been modified to survive herbicides, has been legally grown in Maine for at least 10 years, the board said.

And Bt corn is already present in Maine in the form of processed food such as corn flakes, said Lauchlin Titus, an agronomist who consults for Monsanto and Maine farmers. He said some of the sweet corn sold in Maine may be Bt corn.

But the fact that Bt corn can't be grown in Maine has been a point of pride for some environmental and agricultural groups, whose members worry that the rise of bioengineered crops will hurt wildlife and humans and give corporations too much control over farming.

Jemison encountered an extreme form of the opposition when a field of genetically modified corn he was growing for research was vandalized in 1999.

But these days some of the biggest critics of bioengineering have been sounding less confident. Russell Libby, executive director of the Maine Organic Farmers and Gardeners
Association, said he would be disappointed but not surprised if the Bt corn applications are approved.

Should that happen, there need to be conditions placed on growing Bt corn, such as requiring farmers to receive training and provide a strategy to prevent pollen drift, Libby said.

He said farmers must also follow a U.S. Environmental Protection Agency requirement to use non-Bt corn on 20 percent of their corn acres, so insects have a refuge from the toxin.

"If the refuge is planted on the edge of cornfields then it would make a great buffer" with nearby farms, Libby said.

If approved by the board this year, Bt corn products would be available in time for a 2008 planting, said Julie Kenney, a spokeswoman for Pioneer.

Kenney said Pioneer and the other companies decided to coordinate their applications because increasing numbers of Maine farmers were asking for their products. "It was an industry approach to get this product approved and into the hands of the growers," Kenney said.

The board meeting will take place at the Hampton Inn in Waterville beginning at 9:30 a.m.

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Pesticide panel mulls Bt-modified corn

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Maine's Bureau of Pesticides Control will determine next month whether to approve the registration of a type of genetically modified corn in Maine.

Maine is the only state in the country where the corn, known as Bt, for Bacillus thuringiensis, corn cannot be grown or sold.

John Jemison, a crop scientist at the University of Maine in Orono, is chairman of the board committee that has been investigating Bt use.

"Basically, the interest for this came from large-herd dairy farmers who have lots of acreage and plant lots of corn," Jemison said Friday.

Jemison said that in light of the fact that many other genetically altered crops are grown and sold in Maine, the board is responding to a request filed in March by three biotech companies — Dow AgroSciences, Pioneer Hi-Bred International and Monsanto — on behalf of dozens of Maine farmers.

The companies submitted applications to register seven Bt field corn products, used as feed for animals.

Bt corn has been genetically modified to produce plant-incorporated protectants, in this case the pesticidal proteins from the naturally occurring soil-borne Bt bacteria that kill certain insects.

With corn, the target insects are caterpillars and soils pests such as cutworms and rootworms, according to the board. This makes Bt corn a pesticide and, in Maine, all pesticides must be registered and approved by the BPC before they can be sold or used.

The history of Bt corn in Maine began in 1994, when the BPC undertook technical reviews to look for adverse effects on human health and for the potential development of insect resistance.

According to Jemison, these reviews were conducted in 1997 after receipt of applications to register three Bt corn products. The human health review concluded there were no concerns, and a process was established to identify any development of insect resistance. However, the registrations were denied because Maine's pesticide statute requires that there be a demonstrated need or benefit for the products, and there was no such information available at that time.

Jemison said the farmers have made inquiries about Bt corn for a decade but only in the past five months have registration requests been pursued by the three chemical companies. In the interim, the board has been gathering information at each of its meetings on topics such as economic need, and a technical advisory committee was established to evaluate the potential for pollen drift and resistance issues.

At these meetings, Jemison said, supporters claimed that Bt corn reduces pesticide use, increases yield and requires fewer trips through the field. They also stated that the highest-yielding varieties are now available only as Bt corn and that Maine is at a disadvantage compared with the rest of the country.

Opponents, however, expressed concern about insects developing resistance to Bt, since, in spray form, Bt is an important tool for organic growers. Other concerns mentioned were the potential contamination of non-Bt corn crops from pollen drift and liability issues when non-Bt crops are contaminated.

The Board of Pesticides Control will meet at 9:30 a.m. Friday, July 27, at the Hampton Inn in Waterville. The meeting will be open to the public but is not a formal public hearing.

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ARTICLE

Decline in pesticide poisonings in the United States from 1995 to 2004

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Background. Trends in rates of unintentional pesticide illnesses and injuries by type were estimated for the United States from 1995 to 2004. *Methods*. Poison Control Center data were examined for the years 1995 through 2004. Rates were calculated for pesticide type and selected pesticide classes based on estimated total United States population and proportion of population served. Pesticides as a proportion of poisonings to all substances over the years and vital statistics on deaths were examined to validate trends. *Results*. Incidence rates of serious pesticide poisonings and injuries have declined 42% from 1995 to 2004 and death rates declined 62% over the same period. Selected, more toxic pesticides such as organophosphate and carbamate insecticides, strychnine rodenticides, and paraquat herbicides have shown greater declines, ranging 63% to 79%. *Conclusions*. Pesticide poisonings and injuries appear to have declined in the past decade.

Keywords Pesticide; Insecticide; Poisoning; Trends

Introduction

The United States Environmental Protection Agency's (EPA) Office of Pesticide Programs is responsible for the licensing of pesticides and for safety assurance regarding pesticide use. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the EPA shall establish procedures for monitoring people for incidental pesticide exposure, "including, but not limited to, the quantification of incidental human and environmental pesticide pollution and the secular trends thereof" (1). The EPA has elected to use poison control center (PCC) data as a source of information on pesticide exposure because it is nationwide in scope with a standardized format and definitions that permits comparisons over a period of years. The American Association of Poison Control Centers (AAPCC) has provided computerized data sets to the EPA with observations of reported acute adverse health effects from pesticide exposure. This is the single largest source of information in the United States on the acute health effects of pesticides. The purpose of this study was to examine trends in reports of pesticide exposure to PCC.

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The views expressed and the results/conclusions reached within this article do not necessarily reflect the opinions of the U.S. Environmental Protection Agency.

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Methods

The AAPCC uses the Toxic Exposure Surveillance System (TESS) to collect information from PCC on reported poison exposures. Computer files of data on illnesses and injuries by pesticides were purchased from the AAPCC for the years 1995 through 2003; the basic methodology has been described elsewhere (2–4). An unpublished summary of data for 2004 was also provided to the author's specifications, courtesy of the AAPCC (Litovitz, personal communication). During these years, at least 83% of the U. S. population was included in PCC catchment areas reporting to the national database. The data excluded exposures to mixtures of products (about 8% of reports) where the primary cause of poisoning (between two pesticides or a pesticide and another product) could not be determined and intentional exposures (suicide attempts, abuse, malicious use, and unknown intention) that account for less than 3% of reports.

For this analysis, only the more serious symptomatic exposures, defined as moderate, major, or fatal medical outcomes, are included because the intent was to capture trends in cases that usually would require medical treatment. These typically account for about 15% of reported cases with known outcome; the other 85% having minor outcome that usually can be treated on site (e.g., at home with dilution and observation) and are more likely self-reported without confirmation by a health care provider. Known outcome means the poison specialist followed-up until an exposure could be classified as none (no symptoms reported), minor, moderate, major, or fatal. Minor effects are defined as symptoms which are "minimally bothersome . . . usually resolve rapidly, and usually

involve skin or mucous membrane manifestations" (3). Moderate and above have "more pronounced, prolonged or more of a systemic nature than minor symptoms" and "usually some form of treatment is or would have been indicated." Note that this definition includes many cases of eye and skin injuries. However, not all skin and eye effects can be classified as injuries; some may be due to systemic effects. So the term "poisonings" or "symptomatic cases" used in this article is intended to include injuries without reference to whether the effects were due to systemic or topical effects (e.g., hives and lacrimation due to systemic immunological or neurological effects versus skin rash or corneal abrasion due to irritant properties).

Denominators for population at risk were based on estimates of total population served by Poison Control Centers based on U. S. census data for the catchment area served (2). Earlier studies have shown that 85% of households use pesticides (5).

Two methods were used to examine the potential for reporting bias and to validate observed trends. First, a proportionate hazard analysis was performed to see if the reported declines in pesticide poisoning were simply a reflection of reduced reporting for exposures and poisonings due to all substances. Greater declines in pesticide exposures would suggest a real decrease rather than a reduced use of PCC. Second, the trend in pesticide-related deaths reported by States to the National Center for Health Statistics (Compressed Mortality File Underlying Cause-of-Death, available at http://wonder.cdc.gov/mortSQL.html) were compared with the TESS trends to address overall reporting bias of pesticides versus other products, but does not address possible reporting bias among different types of pesticides (6).

Results

Table 1 reports the annual incidence rate of moderate/major/fatal cases per million population in the U. S. for each type of pesticide reported to PCC participating in TESS. Just three types of pesticides account for 88% of the cases. Insecticides accounted for 61.2%, disinfectants 18.0%, and herbicides 8.4% of all reported moderate, major, or fatal outcomes.

Overall, unintentional moderate/major/fatal outcome poisonings declined 42% from 1995 to 2004. However, these declines are not uniform across all categories of pesticide types. For example, poisonings due to disinfectants declined 57%, more than for any other type of pesticide. Repellents, on the other hand, showed the least decrease in rates of 9%. Repellents consist of both insect repellents applied to the human body and moth repellents placed near vulnerable clothing and food stores. A separate analysis for these two categories revealed no change in the rate of poisoning due to insect repellents. Moth repellents, on the other hand, showed a decrease of 35% in poisonings.

A more detailed analysis found poisonings to organophosphate (OP) and carbamate insecticides (including mixtures with other types of insecticides) have declined the most. OP poisonings are down 72% and carbamate poisonings are down 67%. Pyrethrins and pyrethroids, on the other hand, show a decrease of only 3%. The decline for strychnine based on three cases in 2004 is 63% from 1995 to 2004. Paraquat poisonings have declined 79% from 1995 to 2004. The only remaining non-restricted use of strychnine and, therefore, for use by the general public, is for applications below ground to control pocket gophers. Sale of above ground uses was prohibited in 1988 and the public's use markedly declined in subsequent years as remaining stocks in the marketplace were exhausted. Paraquat reductions may be partly due to reformulation by the manufacturer who added an emetic and stenching agent to make ingestion less likely starting in 1988.

Validation

During the time period under study, the rate of serious unintentional poisonings from all substances declined 17% (based

Table 1. Average annual rate of unintentional poisonings (moderate, major, or fatal outcome) per million U.S. population for pesticides by type reported to the TESS, 1995 to 2004

Year	Insecticides	Disinfectants	Herbicides	Rodenticides	Fungicides	Repellents	Other*	Total
1995	8.89	2.95	1.355	0.325	0.206	0.920	0.324	14.97
1996	7.00	2.54	0.977	0.211	0.164	0.865	0.253	12.01
1997	6.28	2.20	0.892	0.216	0.160	0.552	0.230	10.53
1998	7.25	2.27	0.940	0.268	0.163	0.773	0.266	11.93
1999	7.34	2.01	0.885	0.238	0.123	0.602	0.332	11.53
2000	6.27	1.44	0.754	0.255	0.107	0.436	0.288	9.55
2001	5.27	1.33	0.736	0.192	0.107	0.590	0.265	8.49
2002	5.42	1.60	0.792	0.226	0.110	0.637	0.195	8.98
2003	5.21	1.35	0.767	0.238	0.088	0.682	0.155	8.49
2004	5.43	1.28	0.701	0.174	0.133	0.838	0.194	8.75
% decline1995 to 2004	39%	57%	48%	46%	35%	9%	40%	42%

*Includes insect growth regulators, fumigants, wood preservatives, algicides, and molluscicides.

on Table 12 from the annual reports for the years 1995 through 2004, published each year in the *American Journal of Emergency Medicine*), suggesting a possible reporting bias. Perhaps there was less use of Poison Control Centers or perhaps the decline is real. However, pesticides showed a greater decline (42%) in rates, suggesting that at least 60% of the decline is not attributable to reporting bias. From 1995 to 2004, the decline in the rate of pesticide poisonings as a proportion of the rate for all substances went from 5.68% (14.97/263.3) to 4.02% (8.75/217.9), a decline of 29.2%. This decline suggests that much of the 42% decline reported in Table 1 is not due to overall reporting bias.

The National Center for Health Statistics (NCHS) publishes mortality data, available at http://wonder.cdc.gov/mortSQL.html (6). Disinfectants that are regulated as pesticides by EPA are not included in the mortality data discussed below. NCHS cautions that "death rates based on counts of twenty or less . . . are flagged as unreliable" (6). To avoid this problem, a comparison was made between the average rate for 1994 through 1996 based on 36 unintentional deaths with the rate for 2001–4, which is based on 20 unintentional deaths. The rate per million population declined 62%, from 0.045 during 1994–6 to 0.017 during 2001–4. This decline in deaths from 1994–6 to 2001–4 is greater than the decline in the number of serious poisonings reported from 1995 to 2004 suggesting that, perhaps, the decline in pesticide poisoning is not due to incomplete reporting.

Discussion

Starting in 2000, after human health risk assessments showed potential risks, negotiated agreements between the EPA and manufacturers eliminated nearly all residential uses of the two leading organophosphates, chlorpyrifos and diazinon, which accounted for 62% of TESS exposures to OPs from 1993 through 1996. There was concern that replacement with non-organophosphate insecticides would result in no net reduction in insecticide poisonings. TESS data indicate that poisonings due to non-OP insecticides was reduced from 1995 to 2004 by 19%.

Neither personal-use insect repellents nor pyrethrins/pyrethroids showed declines commensurate with other pesticides. This is consistent with the increased use of insect repellents in recent years to avoid West Nile Virus and Lyme disease, and increased use of pyrethrins and pyrethroids that have largely replaced the OPs and carbamate insecticides among residential pesticide users. Residential exposures account for about 93% of the pesticide reports to PCC. The small decrease in poisonings (3%) for pyrethrins and pyrethroids occurred despite increased residential use. Pyrethrins and pyrethroids are noted for their low toxicity; therefore, further investigation was undertaken to discover why they were responsible for any moderate or major medical outcomes according to PCC reports (7). An examination of symptoms among reports categorized as moderate or major medical outcome due to pyrethrins/pyrethroids (1993–2003) revealed that the most common symptom was dyspnea, present in 45% of 7,096 reports. Also reported in 15% or more of the 7,096 reports was bronchospasm (18%), cough/choke (35%), eye irritation (36%), corneal abrasion (15%), nausea (18%), and vomiting (18%). The prevalence of the respiratory symptoms, dyspnea, bronchospasm, and cough/choke, suggest that pyrethrins and pyrethroids may be irritants and/or sensitizers that pose risks for persons with a history of respiratory illness, allergy, or asthma.

The trend in reduction of unintentional pesticide poisoning deaths has continued over many years (8). Data for 1980–1981 found 0.123 unintentional deaths per million U. S. population compared to 0.017 in 2001–2004, a 86% decline. For the years 1980 through 1998, when specific pesticide classes could be identified, there was a 59% decline in deaths due to organophosphate insecticides. Some of the earlier decline in deaths is likely due to the negotiated cancellations of most uses ethyl parathion in 1991 and all uses of mevinphos in 1995, two of the top ten causes of occupational hospitalized poisonings from 1977 through 1982 (8). In 2000 and 2001, EPA announced the phase out of all residential uses of chlorpyrifos and diazinon, the two leading causes of serious organophosphate insecticide poisoning. This latter action appears to be largely responsible for the 72% decline in OP insecticide poisoning reported above. In addition to these actions, other preventive measures have been introduced over the years to reduce OP insecticide poisoning in both the agricultural and residential sectors including: restriction of use to trained applicators, requirements for closed mixing-loading, enclosed cabs, and other engineering controls, changes in concentration and packaging design, changes in application rates and size of containers, and requirements for training of applicators and field workers.

Unintentional mortality from drugs, unlike pesticides, have shown a marked increase in death rates, increasing by 218% from 1990 to 2002, mostly due to narcotics and most notably the opioid analgesics (9). In 1980, 58% of unintentional poisoning deaths were reported due to drugs, but by 2004 the percent rose to 95% and the death rate was six times higher (6). Even for non-narcotic drugs the death rate increased over three-fold, although a small portion of this increase may be due to changes in coding of poisoning deaths that started in 1999 with the introduction of the Tenth Revision of International Classification of Diseases (8). Researchers at the Centers for Disease Control and Prevention concluded that the Food and Drug Administration (FDA) needed to do more "to identify ways to reduce deaths from opioid analgesics without diminishing the quality of care for patients" (9). The current author would suggest that FDA needs a more comprehensive approach to preventing drug-related poisonings and deaths making full use of other available sources of data besides their own Adverse Event Reporting System.

Limitations

Misclassification may occur when symptoms are reported over the telephone and are not confirmed by a physician or laboratory tests. In this study 63% of symptomatic cases were seen in a health care facility. Although some misclassification can be expected to occur, it is assumed that any differential between types of pesticides would not change significantly over the time studied, in a manner that would artificially affect trends. As noted by Calvert et al., "pesticide-related illness is not routinely encountered by the majority of primary-care providers in the United States and most receive minimal training on recognition of environmental and occupational illness" (4). "In addition, the ability to make the diagnosis is complicated by the fact that symptoms are often nonspecific and by the lack of readily available specific laboratory tests to measure the pesticide, its metabolites, and the effect of the pesticide. Even when tests are available, they are frequently not performed sufficiently promptly to detect an abnormality" (4). It is possible that physicians might variably report pesticide exposures to PCC according to their knowledge of the pesticide category, their assessment of the severity of the patient's symptoms and course, or their access to sources of medical information on pesticides other than PCC. Under reporting of poisonings by doctors and hospitals to PCC is a serious shortcoming. The range of referrals of poisonings from all substances from inpatient and outpatient cases to PCC is estimated at about 25% (10,11). This suggests that the rates of poisonings account for only about a quarter of the total cases that occur, especially those requiring treatment.

Surrogates for the population at risk can be considered such as sales data or pounds of active ingredients, especially for the home and garden market that account for 93% of all cases reported to PCC. Estimates of pounds of active ingredient in use by the home and garden market showed a 27% increase from 1995 to 2001, the last year for which data is available (12). Figures are not available for each pesticide type but for insecticides and herbicides, the estimated increase in use was 42% and 51%, respectively. This suggests that the decreases seen in rates of pesticide poisonings were not due to any marked reduction in residential pesticide use.

Conclusion

From 1995 to 2004 there has been an overall 42% decline in estimated serious symptomatic exposures to pesticides reported to PCC in the United States. At least 60% of this decline appears to be unrelated to any overall reporting bias. Organophosphate insecticides declined 72% and carbamates 67%, the largest for any particular group of pesticides. Other toxic pesticides, such as paraquat and strychnine exhibited declines of about 79% and 63%, respectively. Declines in PCC-reported pesticide exposures are not fully understood because of the absence of denominator data on use and historical data on use patterns.

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Appeal
Responsible Science for Sustainable Food
To adhere to this appeal, please see the note at the bottom (*)

A national debate promoted by the ITALIAEUROPA – LIBERI DA OGM Coalition will be held between September 15 and November 15, 2007. This event aims to bring citizens back to the heart of decision-making. All the players in Italy's agrifood system – organizations for agriculture and artisanship, small and mid-sized businesses, mass distribution, consumer associations, environmental groups and international organizations – are going to reach out together to establish a *common ground*. In the context of this event, they will open a dialogue with citizens on "food quality and sustainability."

This debate cannot exclude the support of all scientists and researchers who understand the value of sustainability for scientific and technological innovation. This represents a crucial issue in the agricultural sector. European agriculture is facing an increasingly critical situation, which requires rational and informed political and economic decisions as well as scientific and technological countermeasures. Two glaring examples of this are the effects of climate change and the urgent measures established by the Kyoto Protocol, with the challenges these pose for European agriculture. Similarly, the EU directive on nitrates (91/676/CEE) mandates reductions in the use of synthetic fertilizers and fluids from zootechnical sources, requiring the agricultural sector to respect strict limits. Successfully addressing these challenges depends squarely on the ability to implement innovations that are sustainable and that also meet environmental standards.

In Italy, the development of the agrifood system must take some essential elements into consideration. In the vast majority of cases, the dimension of Italy's typical agricultural enterprise is limited by the morphology of the geographical territory and the nation's socioeconomic history. Thus, Italy has no chance of competing on the *quantity* side of production, with low profit margins, yet it can and must compete on the *quality* side, which can guarantee high profit margins, especially in the export market. Evidence for the accuracy of this assessment comes from the increasing demand on the part of European citizens and Italians themselves for genuine foods and local specialties.

Based on these premises, the economic, environmental and social costs of this kind of agriculture - increasingly dependent on oil, the chemical industry and patents - would be huge and unjustifiable. Moreover,

genetically modified crops are not cost-effective. Advanced studies in the economics of agricultural production show that transgenic agriculture doesn't pay: its cost/benefit ratio is similar to that of traditional agriculture. In addition, the range of markets open to transgenic agricultural products is smaller than the one for traditional agriculture, because of the reluctance shown by consumers towards these products.

Beyond economic analysis, evaluations of agricultural policy should take into consideration the obligation to respect the Precautionary Principle – as specified by international law and the EU Treaty – in order to avoid potential risks related to GMOs. To this regard, this appeal adheres to the principles presented by the Italian Ecological Society (*Società Italiana di Ecologia)* in the document *Scienza e Ambiente 2002* (downloadable at www.dsa.unipr.it/site).

The special nature of the traditions and resources of the European agroalimentary system already contains a substantial part of the innovative potential needed for the system's recovery. The advisability of exploiting this potential in order to consolidate sustainable processes and production chains is obvious to everyone involved. In the short run, therefore, it is crucial to draw on every useful competence and innovation in order to preserve and improve the *diversity* of local products in their territories of origin. For example, it is possible to use innovative technologies aimed at genetic improvements that do not involve genetic engineering, in order to allow agricultural varieties to express features developed in harmony with their environment. Investment in advanced scientific and technological research cannot be put off either, because the damage brought about by climate change will soon require the development and implementation of measures designed to conserve water, energy and chemical treatments used in the production process.

In Italy and Europe, many of the resources and skills needed to achieve these goals already exist. However, it is now time to translate them into system programming and efficiency. The aim must be the reconstruction of a strong social pact regarding food security and healthy nutrition, in order to define a realistic *model of development* that will be advantageous to present and future producers and consumers. If developed in the context of the EU, this model would trigger a concrete improvement in the quality of community policies that are of great interest to citizens.

Italy and Europe now face a choice between the large-scale profits of a handful of multinational enterprises and the interests of the entire population. The scientific community – regardless of cultural and

disciplinary differences – has a particular responsibility for influencing this choice. In fact, to sign the appeal *Responsible Science for Sustainable Food* is largely an expression of scientific and social civility. It is a simple act that brings scientists back to their fundamental role in social emancipation.(*)

(*) To adhere to the appeal you must send an e-mail to one of the following addresses:
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MAINE MAY RECONSIDER BAN

Modified corn debate returns

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By JOSIE HUANG
Blethen Maine Newspapers

Over the last decade, a particular type of genetically modified corn has taken the farming world by storm with a built-in pesticide that wards off bugs from seed to harvest.

The exception has been Maine, the only state where corn engineered to produce the Bt toxin cannot be sold or grown. But that may change soon.

The biotechnology industry is trying to break into the Maine market again. And, with science that protects against a wider array of pests and growing demand from Maine farmers, opponents of Bt corn are worried that the state won't say no this time around.

Dow AgroSciences, Pioneer Hi-Bred International and Monsanto have applied to sell seven Bt corn products that would be grown for animal feed.

The Maine Board of Pesticides Control could make a decision as early as its next meeting on July 27 in Waterville, according to agency officials.

Maine's organic farmers have spoken out against Bt corn at a past board meeting, warning that overuse of the crop will create insect resistance to the Bt toxin, a naturally occurring pesticide that is widely sprayed on organic crops. Another concern is that the pollen from Bt corn will contaminate crops that are not bioengineered.

Spencer Aitel, who is one of the 250 corn growers in Maine, said there would be no recourse for him if pollen from Bt corn drifted to his land.

"If your dog comes over in my yard and bites my kid, I can come back at the dog owner," Aitel said, who grows corn to feed 150 Jersey cows on his dairy farm in China. "It's not so with genetically engineered corn."

But Tom Cote, a dairy farmer in Pittsfield advocating for Bt corn, said he can only see benefits such as healthier crops and better feed quality.

He said Bt corn is worth the additional $3 to $8 it would cost to plant per acre because it solves the conundrum of which type of pest will attack his corn stalks in a particular year. Bt corn provides insurance against multiple pests, so Cote can avoid exposure to powerful pesticides, while saving money from having to use them, he said.

"I've got a daughter who is doing more work on the farm and if she doesn't have to handle the pesticides, then I don't have to worry about it," Cote said.

Biotechnology firms last made a bid to sell Bt corn in Maine in 1997. As part of the application evaluation, the pesticides agency determined that Bt corn did not pose a risk to human health. The pesticidal protein in Bt corn attacks the digestive system of larvae that eat the corn, but is destroyed by the acids in people's stomachs, according to staff toxicologist Lebelle Hicks.

The board, however, rejected the applications from Novartis Seeds and DeKalb Genetics by a 4-3 vote on the basis that growers in Maine did not demonstrate a need for the product, which at the time only protected against corn borers — a bug that farmers were not spraying against to begin with.

In the years since, the technology has advanced to where some Bt corn varieties can protect against combinations of pests, such as caterpillars and rootworms and cutworms.

Board member John Jemison, who leads its Bt Corn Technical Committee, said there still are mixed feelings about Bt corn on the board. But Jemison, who said he is abstaining from voting because he has accepted seeds from the applicants for his work as a water and soil specialist, could picture at least some applications getting approved.

"We're in a bit of a different place than we were in 1997," Jemison said.

"Today the biggest difference is that I've seen fields that have been mowed down by cutworms, and farmers have had to go and reseed the fields. That costs a lot of money, especially if they're using a high-end hybrid variety seed." Bt corn would not be the first genetically engineered crop grown in Maine — the Roundup Ready line of canola, corn and soybeans, which has been modified to survive herbicides, have been legally grown in Maine for at least a decade, according to the board.

And Bt corn is already present in Maine in the form of processed food such as corn flakes, said Lauchlin Titus, an agronomist who consults for Monsanto and Maine farmers. He said some of the sweet corn sold in Maine may be Bt corn.

From the Bureau of National Affairs

Study Finds Biotech Crops Less Harmful Than Crops Treated With Insecticides

Genetically modified crops that are engineered to produce their own insecticides are less harmful to nontarget species than are regular crops treated with chemical insecticides, according to a study published June 8 in the journal *Science*.

The study reportedly is the first to analyze environmental impact data from field experiments worldwide involving corn and cotton plants with a Bt (*Bacillus thuringiensis*) gene inserted for its insecticidal properties. The research was conducted by scientists at the National Center for Ecological Analysis and Synthesis at the University of California in Santa Barbara, The Nature Conservancy, and Santa Clara University.

Opinion varies on the safety of plant-produced insecticides, also known as plant-incorporated protectants (PIPs), which the Environmental Protection Agency currently is deciding how to regulate.

Some environmental groups argue that PIPs are potentially dangerous and should be more heavily regulated. However, biotechnology industry representatives claim PIPs are safe and a boon to farmers and should be exempt from many of the Federal Insecticide, Fungicide, and Rodenticide Act's registration and recordkeeping provisions.

Despite the controversy, the researchers said few existing studies reveal the actual effects of genetically modified plants on beneficial, nontarget species. According to the researchers, their study, "A Meta-Analysis of Effects of Bt Cotton and Maize on Nontarget Invertebrates," helps fill this knowledge gap.

The researchers' analysis of 42 field experiments found beneficial organisms such as ladybird beetles, earthworms, and bees fared better in locations with Bt crops than in locations with conventional crops treated with chemical insecticides.

Organically Grown Crops Still Best

The study found that organically grown crops appeared to be better for the environment than either Bt crops or conventional crops treated with chemicals. In particular, the researchers said that compared with organically grown crops, Bt crops reduced the abundance of some types of beneficial, nontarget insects, worms, and other species.

The study is accompanied by a searchable global database for agricultural and environmental scientists studying the effects of genetically modified crops.

The study, A Meta-Analysis of Effects of Bt Cotton and Maize on Nontarget Invertebrates, is available at http://www.sciencemag.org/cgi/content/abstract/316/5830/1475.