

GM crop use makes minor pests major problem

Pesticide use rising as Chinese farmers fight insects thriving on transgenic crop.

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Growing cotton that has been genetically modified to poison its main pest can lead to a boom in the numbers of other insects, a ten-year study in northern China has found.

In 1997, the Chinese government approved the commercial cultivation of cotton plants genetically modified to produce a toxin from the bacteria *Bacillus thuringiensis* (*Bt*) that is deadly to the bollworm *Helicoverpa armigera*. Outbreaks of larvae of the cotton bollworm moth in the early 1990s had hit crop yields and profits, and the pesticides used to control the bollworm damaged the environment and caused thousands of (human) deaths from poisoning each year.

More than 4 million hectares of *Bt* cotton are now grown in China. Since the crop was approved, a team led by Kongming Wu, an entomologist at the Chinese Academy of Agricultural Sciences in Beijing, has monitored pest populations at 38 locations in northern China, covering 3 million hectares of cotton and 26 million hectares of various other crops.

Numbers of mirid bugs (insects of the Miridae family), previously only minor pests in northern China, have increased 12-fold since 1997, they found. "Mirids are now a main pest in the region," says Wu. "Their rise in abundance is associated with the scale of *Bt* cotton cultivation."

Wu and his colleagues suspect that mirid populations increased because less broad-spectrum pesticide was used following the introduction of *Bt* cotton. "Mirids are not susceptible to the *Bt* toxin, so they started to thrive when farmers used less pesticide," says Wu. The study is published in this week's issue of *Science*¹.

"Mirids can reduce cotton yields just as much as bollworms, up to 50% when not controlled," Wu adds. The insects are also emerging as a threat to crops such as green beans, cereals, vegetables and various fruits.



Rise of the mirids

The rise of mirids has driven Chinese farmers back to pesticides — they are currently using about two-thirds as much as they did before *Bt* cotton was introduced. As mirids develop resistance to the pesticides, Wu expects that farmers will soon spray as much as they ever did.

Two years ago, a study led by David Just, an economist at Cornell University at Ithaca, New York, concluded that the economic benefits of *Bt* cotton in China have eroded². The team attributed this to increased pesticide use to deal with secondary pests.

The conclusion was controversial, with critics of the study focusing on the relatively small sample size and use of economic modelling. Wu's findings back up the earlier study, says David Andow, an entomologist at the University of Minnesota in St Paul.

"The finding reminds us yet again that genetic modified crops are not a magic bullet for pest control," says Andow. "They have to be part of an integrated pest-management system to retain long-term benefits."

• References

1. Lu, Y. *et al.* *Science* advance online publication [doi:10.1126/science.1187881](https://doi.org/10.1126/science.1187881) (2010).
2. Wang, S., Just, D. & Pinstrip-Anderson, P. *Int. J. Biotechnol.* **10**, 113-120 (2008). | [Article](#)

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