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Natural Farming Cannot Co-exist with GM Crops

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Some countries are taking up the promotion of natural farming crops which is very welcome. However a big problem and constraint arises when they say at the same time that they will spread GM crops, forgetting that natural farming cannot co-exist with GM crops. Apart from the high risk of contamination, there is the wider reality that GM crops involve very high environment, safety and health risks.

We should look carefully at what the most senior scientists known also for their commitment to the public interest have been saying. Surely the opinion of such scientists should get preference over those who have been working with multinational corporations known to be very exploitative towards farmers and known also for their attempts of trying to dominate the farm and food systems of developing countries. If according to reviews by very reputed scientists it can be shown that GM crops have been a disaster, then this view should get adequate importance.

Here we may note that GM crops and the herbicides accompanying them have been in court cases in some countries generally courts have been sympathetic to the victims of these crops and the agro-chemicals accompanying them. A case which attracted worldwide attention relates to the award of huge compensation to Johnson, a school groundskeeper, by a California jury on account of his health being damaged severely by a herbicide glyphosate which this groundskeeper had to use regularly, resulting in very painful and life-threatening blood-cell cancer. There was widespread sympathy for this victim and Edward Kennedy, nephew of former President John Kennedy, (he is now a Presidential candidate in the USA) was among the team of lawyers who argued this case.

For people involved in food safety issues this case had an additional significance. The herbicide in question is produced most prominently by a multinational company which is also in the forefront of the spread of GM crops. It has been involved in providing packages in which the company's GM seeds are closely tied to the marketing of the disputed herbicide whose serious health hazards had been the subject of much debate earlier also. In the course of the hearings of this case, however, it became increasingly clear that the so-called scientific evidence of safety of its products by which the giant multinational company had been swearing had many holes in it and at times its own findings were being passed off as the opinion of reputed scientists.

All the time some of the most eminent scientists have been warning against GM crops. The most eminent scientist of India on this subject Dr. Pushpa M. Bhargava was in the forefront of voicing these warnings. He was the founder of the Centre for Cellular and Molecular Biology and in addition he was also the Vice Chairperson of the National Knowledge Commission. Many people's science movements looked upon him as their mentor. He had been appointed by the Supreme Court of India as an observer in the Genetic Engineering Appraisal Committee as he was widely perceived to be not only a very accomplished expert

on this issue and that too of the highest integrity but in addition he was also seen on the basis of his past record as a very strong and persistent defender of public interest.

Therefore it is very useful and interesting to see what this very senior scientist with a comprehensive understanding of this issue had to say about GM crops. First of all he made a strong and clear effort to break the myth which had been created by relentless manipulation by the very powerful forces trying to spread GM crops In India. According to this myth most scientific research supports GM crops. While demolishing this myth Dr. Bhargava wrote,

> " There are over 500 research publications by scientists of indisputable integrity , who have no conflict of interest, that establish harmful effects of GM crops on human, animal and plant health, and on the environment and biodiversity. For example, a recent paper by Indian scientists showed that the Bt gene in both cotton and brinjal leads to inhibition of growth and development of the plant. On the other hand, virtually every paper supporting GM crops is by scientists who have a declared conflict of interest or whose credibility and integrity can be doubted."

In another review of recent trends titled 'Food Without Choice' (published in the Tribune) Prof. Pushpa M. Bhargava, who was an internationally acclaimed authority on this subject, drew pointed attention to the "attempt by a small but powerful minority to propagate genetically modified crops to serve their interests and those of multinational corporations (read the US), the bureaucracy, the political setup and a few unprincipled and unethical scientists and technologists who can be used as tools." Further he warned,

> "The ultimate goal of this attempt in India of which the leader is Monsanto, is to obtain control over Indian agriculture and thus food production. With 60 per cent of our population engaged in agriculture and living in villages, this would essentially mean not only a control over our food security but also over our farmer security, agricultural security and security of the rural sector."

The strong stand of Dr. Bhargava against GM crops is supported by other eminent scientists in various parts of world. A group of eminent scientists organized under the Independent Science Panel have stated in very clear terms,

> "GM crops have failed to deliver the promised benefits and are posing escalating problems on the farm. Transgenic contamination is now widely acknowledged to be unavoidable, and hence there can be no co-existence of GM and non-GM agriculture. Most important of all, GM crops have not been proven safe. On the contrary, sufficient evidence has emerged to raise serious safety concerns, that if ignored could result in irreversible damage to health and the environment. GM crops should be firmly rejected now."

The Independent Science Panel (ISP) is a panel of scientists from many disciplines and countries, committed to the promotion of science for the public good. In a document titled 'The case for a GMO-free Sustainable World' the ISP has stated further,

> "By far the most insidious dangers of genetic engineering are inherent to the process itself, which greatly enhances the scope and probability of horizontal gene transfer and recombination, the main route to creating viruses and bacteria that cause disease epidemics. This was highlighted, in 2001, by the 'accidental' creation of a killer mouse virus in the course of an apparently innocent genetic engineering experiment. Newer

> techniques, such as DNA shuffling, are allowing geneticists to create in a matter of minutes in the laboratory millions of recombinant viruses that have never existed in billions of years of evolution. Disease-causing viruses and bacteria and their genetic material are the predominant materials and tools for genetic engineering, as much as for the intentional creation of bio-weapons."

Several scientists involved in studying the implications and impacts of genetic engineering got together at the International Conference on 'Redefining of Life Sciences' organized at Penang, Malaysia, by the Third World Network. They issued a statement (the Penang Statement, or PS) which questioned the scientific basis of genetic engineering. This statement said:

> "The new biotechnology based upon genetic engineering makes the assumption that each specific feature of an organism is encoded in one or a few specific, stable genes, so that the transfer of these genes results in the transfer of a discrete feature. This extreme form of genetic reductionism has already been rejected by the majority of biologists and many other members of the intellectual community because it fails to take into account the complex interactions between genes and their cellular, extracellular and external environments that are involved in the development of all traits.
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> "It has thus been impossible to predict the consequences of transferring a gene from one type of organism to another in a significant number of cases. The limited ability to transfer identifiable molecular characteristics between organisms through genetic engineering does not constitute the demonstration of any comprehensive or reliable system for predicting all the significant effects of transposing genes."

Hence it is clear that to promote GM crops as a means of increasing crop productivity has no basis in scientific reality and is merely a manipulation tactic of the powerful GM lobby which uses highly selective data to somehow promote its case in the wake of ever-increasing evidence against GM crops. The powerful GM lobby uses many kinds of front-men but behind the scenes it is essentially controlled by the most powerful, resourceful and biggest multinational companies in the food, farming, agro-chemical and related sectors.

One factor that has not received adequate attention is that due to the threat of contamination, it is difficult for normal crops and crops of natural farming and organic crops to remain free from the impact of GM crops once these have been released. As worldwide concern for food safety grows, it is likely that there will be increasing demand for organically grown crops and crops which are not contaminated by GM crops. Therefore we will be surrendering premium world markets if we allow our crops to be contaminated. Star Link (corn engineered to contain a Bt toxin pesticide) was planted on less than 0.5% of US corn acereage, but its recall cost hundreds of millions of dollars, and even then the recall was not entirely successful.

Several eminent scientists representing the Independent Science Panel have also warned against the serious threat of contamination by GM crops,

> "Extensive transgenic contamination has occurred in maize landraces growing in remote regions in Mexico despite an official moratorium that has been in place since 1998. High levels of contamination have since been found in Canada. In a test of 33 samples of certified canola (oilseed rape) seed stocks, 32 were found contaminated.

> New research shows that transgenic pollen, wind-blown and deposited elsewhere, or fallen directly to the ground, is a major source of transgenic contamination. Contamination is generally acknowledged to be unavoidable, hence there can be no co-existence of transgenic and non-transgenic crops."

> "Crops engineered with 'suicide' genes for male sterility have been promoted as a means of 'containing', i.e., preventing, the spread of transgenes. In reality, the hybrid crops sold to farmers spread both male sterile suicide genes as well herbicide tolerance genes via pollen."

It is due to the serious threat of contamination that even trials of GM crops are considered unacceptably risky.

As prominent environmentalist Sailendra Nath Ghosh has written,

> "According to independent geneticists, the isolation distance needed to be both in time and space. The land on which the GM crop is to be grown should not sow a crop in the previous or the succeeding year. Cross-pollinating crops, unlike the self-pollinating ones, require isolation distance of three to four kms. The implementation of these requirements is impossible under Indian conditions. Farmers would not keep their lands fallow. Crops in adjoining fields are almost always planted up to the boundaries."

Several of these threats were examined at an international conference of scientists involved in studying the implication and impacts of genetic engineering. This conference on 'Redefining the Life Sciences' was organised at Penang, Malaysia, by the Third World Network. These scientists and experts issued a statement called the Penang Statement (PS).

This statement listed a wide range of potential adverse effects of genetic engineering. Of particular concern is the difficulty or impossibility of recalling GEOs which have been released into the environment, or which have escaped from containment and later found to have adverse effects.

The potential ecological risks of applying genetic engineering to agriculture include the possibility that some transgenic crops could become noxious weeds, and others could become a conduit through which new genes may move to wild plants which themselves could then become weeds. The new weeds could adversely affect farm crops as well as wild ecosystems. Similarly, genetically engineered fish, shellfish and insects could become pests under certain conditions.

Plants are presently being engineered to contain parts of a virus in order to become virus-resistant. Some scientists have raised the possibility that widespread use of transgenic virus-resistant plants in agriculture may lead to new strains of viruses or allow a virus to infect a new host. There are concerns that the creation of new viral strains and the broadening of the virus's host may increase the risks of new viral diseases that adversely affect crops and other plants. Mechanisms have been described whereby genetically engineered plants could plausibly give rise to new plant diseases.

In addition this statement warns that the rapid spread of transgenic crops poses a threat to traditional crop varieties and wild plants that are the major sources of crop genetic diversity.

Some traits of organisms may take decades or even longer to manifest themselves. An

organism declared ‘safe’ in the short term could eventually prove to be dangerous.

Another ecological risk is the possibility that field or forestry plants engineered to express toxic substances like pesticides and pharmaceutical drugs may poison certain non-target organisms. Transgenes for insecticidal or fungicidal compounds that are introduced into crops to inhibit pests may unintentionally kill non-target and beneficial insects and fungi. Transgenic crops used to manufacture drugs or industrial oils and chemicals could potentially harm animals, insects and soil microorganisms.

The possible chemical contamination of surface-water and ground-water by microorganisms or plants with unusual or accelerated metabolic processes is a special concern because of the crucial importance of water for all life. It may be impossible to recall and difficult to control harmful GEOs, especially those that may contaminate ground-water.

This statement adds that developing countries in particular face special risks,

> “Third World countries face even greater environmental risks than countries of the North because, in contrast, they have many wild relatives of many crops and thus there are more opportunities for various kinds of rogue species to be created.”

Moreover, most Third World countries currently have less scientific expertise and legal or regulatory capacity to monitor, assess and control activities involving genetically engineered organisms, and are thus even more vulnerable to adverse impacts.

Given the high hazards, risks and uncertainties associated with GM crops, these can never be sustainable. Markets and consumers of several countries simply do not accept GM crops.

In a letter written to the Prime Minister of India in 2009 as many as 17 distinguished scientists from the USA, Canada, Europe and New Zealand have pointed out that the claims relating to higher yield and protection of environment made for GM crops are absolutely false. Due to various problems of GM crops, their spread has been highly limited. This letter says,

> “More than 95 percent of all GM crops are engineered to either synthesise an insecticide (Bt toxin) or to tolerate a broad spectrum herbicide (e.g. Roundup, Liberty) or both.
>
> “To date there are only four major commercialised GM crops (soya, maize/corn, cotton, canola/oilseed rape) most of which (soya, corn, canola) are used primarily as animal feed. All were commercialised in the late 90s. Since then, no other commercially viable GM crop application has made it to market, especially due to farmers not accepting other GM crops (such as wheat, potatoes, and rice) for negative economic reasons (lack of buyers, loss of export markets).
>
> “GM crops have not been widely accepted around the world. 95 percent of all GM food crops are grown in only five countries: the US, Canada, Australia, Argentina, and Brazil. If you include fibre crops (cotton), India and China would be included. Only one GM crop is approved for cultivation within the European Union, MON810 corn, which has been banned by several member states invoking documented health and especially environmental risks.
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> “…The basic problem is that GM as employed in agriculture is conceptually flawed,

crude, imprecise and poorly controlled technology, that is incapable of generating plants that contain the required multiple, co-ordinately regulated genes that work in an integrated way to respond to environmental challenges.

"…GM has not increased yield potential. Yields from GM crops to date have been no better and in the case of GM soya have been consistently lower. A 2009 report reviewing more than 20 academic studies clearly shows that the cultivation of GM herbicide-tolerant soybeans has not increased yields. Insect-resistant corn, meanwhile, has at best only improved yields marginally. This report found that increase in yields for both crops over the last 13 years was due to traditional breeding or improvements in agricultural practices.

"…GM crops have led to vast increases in pesticide use, not decreases and therefore reduction of agricultural pollution cannot be claimed

"…Climate change brings sudden, extreme, and unpredictable changes in weather, which requires that a cropping system be flexible, resilient and as genetically diverse as possible. GM technology offers just the opposite.

"…Stability of productivity and production is much lower with many of the GM crops commercialised today. Herbicide tolerant GM soya is far more sensitive to heat or drought stress than conventional soya.

"…GM crops are designed to be used in conjunction with synthetic pesticides and fertilisers, which are manufactured from oil and natural gas.

"GM crops do not reduce greenhouse gas emissions.

"Recent data from the US department of agriculture has shown a vast increase in herbicide use since the introduction of GM crops tolerant to the application of these agrochemicals.

"Therefore, the introduction of GM crops has exacerbated rather than reduced agriculture's carbon footprint and is clearly unsustainable.

"Alternative proven technologies that can reduce the amount of fossil fuel used in farming already exist. This includes methods for reducing fertiliser applications, selecting farm machinery appropriate for each task, managing soil for conservation, limiting irrigation and (using) agro-ecological farming techniques."

All over the world the controversy over GM crops, also called genetically modified organisms (GMOs) is heating up as more and more evidence becomes available on their extremely serious hazards and threats. What needs to be emphasised is that these warnings have the support of some of the world's most eminent and well-qualified independent scientists and experts in the field.

As eminent scientists from several countries wrote in a letter to the Prime Minister of India in 2009,

"GM transformation can produce novel biochemical processes that are unpredictable and for which there is no natural history to assume are safe.

> "The GM transformation process is highly mutagenic leading to disruptions to host plant genetic structure and function, which in turn leads to disturbances in the biochemistry of the plant. This can lead to novel toxin and allergen production as well as reduced/altered nutritional quality.
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> "It is not a question of if there are disturbances to gene function and biochemistry but to what degree they will be present within any given GM plant. For example, the levels of more than 40 proteins are altered significantly in the commercialised GM MON810 corn compared to equivalent non-GM corn, which included production of a new allergenic protein.
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> "Numerous animal feeding studies demonstrate negative health impacts of GM feed on kidney, liver, gut, blood cells, blood biochemistry and the immune system.
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> "Of greatest concern is that studies show negative health effects with GM crops that have already been approved and which have been grown commercially for 10-13 years. This highlights the inadequacy of the original criteria and set of data on the basis of which marketing approval was and is still being granted."

In the more specific context of Bt brinjal this letter says,

> "Bt toxin is a proven potent immunogen raising justifiable concerns that it can give rise to allergic reactions.
>
> "Animals fed diets containing Bt corn have shown signs of direct toxicity.
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> "Independent re-evaluation of Monsanto's own research on their Bt corn crops shows negative health effects even in short-term (90-day) animal feeding studies.
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> "The Mahyco-Monsanto dossier of the raw experimental data of animal feeding studies with Bt brinjal shows highly statistically significant negative signs of toxicity on the functioning of multiple organ systems such as liver, kidney, blood and pancreas in all animals tested (especially rats, rabbits and goats). It is very important to note that these adverse effects were observed after only at most, a 90-day feeding time, which raises serious concerns about the safety of consuming this product over an entire lifetime. Long-term (at least 2-year) animal feeding studies were not done and are stated as not required by the apex regulator, contrary to the science, which requires these studies to detect chronic slow-onset toxicity and cancer.
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> "There is therefore, no scientific justification for the safety claim of Bt brinjal by India's regulators, which are based on an uncritical acceptance of the interpretation of the data submitted by Mahyco-Monsanto. This has been heavily criticised by eminent scientists of international standing."

In 2003 the Independent Science Panel, which consists of eminent scientists from many countries covering a wide range of relevant disciplines reviewed the evidence on the hazards of GMOs. This review concluded that many GM crops contain gene products known to be harmful. For example, the Bt proteins that kill pests include potent immunogens and allergens. Food crops are increasingly being engineered to produce pharmaceuticals, drugs and vaccines in the open environment, exposing people to the danger of inappropriate medication and their harmful side effects.GM varieties are unstable, with the potential to create new viruses and bacteria that cause diseases, and to disrupt gene function in animal

and human cells.

This report also said that there have been very few credible studies on GM food safety. Nevertheless, the available findings already give cause for concern. In the still only systematic investigation on GM food ever carried out in the world, 'growth factor-like' effects were found in the stomach and small intestine of young rats that were not fully accounted for by the transgene product, and were hence attributable to the transgenic process or the transgenic construct, and may hence be general to all GM food. There have been at least two other, more limited, studies that also raised serious safety concerns.

> "There is already experimental evidence that transgenic DNA from plants has been taken up by bacteria in the soil and in the gut of human volunteers. Antibiotic resistance marker genes can spread from transgenic food to pathogenic bacteria, making infections very difficult to treat.
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> Transgenic DNA is known to survive digestion in the gut and to jump into the genome of mammalian cells, raising the possibility for triggering cancer. The possibility cannot be excluded that feeding GM products such as maize to animals also carries risks, not just for the animals but also for human beings consuming the animal products.
>
> Evidence suggests that transgenic constructs with the CaMV 35S promoter might be especially unstable and prone to horizontal gene transfer and recombination, with all the attendant hazards: gene mutations due to random insertion, cancer, reactivation of dormant viruses and generation of new viruses. This promoter is present in most GM crops being grown commercially today."

A four-part series of experiments conducted over 3 years by the Royal Society for the Protection of Birds and the Centre for Ecology and Hydrology, Lancaster (United Kingdom)' (see The Independent dated March 22, 2005 reporting the findings of this study) concluded that GM crops could be more harmful to many groups of wild life than their conventional equivalents. According to these studies, Bt proteins, incorporated into a significant part of all GM crops, have been found to be harmful to many non-target insects, worms and amphibians.

The Penang Statement (PS) on GM crops stated:

> "Some GEOs (Genetically Engineered Organisms) have been made with virus or transposon vectors that have been artificially enhanced to become less species-specific. Since viruses and transposons can cause or induce mutations, there is the concern that enhanced vectors could be carcinogenic to humans, domestic animals and wild animals.
>
> "Persons with allergies may have legitimate concerns that with genetic engineering, once-familiar foods may be made allergenic. Furthermore, they will not be able to protect themselves if the foods are not labelled to state that they have been produced from genetically engineered organisms. Allergenic effects could be carried with the transgene or be stimulated by imbalances in the chemistry of the host plant or organism.
>
> "Another problem is that field workers or neighbours may develop allergies to insecticidal transgenic crops. For example, a spider venom expressed in sugarcane might block a metabolic pathway only in insects and not in humans, but humans can

nevertheless develop serious allergies to some venoms.

"With genetic engineering, familiar foods could become dangerous or even toxic. Even if the transgene itself is not dangerous or toxic, it could upset complex biochemical network and create new bioactive compounds or change the concentrations of those normally present. In addition, the properties in proteins may change in a new chemical environment because they may fold in new ways."

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Bharat Dogra is Honorary Convener, Campaign to Save Earth Now. His recent books include India's Quest for Sustainable Farming and Healthy Food, Protecting Earth for Children, Man over Machine (Gandhian Ideas for Our Times) and When the Two Streams Met (Freedom movement of India). He is a regular contributor to Global Research.

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