

GM crop escapes into the American wild

Transgenic canola found growing freely in North Dakota.

Natasha Gilbert

A genetically modified (GM) crop has been found thriving in the wild for the first time in the United States. Transgenic canola is growing freely in parts of North Dakota, researchers told the Ecological Society of America conference in Pittsburgh, Pennsylvania, today.

The scientists behind the discovery say this highlights a lack of proper monitoring and control of GM crops in the United States.

US farmers have dramatically increased their use of GM crops since the plants were introduced in the early 1990s. Last year, nearly half the world's transgenic crops were grown in US soil — Brazil, the world's second heaviest user, grew just 16%. GM crops have broken free from cultivated land in several countries, including Canada, the United Kingdom and Japan, but they have not previously been found in uncultivated land in the United States.

"The extent of the escape is unprecedented," says Cynthia Sagers, an ecologist at the University of Arkansas in Fayetteville, who led the research team that found the canola (*Brassica napus*, also known as rapeseed).

Sagers and her team found two varieties of transgenic canola in the wild — one modified to be resistant to Monsanto's Roundup herbicide (glyphosate), and one resistant to Bayer Crop Science's Liberty herbicide (gluphosinate). They also found some plants that were resistant to both herbicides, showing that the different GM plants had bred to produce a plant with a new trait that did not exist anywhere else.

Sagers says the previous discoveries in other countries of transgenic canola populations growing outside of cultivation were often in or near fields used for commercial transgenic canola production. By contrast, her research team found feral populations of herbicide-resistant canola growing along roads, near petrol stations and grocery stores, often at large distances from areas of agricultural production.

The researchers took samples of plants at 8-kilometre intervals along roads in North Dakota from 4 June to 23 July 2010. The number of *B. napus* plants in each sample plot was counted, and one plant was collected and tested for the presence of proteins that could give it resistance to either of the herbicides.



If GM crops with herbicide resistance spread beyond farmland, they could become problematic weeds.

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The team found *B. napus* at nearly half of the 288 sites tested. Of these, 80% had at least one herbicide-resistant transgene (41% were resistant to Roundup and 40% resistant to Liberty). They also found two plants that contained both transgenes.

Feral generations

Sagers says the discovery of plants that are resistant to both herbicides shows that "these feral populations of canola have been part of the landscape for several generations". Further studies are needed to establish whether these escaped GM canola plants have any ecological consequences. But those that have evolved resistance to both herbicides could become a weed problem for farmers, adds Sagers.

"The regulatory protocols designed to reduce or prevent escape and proliferation of feral transgenic crops are ineffective. Current tracking and monitoring of GM organisms are insufficient," she says. Sagers blames the delay in discovering escaped populations of transgenic plants in the United States largely on the lack of funding for research in this area.

Tom Nickson, head of environmental policy at Monsanto in St Louis, Missouri, told *Nature*, "Those familiar with canola know that these plants are readily found on roadsides and in areas near farmers' fields. This was true prior to the introduction of GM canola, and a common source is seed that has scattered during harvest and fallen off a truck during transport."

Sagers agrees that feral populations could have become established after trucks carrying cultivated GM seeds spilled some of their load during transportation. She notes that the frequency and population density of GM canola that they found may be biased as they only sampled along roadsides.

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Alison Snow, an ecologist at Ohio State University in Columbus, says it is not surprising that escaped transgenic plants have now been found in the United States, given that this has already happened elsewhere. The escaped populations "could be a problem if you are worried about herbicide use", she says. A major advantage of herbicide-resistant crops is that non-selective herbicides can be used, reducing the number of applications needed. But if transgenic crops escape and breed with related weed species, then that advantage could be eroded, and different and more herbicides might have to be used.

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This reminds me of the lawsuit that was brought upon a farmer in Canada that had a few individual GM plant in his non-GM field. The plants were discovered by the corporation that created the GM plants. He was sued by them, and both parties ultimately settled the issue out of court. #12615

With this current information about GM crops, plants that were NOT designed to proliferate in the wild (and in some cases, designed NOT to proliferate in the wild) without farmer intervention nor with the GM corporations knowledge, I wonder if lawsuits like this will ever crop up again.

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Posted by: **belinda librarian** | 2010-08-09 01:24:44 PM

GM crop with herbicide resistance.

#12621

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Posted by: **rudra bhattarai** | 2010-08-10 04:14:32 AM

The title of this news flash may be a bit misleading. If you look at slide 4 of the University of Arkansas website (<http://newswire.uark.edu/Article.aspx?id=14453>) you see that canola covers 1-2 meters from the road, the strip where herbicides are sprayed. Further away from the road grass takes over from canola. This is quite similar to the situation we found in the Netherlands where feral canola populations occur occasionally when seed is spilt on very disturbed sites along roads. When left undisturbed such populations are replaced by other species within a few years. So rather than escaping into the American wild, the finding is probably that GM canola now grows along all roads in Northern Dakota. When it would turn out that plants pose an ecological problem they could be removed. This would still be feasible for roadsides but not when canola had really gone wild. #12629

Report on wild canola in the Netherlands by Tom de Jong & Sheila Luijten:
<http://www.cogem.net/ContentFiles/CGM%202010-03%20koolzaad.pdf>

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Posted by: **Tom J de Jong** | 2010-08-10 09:13:34 AM

Belinda: Yes the lawsuits will continue. In Percy's case (the infamous Canadian farmer) he admitted that he (actually his farmhand but very likely with Percy's approval) was spraying Roundup on a sub-set of his crops. The implication is that he was creating a reserve of roundup-resistant seed. Which, for better or worse, is illegal. #12637

As Tom J mention, it appears that most of wild herbicide-resistant canola is growing along the roadside where the department of transportation (or another person) is spraying herbicides in order to kill weeds. Not surprisingly there is a strong evolutionary pressure for herbicide resistant plants to grow in such locations.

As far as I know (and I could be wrong on this) zero of the GM plants grown in America are expected to only grow where the farmers and corporations plant them. There is no 'kill switch' embedded in them to keep them from growing outside their planting area. Some of the plants (in the form of seeds) will escape beyond their boundaries and, when there is a selective pressure for them to succeed (e.g., in places where herbicides are used) then they will grow there.

Similar to the growing antibiotic resistance in bacteria, even with weeds that have not been engineered to be resistant to roundup (and other herbicides) we have found some becoming resistant. Keep spraying herbicides on the same ground every year and eventually herbicide resistant weeds will appear.

Once the herbicides are not sprayed then the resistance will slowly fade into the background.

Going back to the original question about lawsuits. Basically doing something illegal (e.g., knowingly

collect roundup-resistant seeds) will get you a visit from Monsanto. The larger question of if such an activity should be illegal will not be considered in the resultant lawsuits.

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Posted by: **Richard Westerman** | 2010-08-10 03:12:35 PM

"GM crop escapes into the American wild"! In Nature News, no less: ah, well, I suppose sensationalism rules, even in Nature.

#12644

And what, exactly, has been shown here? Why, that rogue plants of GM canola – which could also be ANY variety of canola – can be found along roads where trucks carrying harvested seed have driven.

Wow...radical! Plants sprout from stray seeds scattered along roads! And cross-breed with other varieties!!

And this is a problem, how? As pointed out in other responses, "along teh road" does not quite equate to "in the wild": anyone who has ever worked in the agricultural sector knows that roguing is an ordianry thing to do in fields, and that rogues along roadsides are simply incidental to the farming process. Unless and until they become "weeds" - which means they have to be seen to readily colonise agricultural and undisturbed land away from roadsides – they are not a problem, and their herbicide resistance is just another trait that may not stand them in any good stead in the absence of selection.

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Posted by: **Ed Rybicki** | 2010-08-11 04:38:23 AM

Escaped poison is escaped poison- would you like an oil spill by the side of the road? Some PCB's in the food chain? GM has been shown in numerous scientific studies to be poison to animals that eat it. Imagine that we trust Monsanto to police itself in terms of safety! But that is exactly what the FDA is doing. if Monsanto says the plants are safe then "that's cool with us"! Animals that eat the canola- or insects that use the canola plant can and will be damaged. GM crops are also implicated in colony collapse disorder. The only reason we have this monster in our midst is corruption. GM neither increases yield nor reduces pesticide use. If you hear otherwise, you have been victimized by lies. Hamsters fed GM soy were sterile after 3 generations! Cattle die after eating GM cotton plants! Look it up- don't be victimized by profit oriented propaganda. GM is profitable only because it is easier to spray herbicides- resulting in lower labor costs. Just because you seek the truth, doesn't mean you are anti-science. You just want the truth. Keep seeking and say no yo poison!

#12677

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Posted by: **Bob Klein** | 2010-08-11 12:19:10 PM

This is a great article exposing the beginning of another noxious weed problem. The first step in weed management is prevention. It is our responsibility to follow best management practices when we are cultivating and using the land. The second step in weed management is early detection. Most noxious weed infestations begin along roadsides. If the introduced species prove more vigorous than their competition, e.g. more drought tolerant or the plants benefit from roadside herbicide applications, the population then spreads further from the roadsides and into the wildlands. It is only a matter of time. You can see this in most data connected to any of the noxious weeds spread throughout the U.S. This article is describing an early detection study and should be taken into consideration without all of the patent issues packed around GMO's. This is far more important than lawsuits and legalities. Our natural plant communities have long been challenged by introduced species. Because of the roaming canola's herbicide resistance, our efforts to control it once it is widely accepted as problem will be difficult. We can't allow politics and opinions to cover the truth of the matter. Brassica napus GM was not intended to grow outside of cultivation. Because it is, it is a potential threat to native plant communities.

#12681

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Posted by: **Christy Wagner** | 2010-08-11 02:04:26 PM

Please don't play with nature by introducing GMOs. Indian situation is still grim in case of GMOs #12723 field trials. I have conducted first field trial of Bt transgenic brinjal & tomato at IARI, Pusa, N. Delhi in India and found no seriousness on part of regulatory authorities of Department of Biotechnology. Dr P K Ghosh, DBT official regulating the trials was from chemistry background having no information regarding plant systems. Rules were made not to grow two transgenic plants of same family but we have grown tomato & brinjal (both from Solanaceae) together. Similarly many rules were ignored during the trials.

World needs uniform global rules & regulations with regard to GMOs field trials. SAFOTEST (Animal study with GMOs too) should be regulated.

Let's not play with Nature otherwise our future generation will never forgive us for our shortsightedness in regard to GMOs.

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Posted by: **Anurag Chaurasia** | 2010-08-12 02:39:15 PM

The more severe and realistic problem that we are gonna face is, the break down of natural food, #13155 some insects may permanently extinct or this "escaped" GM plant.

Some researches were done to prove the problematic outcome when bee vanished. Now, not only bee, but other insects, people, start to think about that.

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Posted by: **Isaac Chow** | 2010-08-29 07:36:47 AM

The Sagers report¹ on the establishment of feral communities of two GM herbicide resistant #13334 canola varieties (Monsanto's Roundup Ready glyphosate tolerant canola and Bayer Crop Science's Liberty herbicide glyphosate resistant canola) in the USA is a confirmation of earlier reports from Japan², Australia and China. Feral communities of cropped plants originating from agrosystems are so common a phenomenon that it does not evoke attention. This is especially so because agrotechnique-pampered domesticated plant species unlike invasive weeds fail to establish communities in highly competitive natural ecosystems.

GM canola has mimicked an invasive weed in its establishment as feral communities and creation of double herbicide resistant hybrids apparently through cross pollination. This is a matter of serious concern. The report also indicates that transgenes do indeed cross genomic barriers albeit intervarietal barriers in the present case.

Doubts are rightly raised about the adequacy of GM regulatory procedures that evade provisions for monitoring the flow of transgenes or their parts to non-target genomes. A major flaw in GM biosafety monitoring mechanism is that assessments, if properly carried out, would take several years in most cases. Unfortunately, protocols for the emigration of transgenic plants via the contrivances of wind, flash floods, insects, birds and terrestrial animals are neither adequate nor transparent. GM biosafety mechanisms should include both the flight of transgenics to non-target ecosystems and the flow of transgenes to non-target genomes in a manner to be cost effective and universally reproducible on quick time basis.

Most regulatory mechanisms avoid the monitoring of subsoil residues of GM crops and their effects on rhizosphere biota and genomes of soil microorganism and on extracellular DNA. These aspects should be made essential components of GM biosafety assessment practice. Experimental formats for real time flow of transgenes are suggested here.

Subsoil metagenomic analysis is quick and common place for a moderately equipped laboratory^{3, 4, 5}. Transfer of large DNA by horizontal transfers across genomic barriers is well known. It would be easy for GM biosafety assessors to monitor relocation of transgenes or their parts to non-target DNA of the metagenome. Simple PCR runs of metagenomic DNA will reveal the presence or absence of the transgene under consideration. Presence of transgene DNA would ensure that transgene migration has indeed

occurred.

Extracellular DNA (eDNA) is known to persist in soil environment for long 6, 7, 8. In all likelihood dead roots, mycorrhizae, leaf litters, left over stubbs etc. will add to soil eDNA pools including the transgene or its part. Persisting eDNA containing the transgene or their parts may be recoured to HGT to laterally move to other genomes at a later time. Tracing the presence of transgenes or parts thereof on eDNA would caution biosafety assessors about later possibilities of transgene flights from GM crop plants.

These new areas of researches should be publicly funded projects and must not be left to the will and wisdom of GM crop developers and lobbyists.

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Posted by: **Nasar SKT** | 2010-09-04 03:36:03 AM

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