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## Bt cotton growers in China lose money due to secondary pests

Bt cotton is genetically modified to resist damage from bollworms, the primary pest affecting cotton yields. When first launched onto the market in 1996 it was quickly adopted by four major cotton growing regions, the US, China, India and Argentina. It offered the promise of protecting yields with significantly reduced use of insecticides. And for a crop renowned for its heavy use of the most hazardous insecticides this promise was sure to attract attention. A number of reports published in the years following documented significant reductions in pesticide use. And despite the high costs of Bt cotton seed some even indicated that Bt cotton adoption might increase financial returns for farmers.

However, alongside those convinced of the benefits of Bt cotton stood others who harboured grave doubts. What happens in an ecosystem once one species is removed? Other species move in to occupy that niche. The naysayers in the Bt cotton debate pointed out that this is exactly what would happen in a cotton field. Without the bollworm, other pests, previously of less significance, would move in. And while the toxin produced by the Bt gene is effective at reducing bollworm infestations it is not effective at countering secondary pests.

A new study is now proving these naysayers correct. Using a 2004 survey conducted in China researchers from Cornell University studied the economics of Bt cotton adoption in China. They found that by year three, Bt cotton farmers in the survey had cut their pesticide use by 70% and had earnings 36% higher than farmers planting conventional cotton. However, by 2004 (year seven) Bt cotton farmers were spending almost an equivalent amount on pesticides (US\$101 per ha) as conventional cotton farmers. And, with higher seed costs, by 2004 Bt cotton farmers were earning 8% less than conventional cotton farmers.

Sustainable alternatives to both conventional and Bt cotton exist. Organic cotton farming is reducing the health and environmental impacts of this damaging crop. And with markets for organic cotton increasing year-on-year conversion to organic cotton holds the promises of a sustainable future for growers.

*Tarnishing Silver Bullets: Bt Technology Adoption, Bounded Rationality and the Outbreak of Secondary Pest Infestations in China, Wang S, Just DR, Pinstrup-Anderson P, Paper presented at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 2006.*

## EPA bans lindane

On 2 August, 2006, the United States Environmental Protection Agency (EPA) finally withdrew registration of the pesticide lindane for agricultural uses calling it 'one of the most toxic, persistent, bioaccumulative pesticides ever registered.' Environmental health groups have applauded the step, and are now calling for the remaining uses of lindane in pharmaceutical products to be phased out.

Lindane has been used on crops since the 1950s but can cause seizures, and damage to the nervous and immune systems. It is a suspected carcinogen and hormone disruptor with possible links to endocrine-related cancers such as breast cancer. Lindane and its breakdown products are highly persistent in the environment and in the human body. A 2003 study from the US Centers for Disease Control and Prevention found that 62% of US residents sampled carried residues of lindane in their body.

Lindane was initially targeted for restriction and phaseout by the EPA in 1977. In 1983 the EPA limited its use to grain seeds to prevent pests from eating the plants. The current decision to end its use as an agricultural pesticide is the culmination of a 10 year review of over 200 active ingredients that was ordered by Congress in 1996 under the Food Quality Protection Act (FQPA). The FQPA transformed the EPA's standards for evaluating risks requiring that

food tolerance limits be based on health rather than farming practices, and that vulnerable sub-populations, particularly children, be taken into account. Lindane is currently being considered for inclusion in the Stockholm Convention on Persistent Organic Pollutants.

Lindane has already been banned in at least 52 countries. However, in the US the Food and Drug Administration (FDA) continues to approve its use in shampoos and lotions for control of lice and scabies. These pharmaceutical uses are also approved in Canada. Given the particular vulnerability of children to pesticides this use of lindane is especially risky. As Ann Heil, of the Los Angeles County Sanitation Districts says 'it is baffling why the federal government has now banned uses of lindane for farming, but still allows it to be put on children's heads.' Use of these products on young children appears to be continuing despite new labelling required by the FDA warning of its dangers. Pharmaceutical uses of lindane for lice and scabies have been banned state-wide in California since 2002, and legislation promoting similar bans is moving forward in Michigan and New York.

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