



September 21, 2001

Christine Todd Whitman, Administrator  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

**Re: Re-registration of Bt crops should be delayed at this time**

Dear Administrator Whitman:

On July 27, 2001, the EPA concluded that there was no reasonable scientific basis to conclude that any level of StarLink corn is safe for human consumption. **Today, we submit new evidence demonstrating that the EPA has no reasonable scientific basis to allow, at this time, the human consumption of any variety of corn or potatoes genetically engineered with bacterial toxins derived from *Bacillus thuringiensis* (Bt)** that the EPA is currently considering for re-registration. Due to the inhalation exposure to cotton dust by field workers and people who process Bt cotton, this crop should also not be approved for commercial planting at this time. The evidence in question derives from two sources: studies conducted after the original registration of Bt crops in 1996, and a re-examination of deficient studies submitted by registrants prior to the original registrations. In addition, the EPA has not collected or evaluated information the Agency itself deems as “required” for its human health assessment.

The EPA is supposed to base its reassessment on “the most current health and ecological data,” incorporating “all available scientific information on Bt products,” in particular the recommendations of its Scientific Advisory Panels and the National Academy of Sciences report on pest-protected plants.<sup>1</sup> As detailed in our submission to the EPA, the Agency has failed to do this.

Our comments focus on the three primary characteristics of known allergens by which the EPA decides whether Bt toxins have the potential to cause allergies. The toxins at issue either have these characteristics, or have not been adequately assessed for them. **Of greatest concern are data showing that the bacterial toxin engineered into Monsanto’s Yieldgard corn and Syngenta’s Bt11 corn is resistant to digestion and heat, similar to the toxin engineered into StarLink corn.** Corn containing the Cry1F protein registered to Mycogen/Pioneer may also exhibit digestive and heat stability (see attached table).

StarLink was not approved for human consumption because it had “characteristics of known allergens,” according to the EPA. Consequently, individuals and their physicians did not know to examine this particular type of corn to seek the cause of unexplained corn allergies that they

suffered, sometimes severely enough to require emergency room admission. Only after hearing news of this potential allergen through the media did individuals know to consider it as a possible cause of their allergic response. Indeed, this summer, at least one individual was diagnosed by his allergist as “most likely” allergic to this corn, and the EPA’s scientific advisors recommended that he and others undergo further testing.

As long as products made with genetically engineered corn are not labeled, consumers will be exposed to potential hazards. Due to this situation, it is incumbent upon you to take all available measures to determine if other engineered varieties are allergenic or toxic to people before making any decision to re-register these crops for cultivation. The alternative is for the EPA to advise the Food and Drug Administration that the potential human health impacts of these crops remain uncharacterized and, therefore, that foods containing genetically engineered corn should be labeled “may cause allergic reactions or other adverse effects.”

According to a study by Aventis CropScience: “The Cry1Ab protein was digested at a similar, if slightly faster, rate than the E. coli-derived Cry9C protein in simulated gastric fluid.”<sup>ii</sup> This finding of digestive stability was confirmed by Dr. Hubert Noteborn, who also found that, unlike other Cry proteins, the Cry1Ab protein exhibits “relatively significant thermostability ... comparable to that of the Lys mutant of Cry9C protein” found in StarLink.<sup>iii</sup>

The EPA has failed to collect data on the third criterion, amino acid homology to known allergens and toxins, for two of the three varieties of Bt corn. The data available for Bt cotton and potatoes is likewise lacking or deficient.

The issues raised, above, in summary form are discussed in more detail along with other concerns in an annotated document we have submitted to the Bt re-registration docket, OOP-00678B. The full submission will be posted at [www.foe.org/safefood](http://www.foe.org/safefood).

We urge you to delay the registration of Bt crops currently under consideration unless complete and adequate studies on potential health impacts, as noted above, are submitted by the biotechnology industry or are conducted. The health of the American people, confidence in the food supply and the vitality of our farm economy depend on it.

Sincerely,

Larry Bohlen  
Director, Health and Environment Programs

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<sup>i</sup> (EPA Biopesticide Registration Action Document 2001, p. I1)

<sup>ii</sup> (Aventis CropScience 2000, “Cry9C Protein: The Digestibility of the Cry9C Protein by Simulated Gastric and Intestinal Fluids,” study submitted to the EPA by Aventis CropScience, p. 17)

<sup>iii</sup> (Noteborn 1998, “Assessment of the Stability to Digestion and Bioavailability of the LYS Mutant Cry9C Protein from *Bacillus thuringiensis* serovar *tolworthi*,” study submitted to the EPA by AgrEvo, p. 22)

## Summary of Available Data for Human Health Assessment of Bt Crops Considered for Re-registration, September 2001

Company, Crop, Bt protein	Digestive Stability	Heat Stability	Amino Acid Sequence Homology
<b>Monsanto, Yieldgard Corn, Cry1Ab</b>	<b><u>RED FLAG</u></b> Digestive stability similar to that of StarLink Cry9C <sup>(1)</sup>	<b><u>RED FLAG</u></b> Heat stability comparable to that of StarLink Cry9C <sup>(2)</sup>	<b><u>NONE</u></b> <sup>(3)</sup>
<b>Syngenta, Bt 11 Corn, Cry1Ab</b>	<b><u>RED FLAG</u></b> Digestive stability similar to that of StarLink Cry9C <sup>(1)</sup>	<b><u>RED FLAG</u></b> Heat stability comparable to that of StarLink Cry9C” <sup>(2)</sup>	<b><u>NONE</u></b> <sup>(3)</sup>
<b>Monsanto, BollGard Cotton, Cry1Ab/Ac</b>	<b><u>INADEQUATE</u></b> Flawed study shows degradation in 2-7 minutes <sup>(4)</sup>	<b><u>INADEQUATE</u></b> Only shown to be “inactive” in processing study <sup>(5)</sup>	<b><u>NONE</u></b> <sup>(3)</sup>
<b>Mycogen &amp; Pioneer, Herculex Corn, Cry1F</b>	<b><u>RED FLAG</u></b> Test conditions not specified by EPA <sup>(6)</sup>	<b><u>INADEQUATE</u></b> Only shown to be “inactive” in bioassay after 30 min. at 75° & 90°C <sup>(5)</sup>	<b><u>OK</u></b> Though more stringent test would be desirable <sup>(7)</sup>
<b>Monsanto, NewLeaf Potato, Cry3A</b>	<b><u>RED FLAG</u></b> Test conditions not specified by EPA <sup>(5)</sup>	<b><u>NONE</u></b> <sup>(3)</sup>	<b><u>INADEQUATE</u></b> Additional data needed <sup>(8)</sup>

### **Notes:**

- (1) “digested at a similar, if slightly faster, rate than ... Cry9C protein in SGF [simulated gastric fluids]” (Aventis CropScience 2000, “Cry9C Protein: The Digestibility of the Cry9C Protein by Simulated Gastric and Intestinal Fluids,” study submitted to the EPA by Aventis CropScience, p. 17).
- (2) “relatively significant thermostability ... comparable to that of the Lys mutant Cry9C protein.” (Noteborn 1998, “Assessment of the Stability to Digestion and Bioavailability of the LYS Mutant Cry9C Protein from *Bacillus thuringiensis* serovar *tolworthi*,” study submitted to the EPA by AgrEvo, p. 22)
- (3) “Amino acid homology comparisons for Cry1Ab, Cry1Ac and Cry3A against the database of known allergenic and toxic proteins were not submitted.” (EPA Biopesticide Registration Action Document 2001, p. IIB2)
- (4) Monsanto conducted this study under conditions that proved extremely favorable to rapid digestion of the Cry1Ab/Ac hybrid protein: pH = 1.2, 2 µg test protein / ml SGF (Monsanto 1994, “Assessment of the *in vitro* Digestive Fate of *Bacillus thuringiensis* var. *kurstaki* HD-73 Protein,” p. 14-15). Experts now recommend testing with much higher concentrations of test protein at a milder pH (at least pH = 2.0).
- (5) “Inactive” here means “unable to kill insects” in bioassays, which provide little or no information about degradation of the protein into amino acids and small peptides, which is what should have been measured (e.g. by HPLC or SDS-PAGE)
- (6) EPA fails to cite the pH value of SGF. If test conducted at pH = 1.2, it should be repeated at pH = 2.0. See note (4).
- (7) Many experts recommend a more stringent test than one based on 8 contiguous amino acids.
- (8) EPA states that the study submitted by Monsanto is not adequate (EPA BRAD 2001, Table B1, p. IIB3)