GE oilseed rape – out of control in Canada

Experiences with GE oilseed rape (canola) in Canada are showing that 'super-weeds' are already emerging. A recent study by English Nature[1] revealed the widespread emergence of multiple herbicide resistant volunteer oilseed rape plants following the growing of GE oilseed rape in the Canadian prairies. As a result, known toxic chemicals such as 2,4-D are being used to control the new weeds. The use of GE crops is also leading to the genetic contamination of seed production by GE varieties and is driving seed production out of the prairies to other parts of North America. In some cases it is being driven out of Canada altogether, relocating to GE free producer nations such as New Zealand.

English Nature's report, "Gene Stacking in Herbicide Tolerant Oilseed Rape: Lessons from the North American Experience", has led to serious questions being asked about whether GE crops can be controlled and, because of contamination through cross pollination, about the possibility of growing non-GE food in countries where GE crops are being grown. This briefing reviews the recent experience in Canada and the lessons that should be learned for GE crops across the world.

The race for herbicide tolerance in Canada

In Canada, Aventis' genetically engineered Liberty Link oilseed rape was first grown commercially in 1995. It was designed to tolerate the herbicide (or weedkiller) glufosinate. Monsanto's GE glyphosate tolerant Roundup Ready canola was introduced in 1996 and Rhone Poulenc's bromoxynil tolerant canola (Navigator) was added to the list in 1999. A non-GE herbicide tolerant canola, tolerant to another type of herbicide, an imidazoline (Clearfield), made by Pioneer Hybrid also became available in Canada in 1995. About 75 percent of Canadian oilseed rape is currently herbicide tolerant[2] and the downsides of their use are rapidly becoming clear.

The emergence of the super-weeds

Weedy oilseed rape that is resistant to up to three herbicides is becoming common place in the Canadian prairies. The problem has arisen because some seed is shed at harvest time, remains in the ground and germinates in future years. When the plants emerge in subsequent crops of a different species they are then unwanted weeds ('volunteers') which have to be removed by the farmer. Volunteer oilseed rape weeds that are tolerant to three herbicides (Liberty, Roundup and Clearfield), were first identified in Canada in1998, only 3 years after GE herbicide tolerant oilseed rape was first grown[3,4]. This resistance to more than one herbicide is known as "gene stacking" and arises through pollination of one herbicide tolerant variety by another. An Agriculture Canada project found evidence of stacking at all 11 sites it sampled in 1999 with gene flow taking place at distances of up to 800 metres[5]. Seed contamination has occurred at distances over 4kms (see below), proving that the175 metre separation distance recommended for use by farmers growing GE oilseed rape in Canada simply cannot contain the problem.

Semi-wild, feral oilseed rape also grows when seed is spilled and scattered following harvesting and its transport to processing plants. This is another way in which multiple herbicide tolerant weeds are likely to spread over time.

More chemicals to control the super-weeds

Although claims are made that the use of herbicide tolerant crops will reduce chemical use, the number of herbicide applications used on herbicide tolerant oilseed rape in Canada is higher than for conventional oilseed rape. Between 1997-2000, there was an average of 2.13 herbicide applications/crop with Roundup Ready and Liberty Link compared to 1.78 in conventional crops[1].

While biotech proponents like Monsanto also claim that the use of GE crops will reduce toxic herbicide use, the emergence of super-weeds in Canada is driving up the use of other, more toxic chemicals. Both 2,4D and paraquat (grammoxone) are being recommended by government agencies to control herbicide tolerant oilseed rape volunteers in Canada[6]. 2,4-D is considered "highly toxic" due to its hazard to eyes[7] and some forms are also highly toxic to fish. English Nature considered that if herbicide tolerance gene-stacking arose in the UK, more paraquat and diquat may be used, which could harm an already threatened species, the hare.

Ever willing to exploit an opportunity to increase chemical sales, some herbicides are now being actively marketed by agrochemical companies to deal with herbicide tolerant weeds One example is the promotion of Frontline (an imidazolone herbicide like Clearfield made by Dow AgroSciences) for the control of Roundup Ready and Liberty Link volunteers in wheat, barley and oats[8].

Volunteer oilseed rape weeds are potentially a big problem so environmental impacts from chemical use to deal with them could be immense. In the UK, 23 percent of cereal fields, 9 percent of sugar beet and 9 percent of potato fields are infested with volunteer rape and oilseed rape commonly occurs as a weed in semi-natural habitats, such as roadside verges and field margins[9]. Because oilseed rape is grown on such a large scale (around 6 million hectares annually in Canada) some weed scientists predict that in Canada, herbicide tolerant oilseed rape volunteers will become the most difficult weed problem for many farmers in the Prairie region[10].

In their study of GE crops and food, the Royal Society of Canada noted in this context [10] *'…. the inherent difficulties in the containment of genetic material in the context of normal farming practices in which literally millions of small seeds are produced and harvested over large areas of the landscape. Industry argues that as long as "good farming practices" are followed, these problems should not occur. This perspective may be unduly naïve.'*

However, the problems of GE weeds are not the only symptom of genetic contamination affecting Canadian agriculture. Seeds, the very basic materials of agriculture and food, have already been affected.

Contaminating the seed supply

In 2000, non-GE oilseed rape seed imported by Advanta into Europe from Canada was found to have been contaminated by GE rape grown over 4 kilometres away[11]. Because the seed Advanta was importing was a hybrid, it was produced by planting male sterile plants interspersed with a few (usually about 20 percent) male fertile plants to pollinate them. Under these growing conditions, there is less pollen than normal in the field and so pollen transported into the field has a greater chance of pollinating the crop. Since more and more emphasis is being placed on the use of hybrids, such contamination is likely to increase. Even with traditional non-hybrid varieties, pollen from GE oilseed rape has pollinated other oilseed rape 2 kilometres

away[12] and small scale experimental trials have been shown to be poor predictors of what will happen when oilseed rape is grown on a large scale[13].

Advanta seeds is reported to have announced plans to relocate its seed production facilities away from western Canada to New Zealand, the eastern Canadian province of New Brunswick (where oilseed rape isn't usually planted), or to Montana[14,15].

Protecting the environment and agriculture from GE contamination

Lessons from Canada show that GE contamination cannot be contained. Separation distances expected to prevent genetic pollution have proved hopelessly inadequate. As Greenpeace predicted, it is the agrochemical companies making GE crops who are benefiting from herbicide tolerance twice over. Firstly, through the sales of GE crops and the chemicals they are designed to tolerate and secondly, through the sales of chemicals to control the problems the GE crops create. Whilst the biotechnology industry promised less herbicides and that those used would be environmentally safer, after only 6 years, the Canadian experience is showing how untrue this is.

Canada should act now to ban the use of GE crops to protect the environment and promote sustainable agriculture. The rest of the world should learn the lesson of GE oilseed rape in Canada and ban the release of GE organisms into the environment before irreversible damage arises.

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