E-ISSN: 2278-179X

JECET; March 2014-May 2014; Vol.3.No.2, 828-832

Journal of Environmental Science, Computer Science and Engineering & Technology

An International Peer Review E-3 Journal of Sciences and Technology

Available online at www.jecet.org

Section A: Environmental Science

Review Article

Socio-Economic Impact and Genetic Pollution of Genetically Modified Crop

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Received: 10 October 2013**; Revised:** 20 March 2014; **Accepted:** 25 March 2014

Abstract: The insect-resistant Bt gene are resistant to only one or two insects. In the case of Bt cotton in India, bollworms became resistant to Bt gene and the seed company had to introduce Bt cotton with stacked genes to solve the problem. There were new incidences of yet unknown pests like mealy bug on Bt cotton, which never occurred earlier on cotton crops.GM crops are cultivated in only 25 countries Commercialized GM crops are soybean, corn, cotton, squash, papaya, alfalfa, sugar beet, tomato, poplar, sweet pepper, canola. A study in Nature reported that Bt-containing maize genes were contaminating maize in its center of origin. GM rice carrying the Bt gene was planted by the Mahyco company in field trials in Saparong village in Ratu block /Ranchi violating all rules prescribed by the government for such testing. The trial plots of GM rice were located unprotected, right in the middle of farmers' fields, without any physical containment by a boundary wall, netting or other means to keep the GM rice segregated from the surrounding natural rice fields. This is a serious violation which can lead to contamination of natural rice in the region with very negative consequences for rice genetic diversity and ultimately, food security.

Key words: Bt gene, transgene, genetic mixing, Gene Campaign.

INTRODUCTION

The usage of genetic pollution by the Food and Agriculture is defined as: "*Uncontrolled spread of genetic information (frequently referring to transgenes) into the genomes of organisms in which such genes are not present in nature.*" Since 2005 exist a genetically modified GM Contamination Register, launched for Gene Watch UK and Greenpeace International and, it record all incidents intentional or accidental release of genetically modified (GM) organism[1-4]. Recently, study of four different crops, none of the genetically modified plants was found to be more invasive or more persistent than their conventional counterparts. An often cited example of genetic pollution is the reputed discovery of transgenic from GE maize in landraces of maize in Oaxaca, Mexico. More recent attempts to replicate the original studies have concluded that genetically modified corn is absent from southern Mexico in 2003 and 2004. The goal of genetic engineering crop plants to help advance tenability and condition of the world food supply has been a conflict with public and health concerns raised about the safety of the food from the end product[5-8].

OVERVIEW

A 2004 study performed near an Oregon field trial for a genetically modified variety of creeping bentgrass (*Agrostis stolonifera*) revealed that the transgene and its associate trait (resistance to the glyphosate herbicide) could be transmitted by wind pollination to resident plants of different *Agrostis* species, up to 14 km from the test field trial in a manner which ensured that neither glyphosate-tolerant creeping bentgrass nor its offspring would persist in the environment". "If you take a term used quite frequently these days, the term "genetic pollution," otherwise referred to as genetic contamination, it is a propaganda term, not a technical or scientific term. Pollution and contamination are both *value judgments*. By using the word "genetic" it gives the public the impression that they are talking about something scientific or technical--as if there were such a thing as genes that amount to pollution." Whether genetic pollution or similar terms, such as "*genetic deterioration*", "*genetic swamping*", "*genetic takeover*" and "*genetic aggression*", are an appropriate scientific description of the biology of invasive species is debated. "*simply either that hybrids are less fit than the parentals, which need not be the case, or that there is an inherent value in "pure" gene pools*". They recommend that gene flow from invasive species be termed **genetic mixing** since: *"Mixing" need not be value-laden, and we use it here to denote mixing of gene pools whether or not associated with a decline in fitness*[9-12].

Food security is critical for nation's sovereignty: A food insecure nation cannot maintain its sovereignty. It has to crawl before the providers of food. In today's globalised world there is a geo-politics for food. The MNCs are making attempts to control the food chain. Incidentally these corporations are based in industrialized countries where corporate farming and industrialized agriculture are largely prevalent, backed by heavy subsidies. Agriculture in the industrialized countries cannot exist without subsidies. The subsidy regime and protectionist tariffs in the industrialized countries have rendered farmers in the Third World uncompetitive in the global trade. The negotiations for the Doha Development Round at the WTO could not be concluded due to the rigid attitude of the industrialized countries in refusing to ensure a free and fair trade regime by eliminating their subsidies and protectionist measures. Similar is the geo-politics for the introduction of genetically modified (GM) crops. However, industrialized countries remain divided on the issue of GM crops. Europe is against the forceful introduction of GM crops while the US is aggressively promoting it. Leading developers of GM crops like Monsanto are based in the US. Some European multinationals too are developing GM crops, but their businesses of GM crops are largely outside the

continent. Some European countries like Spain, Czech Republic, Portugal, Romania, Poland and Slovakia have introduced GM corn only for feed, but the area under cultivation have decreased since 2009.One of the reasons behind the European countries' stand on the issue is the strong consumer resistance due to their awareness about the health and environmental hazards of the crop, as shown in various studies. In US, however, the consumer resistance is not strong enough to deal with the politics of GM crops, practiced by the multinational corporations in league with the administration. GM crops have become a tool for the MNCs in controlling the politics of food and agriculture. GM crops through cross pollination can genetically contaminate non-GM crops. There had been instances in Canada where the non-GM corn fields were genetically contaminated by nearby GM corn fields and Monsanto sued these growers of non-GM corn to pay royalty. Genetic contamination of crops would ultimately lead to monoculture and a serious loss of natural biodiversity.

India is the centre of origin for brinjal and there is a possibility for such consequences once the BT brinjal is allowed for cultivation in the country**.** Genetic contamination of crops would ultimately lead to monoculture and a serious loss of natural biodiversity. The danger of genetic contamination is more so if a particular crop which is the centre of origin in a particular place is genetically modified and cultivated there. GM corn cultivation in Mexico has genetically contaminated different indigenous corn varieties of Mexico. India is the centre of origin for brinjal and there is a possibility for such consequences once the BT brinjal is allowed for cultivation in the country.

Largely the commercialized GM crops like corn and soybean are used for feed and not for food and canola for oil. Similarly false promises are being made that transgenic technology increases yield. The fact is that so far the transgenic technology has not been effective in increasing the potential yield of crops. The insect-resistant Bt gene are resistant to only one or two insects. In the case of Bt cotton in India, bollworms became resistant to Bt gene and the seed company had to introduce Bt cotton with stacked genes to solve the problem. There were new incidences of yet unknown pests like mealy bug on Bt cotton, which never occurred earlier on cotton crops.GM crops are cultivated in only 25 countries Commercialized GM crops are soybean, corn, cotton, squash, papaya, alfalfa, sugar beet, tomato, poplar, sweet pepper, canola.

Public Opinion: Across the world is not in favour of GM crops. As the consumer resistance against GM crops is high in developed countries in Europe and in other parts of the world, developing countries are becoming dustbins for hazardous GM crops clearly, public opinion across the world is not in favour of GM crops. As the consumer resistance against GM crops is high in developed countries in Europe and India, the GM crop industry is aggressively pushing for market in the developing countries. In other words the developing countries are becoming dustbins for hazardous GM crops. The Genetic Engineering Approval Committee (GEAC) had approved Bt brinjal, but the environment and forests minister, Jairam Ramesh withheld its release and preferred to go for public consultations. After a series of public consultations, the minister said NO to Bt Brinjal.

Wild maize genetic contamination: A study in *Nature* reported that Bt-containing maize genes were contaminating maize in its center of origin. *Nature* later "concluded that the evidence available is not sufficient to justify." However, there still remains a controversy over the highly unorthodox retraction on the part of Nature. But the research confirmed initial findings concerning contamination of natural maize by transgenic maize.

Gene Campaign defect GM Rice contamination in India: Gene Campaign today confirmed the contamination of rice in Jharkhand, by genetically modified BT rice belonging to the Mahyco Company. Jharkhand, along with Orissa and Chhattisgarh, is known to be the birthplace of rice, the

region where the maximum genetic diversity of rice is found. GM rice carrying the Bt gene was planted by the Mahyco company in field trials in Saparong village in Ratu block /Ranchi violating all rules prescribed by the government for such testing. The trial plots of GM rice were located unprotected, right in the middle of farmers' fields, without any physical containment by a boundary wall, netting or other means to keep the GM rice segregated from the surrounding natural rice fields. This is a serious violation which can lead to contamination of natural rice in the region with very negative consequences for rice genetic diversity and ultimately, food security. At harvest time, part of the GM rice under trial was harvested; part was left standing in the field. This is another clear violation of the law, which requires that after harvesting, all the crop residue of the trial GM crop should be burnt. This is an essential requirement, to ensure that there is no possibility of new GM plants coming up as wild 'volunteer' plants from left over clumps and becoming uncontrolled sources of BT genes which could contaminate natural rice crops in the region. In the Mahyco trial plots, all the clumps had been left in the field after harvesting and nothing was burnt. The company however lied to the government that everything had been burn after the harvest (see letter from Mahyco company). The surrounding rice plants that were harvested by the company were also not destroyed but thrown on the side of the fields (see photo), providing another huge source of contamination of natural rice with the genetically engineered Bt rice. Seeing the careless way in which the rice in the trial field and the surrounding rice, had been handled by the company, Gene Campaign staffers collected samples of seeds and leaves from the second generation rice plants that had come up as well as from the rice plants that had been thrown on the bunds. The test results obtained by Gene Campaign provide conclusive proof that the Bt gene was allowed by Mahyco to escape into the environment. This is of particularly great concern since the environment in this case is where the genetic diversity of rice is found and where damage to the rice gene pool could be maximal.

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12. Effects of the introduction of invasive/non-native species - *Joint Nature Conservation Committee (JNCC)*, a statutory adviser to Government on UK and international nature conservation. Accessed on November 25, 2007. "*Occasionally non-native species can reproduce with native species and produce hybrids, which will alter the genetic pool (a process called* genetic pollution*), which is an irreversible change.*"

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