

# Long-term analysis shows GM cotton no match for insects in India

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An Indian farmer applies pesticide to his cotton field. Credit: Glenn Davis Stone/Washington University

Genetically modified (GM) Bt cotton produces its own insecticide. The seeds were introduced in India in 2002 and today account for 90% of all

cotton planting in the country. Bt cotton is now the most widely planted GM crop on small farms in the developing world.

In India, Bt cotton is the most widely planted cotton crop by acreage, and it is hugely controversial. Supporters long touted increased yields and reduced pesticides to justify its pickup. But that argument does not hold up under the first long-term study of Bt cotton impacts in India. The analysis is co-authored by a Washington University in St. Louis anthropologist in the journal *Nature Plants*.

Bt cotton is explicitly credited with tripling [cotton production](#) during 2002-2014. But the largest production gains came prior to widespread seed adoption and must be viewed in line with changes in fertilization practices and other pest population dynamics, according to Glenn Davis Stone, professor of sociocultural anthropology and [environmental studies](#), both in Arts & Sciences.

"Since Bt cotton first appeared in India there has been a stream of contradictory reports that it has been an unmitigated disaster—or a triumph," Stone said, noting the characteristic deep divide in conversation about GM [crops](#). "But the dynamic environment in Indian cotton fields turns out to be completely incompatible with these sorts of simplistic claims."

Many economists and other observers based their assessments on much shorter time frames than Stone's new study, which spans 20 years.

"There are two particularly devastating caterpillar pests for cotton in India, and, from the beginning, Bt cotton did control one of them: the (misnamed) American bollworm," Stone continued. "It initially controlled the other one, too—the pink bollworm—but that pest quickly developed resistance and now it is a worse problem than ever."

"Bt plants were highly vulnerable to other insect pests that proliferated as more and more farmers adopted the crop. Farmers are now spending much more on insecticides than before they had ever heard of Bt cotton. And the situation is worsening."

Stone, an internationally recognized expert on the human side of global agricultural trends, has published extensively on GM crops in the developing world. His previous work has been funded by the Templeton Foundation and the National Science Foundation.

To prepare this new analysis, Stone partnered with entomologist K.R. Kranthi, the former director of India's Central Institute for Cotton Research. Kranthi is now the head of a technical division at the Washington-based International Cotton Advisory Committee.

"Yields in all crops jumped in 2003, but the increase was especially large in cotton," Stone said. "But Bt cotton had virtually no effect on the rise in cotton yields because it accounted for less than 5% of India's cotton crop at the time."

Instead, huge increases in insecticides and fertilizers may have been the most significant changes.

"Now farmers in India are spending more on seeds, more on fertilizer and more on insecticides," Stone said. "Our conclusion is that Bt [cotton](#)'s primary impact on agriculture will be its role in making farming more capital-intensive—rather than any enduring agronomic benefits."

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