



General Article

Available online at www.journal-advances-developmental-research.com

Journal of Advances in Developmental Research

ISSN: 0976-4704 (Print), e-ISSN: 0976-4844 (Online)

J.Adv.Dev.Res. Volume 1, No.2, December 2010

Super weed-A Threat of GM Crops

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Introduction

Many Genetically Modified (GM) crop varieties are given genes that allow them to resist a specific herbicide, which farmers can then apply to kill the weeds while allowing the GM crop to thrive. Environmental campaigners have long feared that if pollens from the GM crop fertilised a related weed, it could transfer the resistance and create a super weed. This "gene transfer" is what appears to have happened at the field scale trial site. It raises the prospect of farmers who grow some GM crops being forced to use stronger herbicides on their fields to deal with the upstart weeds.

In genetic engineering, scientist modifies the genome of an organism, usually by inserting a foreign gene. In the case of GM oilseed rape, the rape plants carry a bacterial gene which makes them resistant to a powerful herbicide. This bacterial gene encodes a protein that chemically alters and detoxifies the herbicide. Planting GM rape might appeal to farmers because they would be able to treat their fields with a weed-killing herbicide without harming their rape plants. The closer the evolutionary relationship between two plant species, the more likely they are to hybridize. Wild mustard (the weed) and rape (the crop) are evolutionary cousins. In fact, wild mustard is the evolutionary cousin of many crop plants because farmers developed these crops by artificially selecting the ancestors of wild mustard until they evolved into useful crop plants, such as broccoli and cauliflower.

Although it is not yet clear if the super weed is fertile. However, scientists and the public are less concerned about the fate of this particular "super

weed" than the possibility of future super weeds, in general. After all, if it happens once, it could easily happen in other cases, and once a fertile super weed carrying a gene for herbicide resistance evolves, it is likely to be favoured by natural selection in any environment in which farmers use that herbicide. The prevalence of super weeds could encourage farmers to use more toxic herbicides and could eventually escalate into a dangerous arms race wherein agriculturists develop and use ever-more-powerful herbicides, as weeds, in turn, evolve resistance to them.

Some Studies Regarding Super weed

Environmentalists raised an outcry when the British Centre for Ecology and Hydrology announced the discovery of what has been termed a "super weed" in July of 2005. The single wild mustard plant achieved super weed status in the minds of some when it proved resistant to a powerful weed killer. Scientists discovered the plant in a field that had been used in trials of genetically-modified (GM) oilseed rape, a group of plants which includes those used to produce canola oil. Environmental groups warn that this discovery augurs serious agricultural and environmental repercussions if genetically-modified oilseed rape were to be grown commercially. Superweeds are plaguing high-tech Monsanto crops in southern US states, driving farmers to use more herbicides, return to conventional crops or even abandon their farms. The gospel of high-tech genetically modified (GM) crops is not sounding quite so sweet in the land of the converted. A new pest, the evil pigweed,

is hitting headlines and chomping its way across Sun Belt states, threatening to transform cotton and soybean plots into weed battlefields.

In late 2004, "super weeds" that resisted Monsanto's iconic "Roundup" herbicide, popped up in GM crops in the county of Macon, Georgia. Monsanto, the US multinational biotech corporation, is the world's leading producer of Roundup, as well as genetically engineered seeds. Company figures show that nine out of 10 US farmers produce Roundup Ready seeds for their soybean crops.

Super weeds have since alarmingly appeared in other parts of Georgia, as well as South Carolina, North Carolina, Arkansas, Tennessee, Kentucky and Missouri, according to media reports. Roundup contains the active ingredient glyphosate, which is the most used herbicide in the USA.

Today, 100,000 acres in Georgia are severely infested with pigweed and 29 countries have now confirmed resistance to glyphosate, according to weed specialist Stenlay Culpepper from the University of Georgia. "Just to illustrate how aggressive we are, last year we hand-weeded 45% of our severely infested fields," said Culpepper, adding that the fight involved "spending a lot of money."

Farmers in Canada and Argentina growing GM soya beans have large problems with herbicide-resistant weeds, though these have arisen through natural selection and not gene flow through hybridisation. Experiments in Germany have shown sugar beets genetically modified to resist one herbicide accidentally acquired the genes to resist another - so called "gene stacking", which has also been observed in oilseed rape grown in Canada.

What's striking is how many different ways weeds have found to overcome the chemical. Scientists had thought that Roundup was invincible in part because the enzyme it attacks is pretty much the same in all plants. That uniformity suggests that plants can't tolerate mutations to it; mutations must change its shape so that it doesn't work and the plant dies. But it turns out that many populations of ryegrass and goose grass have independently stumbled across one mutation that can change a single amino acid in the enzyme.

Brian Johnson, an ecological geneticist and member of the Government's specialist scientific group which assessed the farm trials, has no doubt of the significance. You only need one event in several million. As soon as it has taken place the new plant has a huge selective advantage. That plant

will multiply rapidly. Although the Government has never conceded that gene transfer was a problem, it was fear of this that led the French and Greek Governments to seek to ban GM rape. Emily Diamond, a friend of the Earth GM researcher, said: "This is what we were reassured could not happen — and yet now it has happened the finding has been hidden away. This is exactly what the French and Greeks were afraid of when they opposed the introduction of GM rape".

Controversial Solutions

In an interview with FRANCE 24, Monsanto's technical development manager, Rick Cole, said he believed super weeds were manageable. "The problem of weeds that have developed a resistance to Roundup crops is real and [Monsanto] doesn't deny that, however the problem is manageable," he said. Cole encourages farmers to alternate crops and use different makes of herbicides.

Indeed, according to Monsanto press releases, company sales representatives are encouraging farmers to mix glyphosate and older herbicides such as 2,4-D, a herbicide which was banned in Sweden, Denmark and Norway over its links to cancer, reproductive harm and mental impairment. 2,4-D is also well-known for being a component of Agent Orange, a toxic herbicide which was used in chemical warfare in Vietnam in the 1960s.

According to the UK-based Soil Association, which campaigns for and certifies organic food, Monsanto was well aware of the risk of super weeds as early as 2001 and took out a patent on mixtures of glyphosate and herbicide targeting glyphosate-resistant weeds. "The patent will enable the company to profit from a problem that its products had created in the first place," says a 2002 soil association report.

The discovery that herbicide-resistant genes have transferred to farm weeds from GM crops is the second blow to the hopes of bio-tech companies to introduce their crops into Britain. Following farm scale trials there was already scientific evidence that herbicide-tolerant oilseed rape and GM sugar beet were bad for biodiversity because the herbicide used to kill the weeds around the crops wiped out more wildlife than with conventionally grown crops. Now this new research,

a follow-up on the original trials, shows that a second undesirable potential result is a race of super weeds.

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