

Monsanto's modified soya beans are cracking up in the heat

Andy Coghlan

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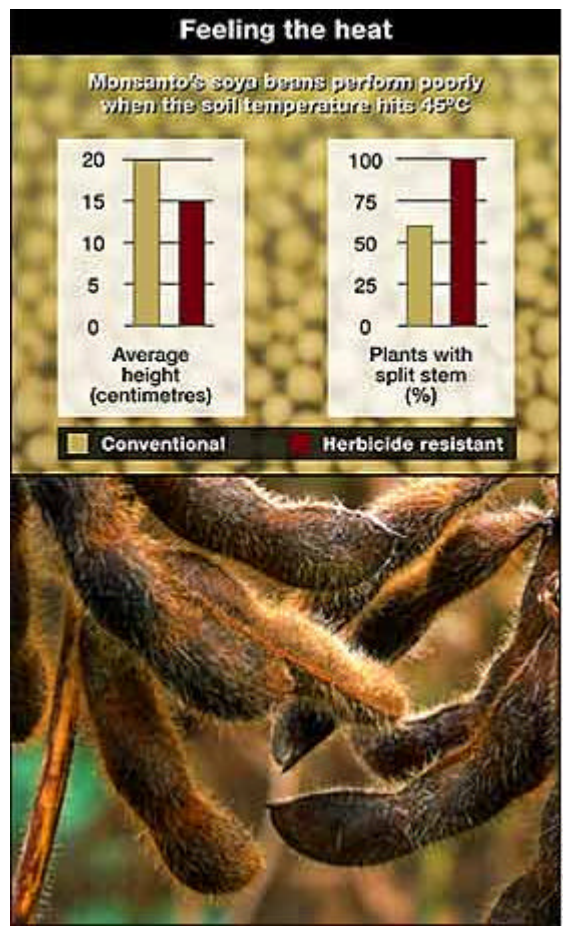
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IT SEEMS barely a week goes by without another piece of bad news for the agribiotech giant Monsanto. Now researchers in the US have found that hot climates don't agree with Monsanto's herbicide-resistant soya beans, causing stems to split open and crop losses of up to 40 per cent.

This could be a serious blow to the St Louis-based company, which sees Brazil and other Latin American countries as major markets for its soya beans. "It has the potential to be quite a problem," says Bill Vencill of the University of Georgia in Athens.

Vencill examined the effects of heat on the engineered soya beans after farmers in the southern state alerted him to unexpected crop losses. He realised that most severe losses occurred during Georgia's two hottest springs since the beans were launched in 1996. "In the years we saw the problems, the soils were reaching 40 to 50 °C," says Vencill.

His team replicated these conditions in laboratory growth chambers, comparing the hardiness of the Monsanto plants with that of conventional strains of soya bean. In soils that reached only 25 °C during the day, the genetically modified Monsanto beans grew just as well as conventional beans. But in warmer soils, the Monsanto plants appeared stunted. And in soils reaching 45 °C, the differences were marked (see Figure). Vencill described the findings at a meeting of the British Crop Protection Council in Brighton this week.



"We saw lower heights, yields and weights in the Monsanto beans," says Vencill. Worse still, stems of virtually all the Monsanto beans split open as the first leaves began to emerge compared with between 50 and 70 per cent of the other test plants. This same phenomenon had occurred on farms, but had been blamed on fungal disease. "Instead, we think the stem splits, and it exposes the plant to secondary infection," says Vencill.

Vencill suspects that the phenomenon is the result of changes in plant physiology caused by the addition of genes making the beans resistant to glyphosate, the herbicide marketed as Roundup by Monsanto. Plants carrying these genetic alterations have been shown to produce up to 20 per cent more lignin, the tough, woody form of cellulose. "We think it might make the plants more brittle," says Vencill.

Intriguingly, he found that plants resistant to a different herbicide, gluphosinate, were not affected by the heat, so he concludes the problem must be peculiar to glyphosate resistance. "It's not genetic modification per se that's causing the effects," he says.

Vencill says that the bacterial enzyme that imparts resistance to glyphosate affects a major metabolic pathway in the plant, and has the side effect of sending lignin production "into overdrive". Gluphosinate resistance, by contrast, is achieved using a gene that simply enables plants to break down the herbicide.

Monsanto says it can't comment in detail on Vencill's results "until we've seen a published and peer-reviewed article". But a spokesman suggests that farmers might avoid the problem by choosing a variety of engineered soya bean that is better suited to hot conditions.