Genetic Pollution

By Sonal Panse

The term genetic pollution refers to the gene flow occurring between genetically modified organisms and non-genetically engineered organisms. It is also used to describe the gene flow between non-native and native species as well as the gene flow between domesticated and wild species.

The Problem of Genetic Pollution

Genetically modified organisms are organisms that have been modified by the insertion of one or more genes. The inserted genes are called transgenes and these can be taken from a different species from the same kingdom or from an entirely different kingdom. In some cases, already occurring genes may simply be tweaked to modify them. The whole point is to imbibe the genetically modifed organism with certain desirable genetic traits that would not occur in it naturally.

If these genetically modified organisms were to breed with non-genetically engineered organisms, they could pass on the modified traits to the non-GE organisms. These modified traits would "pollute" the natural genetic traits of these organisms and could create several ecological problem:

- They might edge out the local species and drive them to extinction.
- They might cause loss of genetic diversity.
- Herbicide or pest resistant strains might spread rapidly and create a nightmare for farmers.

The writer Jeremy Rifkin, in his book "The Biotech Century" (May, 1998), described the dangers posed by the unintentional transfer of genes from genetically modified organisms to non-genetically engineered plants and animals in the environment. He coined the term "genetic pollution" for this undesirable gene flow.

In addition to its association with genetically modified organisms and non-genetically engineered organisms, the term genetic pollution is also used to describe the gene flow from domesticated species and feral species to wild species. It also describes the gene flow from non-native species to indigenous species.

Mechanisms and Examples

Genetic pollution in plants

- Gene flow occurs from genetically modified plants to sexually compatible non-genetically engineered plants.
- Gene flow from a GM plant to non-GM plant may occur by wind pollination, water pollination or animal pollination.
- Genetic pollution may occur by unknowingly or knowingly providing GM seeds and food as food aid or seed stocks to Third World countries.
- The most well-known example of genetic pollution, often cited by researchers, was the Quist and Chapela report of discovery of transgenes from GE maize in landraces of maize in Oaxaca, Mexico. However, this report has since been criticized for insufficient evidence and genetically

modified corn did not show up in later studies in the area.
- A clear example of genetic pollution is the genetically modified, herbicide resistant creeping bentgrass produced by the Scotts Company. This GM bent grass species was seen, in a 2004 study, to be easily transmitted over long distances by wind pollination to breed with naturally occurring species of bentgrass.

Genetic pollution in animals

Genetic pollution in animals occurs when transgenic individuals mate with non-GM animals. This is somewhat less common than genetic pollution in plants, as, unlike GM crops, GM animals have not been approved for human consumption and are not as widespread. One example is the farmed Atlantic salmon breeding with the wild Atlantic salmon.

The transgenes may spread within the non-GM populations or be lost over time, depending upon factors such as the following:

- Size of non-GM population.
- Extent of breeding between GM and non-GM species.
- Whether or not fertile generations are produced.
- Advantages or disadvantages conferred by the GM organisms on the non-GM ones.

Some researchers and environmentalists consider the term 'genetic pollution' controversial and inappropriate. They prefer the term 'genetic mixing'. They give the following reasons:

- Pure gene pools may not necessarily be the better ones.
- Mixing of gene pools does not always lead to a genetic decline.
- Hybrids might be biologically better than the parents.

Resources -

http://www.worldwidewords.org/turnsofphrase/tp-gen1.htm

http://www.greenpeace.org/international/campaigns/genetic-engineering/ge-agriculture-and-genetic-pol

http://www.fao.org/biotech/C7doc.htm

http://www.unesco.org/courier/1998_09/uk/dires/txt1.htm

http://www.fao.org/DOCREP/004/Y2775E/y2775e08.htm#bm08

http://www.nature.com/nature/journal/v414/n6863/full/414541a.html

http://www.springerlink.com/content/w3367640g611u136/

http://www.usda.gov/wps/portal/usdahome?contentidonly=true&contentid=2007/11/0350.xml

http://www.jncc.gov.uk/page-1532

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