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Pesticide results help China edge transgenic rice towards market

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China is poised to commercialize genetically modified rice, possibly within a year. Data have just been published that advocate the rice's health benefits, but observers are concerned by the lack of long-term health and environmental studies, and by evidence that transgenic rice is already being sold illegally in the country.

China has four varieties of genetically modified rice in the final stages of field trials. Last week, Chinese and US researchers presented evidence that two of them — GM Xianyou 63 and GM II-Youming 86 — decrease the use of pesticides by 80% (J. Huang *et al.*, *Science* 308, 688–690; 2005). The authors argue that this would dramatically benefit the health of farmers.

The authors' enthusiasm is in marked contrast to wary noises that have come from China in the past few years. No new transgenic food crop has been approved for commercial use there since 2000, and the government has taken every opportunity to emphasize the possible dangers.

This reflects China's 'no-risk' approach, claims a senior US-based plant scientist who advises the Chinese government on agricultural policy. The agriculture ministry has hesitated to introduce transgenic rice so as to avoid responsibility for any resulting health or environmental problems, he says, adding that positive results such as Huang's will be crucial in overcoming such fears.

But other observers have suggested that China has simply been taking advantage of biotechnology concerns in Europe and elsewhere. These enabled it to deny commercial approval to foreign companies such as Monsanto until its own domestic products could compete (see *Nature* 422, 111–112; 2003).

The publication of the *Science* paper suggests that China believes it has now reached that stage, and is ready to be the first country to approve genetically modified rice. "Products from China's plant biotechnology industry could be an effective way to increase both

IMAGE
UNAVAILABLE
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REASONS

Farmers in China may already be trading in illegal transgenic rice.

competitiveness internationally and rural incomes domestically," the authors write.

The results do sound impressive. GM Xianyou 63 and GM II-Youming 86 contain genes from the *Bacillus thuringiensis* bacterium and the cowpea, respectively, which make them resistant to two serious pests, stem borers and leaf rollers. Farmers in eight villages in the Hubei and Fujian provinces were given either conventional seeds or the transgenic varieties, all at the same price, and were then told to apply pesticides as needed.

There was a slight increase in productivity of about 6%. But it is the 80% drop in pesticide use that would bring both economic and health benefits, says the paper's lead author, Jikun Huang, an agricultural economist at the Chinese Academy of Sciences in Beijing.

Lesser poison

There are no studies showing the extent of pesticide-related illness in China, but according to Huang's unpublished estimates, around 50,000 farmers suffered pesticide poisoning each year in the 1990s, and around 1% of those died. Questionnaires submitted by the farmers in the latest survey showed that no households using the transgenic rice suffered symptoms of pesticide-related illness, whereas up to 8.3% of those using conventional rice did.

The drop in pesticide usage is not in itself a huge surprise, says Chris Leaver, a plant

biologist at the University of Oxford, UK, noting that similar advantages have been seen in the transgenic cotton that is already on sale. "It's nothing new except that it's in rice," he says.

But results such as Huang's could change perceptions about the costs and benefits of genetically modified food, says Robert Ziegler, who became director-general of the non-profit International Rice Research Institute in Los Baños, Philippines, earlier this year. "These hard data are consistent with the objectives that create these materials," he says. "It's not hype. It's real."

Selling genetically modified rice in China could lead to the acceptance of other crops, and other countries may follow suit, says Leaver. "This is just the tip of the iceberg." Huang confirms that scientists from Vietnam and Indonesia have contacted him about plans to introduce the pest-resistant rice. And progress is being made with Golden Rice, a transgenic strain that aims to combat malnutrition by producing extra pro-vitamin A (see J.A. Paine *et al.*, *Nature Biotechnol.* 23, 482–487; 2005).

But it is not all good news. Some observers are concerned that the Chinese government may use Huang's results to justify approval of the transgenic strains, although few if any studies have been done on their long-term health or environmental effects. And they fear that lax regulation in China might cause problems. Transgenic rice already seems to be popping up illegally in markets in Hubei — GM Xianyou 63 is "probably" being sold there, admits Huang.

"Unregulated distribution would definitely happen within the country and across borders," says a Japanese plant biologist and advocate of genetic modification, who asked not to be named. He worries that unregulated distribution could lead to ecologically unbalanced agriculture. He argues that distribution of transgenic crops should come only after farmers have been educated about the technology and its possible risks. ■