

Appendix 5: Monsanto's Roundup and Bt Technologies are Failing in the Field

Since the introduction of GMO corn, soy, and cotton, farmers have seen an overwhelming increase in the amount and variation of glyphosate-resistant weeds in Roundup Ready crops, as well as the creation of worms that have grown resistant to Bt corn and cotton. Farmers are now forced to return to older farming methods including manual weeding and the use of residual pesticides. States in India are laying the groundwork to farm non-Bt seed lines of cotton in an attempt to curb the resistant worms.

Superweeds

1. [Science](#), September 2013. "What happens when weed killers stop killing?" Superweeds are taking over American farms. A study reported that glyphosate-resistant weeds now grow in the majority of soybean, cotton and corn fields, causing a crisis for American farmers.
2. [Phys.org](#), January 13, 2014. In the face of skyrocketing superweeds, Monsanto told the media that superweeds have been around long before their GMO seed products. Phys.org writes that the US is facing epidemic of herbicide-resistant superweeds. Farmers are reporting that superweeds went up 34% in one year from 2011 to 2012. Monsanto refuses to accept responsibility for creating superweeds with its Roundup Ready genetically modified seed.
3. [Farm Industry News](#), January 29, 2013. The 34% increase in glyphosate-resistant weed infestation from 2011 to 2012 encompassed 61.2 million acres.
4. [The New York Times](#), May 4, 2010. Just as heavy use of antibiotics contributed to rise of drug-resistant supergerms, American farmers' use of Roundup has led to the rapid growth of superweeds.
5. [Grainews](#), June 9, 2015. Arkansas is running out of herbicides to fight resistant weeds as farmers say they can barely grow wheat in the state with a new resistant weed emerging every 18 to 24 months. Farmers have had to return to manual weeding and residual herbicides.
6. [CNBC](#), September 30, 2014. Dow Chemical admits that 70 million US acres are infested with herbicide-resistant weeds.
7. [Natural Society](#), November 30, 2011. Experts estimate the worldwide land coverage of superweeds to be at least 120 million hectares (297 million acres).

Bt Corn-Resistant Worms

8. [Wired](#), March 17, 2014. The Bt corn rootworm has evolved to evade the GMO corn that was supposed to kill it. Wired reports that scientists have documented the rapid evolution of corn rootworms resistant to Bt corn. Seed manufacturers and the Environmental Protection Agency ignored scientists' advice in 2002 to split corn fields evenly between GM and non-GM corn to ensure the resistant worms would mate with non-resistant worms. Hindering research, seed manufacturers would not allow Bt corn to be studied until 2010.

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9. [Southeast Farm Press](#), June 1, 2015. A new study from North Carolina State University and Clemson University finds that Bt corn has little impact on earworm infestation; a failure that scientists predicted in the 1990s. The lead author cautions that the US must pay closer attention to clues about developing resistance.

Bt Cotton-Resistant Worms

10. [Monsanto](#) (undated). Monsanto's second-generation Bt cotton was brought to market to cure the bollworm resistance of the first generation seed, and a third-generation line is in the works. After the 2009 discovery of Bt cotton-resistant pink bollworm in four states in India, Monsanto moved on to a second-generation Bt cotton seed to kill the resistant worms. While Monsanto is certain this second generation Bt cotton has not caused insect resistance, they are developing a third generation Bt cotton regardless. Monsanto blames Indian farmers for their lack of refuge planting and early use of unapproved seed in causing the resistant worms.
11. [First Post](#), June 25, 2015. India has wised up to the uselessness of Bt cotton in areas that have no bollworm infestations. An Indian government research institute is seeking to do away with Bt cotton in areas of India that receive rain because the bollworm avoids monsoons, rendering Bt cotton unnecessary. Currently 90% of cotton in India is Bt cotton.

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1. *Science*, "What Happens When Weed Killers Stop Killing?" September 20, 2013.
 2. Phys.org, "US 'superweeds' epidemic shines spotlight on GMOs," January 13, 2014.
 3. Farm Industry News, "Glyphosate-resistant weed problem extends to more species, more farms," January 29, 2013.
 4. *The New York Times*, "Farmers Cope With Roundup-Resistant Weeds," May 3, 2010.
 5. Grainews, "Herbicide resistant weeds changing farm practices," June 9, 2015.
 6. CNBC, "A farming controversy spouts over 'superweeds,'" September 30, 2014.
 7. Natural Society, "Monsanto's Roundup spawns superweeds consuming over 120 million hectares," November 30, 2011.
 8. *Wired*, "Voracious worm evolves to eat biotech corn engineered to kill it," March 17, 2014.
 9. *Southeast Farm Press*, "Carolinas field study: is Bt corn losing against corn earworm?" June 1, 2015.
 10. Monsanto, "Pink Bollworm Resistance to GM Cotton in India," undated.
 11. First Post, "Nagpur's CICR seeks to wean farmers away from Bt cotton hybrids," June 25, 2015.