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## Gene-Altered Bt Crops Threaten Public Health

Immune Responses and Skin Sensitization to Bt in Farm Workers and Presence of Bt in Many Genetically Engineered foods

By Letters from NEIL J. CARMAN, PH.D., Clean Air Program Director, Lone Star Chapter Sierra Club (Texas)



March 14, 2006

Dear Travis County Judge Biscoe and County Commissioners Davis, Daughterty, Sonleitner and Gomez:

Exposure to Bt sprays may lead to allergic skin sensitization and induction of IgE and IgG antibodies, or both based on recent scientific studies. Although health risks to pesticides containing *Bacillus thuringiensis* (Bt) have been minimal, the potential allergenicity of these organisms has not been evaluated. Today large acreage of US crops like soy, corn, canola and others are genetically engineered (GE) to contain Bt in every plant cell and USDA has failed to evaluate the adverse health effects of large-scale Btk [Bt kurstaki, a strain of Bt toxin] spraying on a population where people are likely consuming GE food crops and may be developing skin sensitization and immune reactions to Bt. To date, USDA has egregiously failed to mention the likelihood of skin sensitization and immune reactions to the Btk pesticide spray in GE food consumers.

A health survey was conducted in farm workers before and after exposure to Bt pesticides. The investigation included questionnaires, nasal/mouth lavages, ventilatory function assessment, and skin tests to indigenous aeroallergens and to a variety of Bt spore and vegetative preparations. To authenticate exposure to the organism present in the commercial preparation, isolates from lavage specimens were tested for Bt genes by DNA-DNA hybridization.

Please read more on the adverse health effects of widespread Bt use in food crops in the following excerpt from a 1999 study in the *Journal of Environmental Health Perspectives*.

Environmental Health Perspectives Volume 107, Number 7, July 1999 Immune Responses in Farm Workers after Exposure to *Bacillus Thuringiensis* Pesticides

<http://www.ehponline.org/members/1999/107p575-582bernstei...>

[details of authors at end]

"In addition to the implication that skin sensitization to Bt in pesticides could be a precursor of clinical IgE-mediated diseases, several aspects of this investigation may be relevant to other current health issues: immediate hypersensitivity induced by bacteria and transgenic foods engineered to incorporate pesticidal genes in their genomes. First, because skin sensitivity to spore and vegetative components of a nonpathogenic species of *Bacillus* was clearly demonstrated, future awareness about the allergenic potential of environmental bacteria should be increased, even though this phenomenon has been recognized for relatively few such organisms (e.g., *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Moraxella catarrhalis*) (19,20). There is presently strong evidence of a close molecular genetic relatedness between Bt subspecies and the *B. cereus* food pathogen that would support this call for caution (21,22).

Further, in the case of the *Bacillus* genus, the possibility of cross-allergenic epitopes in an unrelated species such as *B. subtilis* should be appreciated because this organism or its products may occur in both occupational and nonoccupational environments (23,24).

Conversely, results of this investigation should partially allay recent concerns about the occurrence of possible adverse health effects in consumers after exposure to transgenic foods (25,26). Because reactivity to the Btk pro-delta-endotoxin was only encountered in 2 of 123 workers sensitized by the respiratory route, it is unlikely that consumers would develop allergic sensitivity after oral exposure to transgenic foods (e.g., tomatoes, potatoes) that currently contain the gene encoding this protein. However, future clinical assessment of this possibility is now feasible because of the availability of reliable Bt skin and serologic reagents developed during the course of this investigation."

### Selected References

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#### Conclusion

USDA has egregiously failed to mention the likelihood of skin sensitization and immune reactions to the Btk pesticide spray in GE food consumers.

It's highly disconcerting that USDA has grossly failed to inform the public, inside and outside the spray zone, that a number of exposed children, pregnant women, persons with pre-existing illnesses, senior citizens, chemically sensitive persons, and healthy adults may suffer adverse health effects such as skin sensitization and immune reactions from the large number of Bacteria in the Btk pesticide spray.

Will the USDA pay for medical expenses and health care costs if people are injured? No. The USDA will deny health effects just like they have at other locations in Oregon, Washington state and other places.

Respectfully yours,  
NEIL J. CARMAN, PH.D.  
Neil\_Carman@greenbuilder.com

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Mon, 13 Mar 2006  
From: Neil Carman

March 13, 2006

Dear Travis County Judge Biscoe and County Commissioners Davis, Daughterty, Sonleitner and Gomez:

More than 500 people reported a range of health reactions including acute toxicity in Oregon, Washington state and Canada due to the large-scale aerial spraying of *Bacillus thuringiensis* var. *kurstaki* (Btk). But USDA falsely claims no adverse health effects will occur if people are exposed inside and outside the aerial spraying zone. BTK microscopic droplets can also remain airborne for many days after the spraying.

Please read an excerpt from a 1994 report in the *Journal of Pesticide Reform* and six scientific references referred to in the article.

*Bacillus thuringiensis* (Bt): Insecticide Fact Sheet  
Carrie Swadener / *Journal of Pesticide Reform* v.14, n.3 Fall94 Excerpt at:  
<http://www.mindfully.org/GE/Bacillus-thuringiensis-Bt.htm>

*Bacillus thuringiensis* (Bt) is a live microorganism that kills certain insects and is used to kill unwanted insects in forests, agriculture, and urban areas.

In a purified form, some of the proteins produced by Bt are acutely toxic to mammals. However, in their natural form, acute toxicity of commonly-used Bt varieties is limited to caterpillars, mosquito larvae, and beetle larvae. Bt is closely related to *B. cereus*, a bacteria that causes food poisoning and to *B. anthracis*, the agent of the disease anthrax. Few studies have been conducted on the chronic health effects, carcinogenicity, or mutagenicity of Bt. People exposed to Bt have complained of respiratory, eye, and skin irritation, and one corneal ulcer has occurred after direct contact with a Bt formulation. People also suffer from allergies to the "inert" (secret) ingredients. People with compromised immune systems may be particularly susceptible to Bt.

Viable Bt spores are known to exist for up to one year following application. Insect resistance to Bt has been well documented. Genetic engineering may greatly expand use of Bt, speeding up the development of more resistance.

Large-scale applications of Bt can have far-reaching ecological impacts. Bt can reduce dramatically the number and variety of moth and butterfly species, which in turn impacts birds and mammals that feed on caterpillars. In addition, a number of beneficial insects are adversely impacted by Bt.

Bt is less toxic to mammals and shows fewer environmental effects than many synthetic insecticides. However, this is no reason to use it indiscriminately. Its environmental and health effects as well as those of all other alternatives must be thoroughly considered before use. Bt should be used only when necessary, and in the smallest quantities possible. It should always be used as part of a sustainable management program.

#### Acute Toxicity to Humans

##### *Bacillus thuringiensis* var. *kurstaki*

There have been few experimental studies assessing the toxicity of Btk. to humans. Most information comes from occupational exposures, or from exposures occurring during large-scale Btk. programs.

One case of Btk. infection resulted from a farmer splashing a Btk. formulation, Dipel, in his eye. The man developed an ulcer on his cornea from which positive Btk. cultures were taken.<sup>21</sup> Another man working on a spray program splashed Btk. on his face and eyes. He then developed skin irritation, burning, swelling, and redness. Btk. was cultured from a sample taken from his eye.<sup>22</sup> Ground-spray applicators using Foray 48B reported symptoms of eye, nose, throat, and respiratory irritation. The frequency of their complaints was found to be related to the degree of exposure. Workers with similar preexisting health problems were more likely to report adverse effects from the ground spray.<sup>23</sup>

A woman exposed to an Btk. formulation as a result of drift went to the hospital due to burning, itching and swelling of her face and upper chest. She later exhibited a fever, altered consciousness, and suffered seizures.<sup>24</sup> No Bt was cultured from tissue samples, but her doctor believed that Bt was the cause of the clinical symptoms.<sup>25</sup>

Monitoring studies following large-scale Bt spray programs have shown that exposed people carry Bt in their tissues. For example, more than 11 percent of nasal swab samples taken from patients surveyed by doctors in Vancouver (Canada) following a gypsy moth spray program were found to contain Btk.<sup>23</sup> Bt was also found in cultures taken from patients in Lane County, Oregon following a gypsy moth spray program there. Monitoring studies also show that exposed people report a variety of health problems that they believe to be associated with Bt exposure.<sup>22</sup> For example, during the Vancouver spray program, almost 250 people reported health problems, mostly allergy-like or flu-like symptoms. During a Washington gypsy moth spray program, over 250 people reported health problems and 6 were treated in emergency rooms for allergy or asthma problems.<sup>26</sup>

"During the 1992 Asian gypsy moth spray program in Oregon, a woman who was exposed to Foray 48B had a preexisting allergy to a carbohydrate that was present as an inert ingredient. Within 45 minutes of exposure, the woman suffered from joint pain and neurological symptoms."

#### References

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#### Conclusion

USDA has failed to provide adequate public health information of the potential for adverse health effects from large-scale aerial Btk spraying and I am deeply concerned they are attempting to deceive the public claiming that no health effects will occur. Will the USDA pay for medical expenses and health care costs if people are injured? No. The USDA will deny health effects just like they have at other locations in Oregon, Washington state and other places.

USDA may create a public health problem if they spray with BTK since no "Emergency" exists at this time based on the evidence of a single hybrid European-Asian gypsy moth.

Respectfully yours,  
NEIL J. CARMAN, PH.D.  
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