



CAN **TRANSGENICS (GM)** AND **ORGANIC FARMING** CO-EXIST IN INDIA?



CAN TRANSGENICS (GM) AND ORGANIC FARMING CO-EXIST IN INDIA?

Edition : 1st - August, 2014 : 2000 copies

Price : 15/- Rs.

Printed by : Javanika Printers, Karelibaug, Vadodara-390018

Published in Public Interest by

Alliance for Sustainable & Holistic Agriculture (ASHA)

in Collaboration with

JATAN: A Mission for Organic Farming

**CAN
TRANSGENICS (GM)
AND
ORGANIC FARMING
CO-EXIST IN INDIA?**

Published in Public Interest by

Alliance for Sustainable & Holistic Agriculture (ASHA)

A-124/6, 1st Floor, Katwaria Sarai,
New Delhi 110 016.

in Collaboration with

JATAN: A Mission for Organic Farming
Vinoba Ashram, Gotri, Vadodara: 390 021

CONTENTS

| | |
|--|----|
| Introduction to Transgenics and Organic Farming | 1 |
| Can GM and Organic Farming Co-Exist? | 6 |
| Organic Farming is Holistic..... | 8 |
| Promotion of GMOs Challenging The Spread of Organic Farming | 10 |
| Other Issues of Concern | 13 |
| More Reasons to Reject GMOs in Our Food, Farming & Environment | 15 |

INTRODUCTION TO TRANSGENICS AND ORGANIC FARMING

Agri-technologies impact not just human beings but living organisms in general, in addition to affecting the state of our natural resources like soil, air and water. They have a vast impact, given that the largest portion of our land area is under farming and a majority of our population is engaged in farming-related livelihoods. Any agricultural technology that is being deployed on a large scale requires a careful and comprehensive assessment of its benefits, costs and consequences, the extent, time frame and irreversibility of its impacts, as also an understanding of who is pushing it and for what reasons (the 'political economy' behind particular technologies).

Today, there is an acknowledgement that the "Green Revolution" model of agricultural development, based on a package of inputs like high-external-inputs-responsive seeds in the form of 'high-yielding varieties', irrigation and agro-chemicals, has over the years resulted in degraded soils, depleted and poisoned water, caused seed/biodiversity erosion and resulted in stagnating yields with high input costs and indebtedness for many farmers.

There is now a recognition of the need for sustainable increases in yield, often referred to as 'Evergreen Revolution'. There is also greater understanding around the pitfalls of excessive yield-centrism in agricultural development approaches. In the context of moving away from the earlier paradigm, two pathways are advocated by two distinctly different schools of thinking.

On the one hand, there is strong propaganda from the global seed companies that control the patents for transgenic (GM) technology that this is the "evergreen technology" that is essential to provide food security and higher incomes. The technology is essentially based on the concept that genes can be transferred from one species to another to transfer certain traits, in a safe and stable fashion, and it is generally an extension of the chemical input based agriculture.

On the other hand, another path, as enunciated in the world's largest study of agricultural science and technology, the International Assessment of Agricultural Science, Knowledge & Technology for Development (IAASTD Study) commissioned by the World Bank, FAO and a number of UN agencies with over 400 scientists from 50 countries, points out that it is not GM but ecological agriculture by small farmers that holds the key to addressing issues of improved farm yields, food security and poverty reduction. This report was adopted by India amongst other countries.

Further confirmation on this other path was received in 2011 in a report by the United Nations Special Rapporteur on the Right to Food, Mr Olivier de Schutter, which shows that ecological agriculture has in fact been found in practice to have led to an average 79% increase in 286 projects with a 116% increase for all African projects. Agro ecology, which applies ecological sciences, rather than chemical based technologies, to agricultural systems includes organic farming, natural farming, bio-dynamic farming and a number of interim stages to fully organic systems such as Non Pesticidal Management.

This note touches in brief on the essentials of the Organic Farming/ Agroecology path and the GM path, and on whether both can be simultaneously practised or are incompatible.

GM/TRANSGENICS – PERFORMANCE AND PROSPECTS

Definition of Genetic Engineering/Transgenics:

The World Health Organisation defines GMOs as "Organisms in which the genetic material (DNA) has been altered in a way that does not occur naturally". The technology enables geneticists/breeders to insert genes from alien organisms into a host organism with the understanding that new traits or characteristics that hitherto did not exist in the host organism can be created. For example, genes from bacteria, viruses, spiders, fish etc., have been/attempted to be, inserted into our food plants. This not only crosses inter-species barriers that exist in Nature but does so on a massive scale and in a timeframe too short to allow for normal evolutionary adaptation of the ecosystem.

GE is being done as a "cut and paste" technology that is not based on the complex regulatory networks that are at operation at the molecular level. For instance, characters like stress tolerance that GM proponents talk about are driven by almost 50 genes, whereas the current technology transfers at best one or two genes and that too without being able to predict where the gene will lodge in the DNA of the host plant. This introduces instability in the existing host genome and induces unpredictable consequences because of this.

The controversy around GMOs in the environment arises from the fact that the science and technology of transgenics is imprecise, inducing instability at the genomic level. This in turn has many other implications. It has to be remembered that this is a living technology which is irreversible and uncontrollable once released into the environment.

There is adequate and constantly-emerging scientific evidence on the adverse impacts on health, environment, agriculture, seed diversity, climate adaptability, yields, trade security and other such issues due to adoption of GMOs in food and farming systems that requires policy makers to adopt

a precautionary approach. A compilation is available of over 400 such peer reviewed scientific studies titled "Adverse Impacts of Transgenic Crops/Foods", brought out by the Coalition for a GM-Free India in November 2013¹.

Genetic engineering is currently being promoted to decision makers as the world's fastest-growing agricultural technology and best/only option for food security, climate change mitigation, pesticide reduction, for drought and flood tolerance and for nutritional benefits etc.

Current Global Status of GM: It has to be noted that there is no accurate data on adoption and cultivation of GM crops around the world, other than what the biotech industry's PR bodies put out. This is unlike the case of certified organic farming, which has many regulatory systems in place. The current state of GM in agriculture as compiled from biotech industry records shows that:

- GM crops in 2013 covered less than 4% of the world's crop land, and 1% of farmers after nearly two decades after the first GM crop was allowed to be cultivated on a commercial scale.
- Over 90 % of GM crops were grown in just six countries even after 18 years of introduction i.e., in 2013 (USA 40%, Brazil 23%, Argentina 14%, Canada 6%, India 6% and China 2%). An overwhelming majority of the countries around the world reject GM crop cultivation.
- There was only 3% growth in area under GM crops between 2012 and 2013. This was mainly in developing countries, with decline in industrialised countries. Further, two countries which opted for GM earlier stopped cultivating any transgenic crops.
- About 85% of GM is herbicide tolerant (HT) and used for convenience on huge farms in USA, Brazil, Argentina and Canada which have 83% of the world's GM crop area.
- Most GM crops are used in animal feed, biofuels and highly processed food as in the USA. USA also has the largest and fastest growing organic markets.
- A study of 13 years of GM crops in USA by 'Union of Concerned Scientists' found a yield decline in the largest cultivated GM crop in the world – GM soybean - compared to non GM grown earlier.
- Pesticide use in countries like USA, Argentina and Brazil (which are large GM producing countries) has increased with GM crops including the use of toxic chemicals banned in countries in Europe.
- Further, in those countries which have significant transgenic crop areas, food security indices have worsened after such GM crop adoption, belying the hype that GM crops are a solution for food security problems.

¹ <http://indiagminfo.org/?p=657>

It has to be remembered that the above picture is the result of pumping in huge amounts of investments into promotion of GMOs through research, extensive lobbying, aggressive marketing, high profile campaigns etc. over many years. Despite adoption of GM technology, American agriculture, for instance, has to be propped up with increasing quantities of subsidies, which is not possible for developing countries.

ORGANIC FARMING/AGROECOLOGY: PERFORMANCE & PROSPECTS

Definition of Organic Farming (OF):

"Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved." (Definition of IFOAM, International Federation of Organic Agriculture Movements).

OF relies on sustainable agriculture principles of working along with Nature, rather than through methods that seek to control or exploit nature. For instance, GM Bt crops try to kill entire pest populations, thereby creating resistant populations sooner or later, whereas in organic farming, pests are only sought to be managed, as successfully demonstrated in Non Pesticide Management (NPM) practices now acknowledged as sound science all across the globe.

IFOAM puts four principles at the heart of organic farming, as the interconnected ethical principles that guide organic movement in its full diversity: these are principles of Health, Ecology, Fairness and Care. While Health and Ecology are straightforward enough, the Principle of Fairness is with regard to the common environment and life opportunities (equity, respect, justice and stewardship of the shared world); the Principle of Care is around agriculture being managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

While there may not be an exact articulation by various organic farming movements in the same way as IFOAM, there is a commonality of approach that rests on similar principles.

There is much evidence to show that organic farming has a huge potential to improve the state of natural resources, increase food safety, enhance farm livelihoods for the better, bring down riskiness in agriculture and build resilient systems in the era of climate change.

Current Global Status of Organic Farming

OF is one of the fastest growing segments in agriculture around the world.

- On the consumer side, organic products worth almost 64 billion US dollars were sold globally in 2012.
- The production side is also keeping pace, wherein organic farm land has grown in many countries, with some tropical crops showing area growth rates of more than 10%.
- New countries are joining the community of organic producers, with the number touching 164 in 2012².
- The total organic agricultural land reached 37.5 million hectares from 11 million hectares in 1999. Apart from this, non-agricultural organic areas certified as such are pegged at 31 million hectares.
- The number of producers engaged in organic agriculture is estimated at 1.9 million in 2012.
- 36% of the world's organic producers are in Asia, followed by Africa (30%) and Europe (17%).
- About one third of the world's organic agricultural land and more than 80% of the producers are in developing countries and emerging markets.

It has to be noted that all of this data pertains to certified organic agriculture. There is a huge potential estimated for certified organic produce from particular pockets of countries like India, given their "default organic status". Some estimate that this sector is growing at nearly 50% per annum in India. In India, the total volume of organic exports is pegged at 1.6 lakh metric tonnes in 2012-13, and this was worth Rs. 1156 crore rupees³.

² Willer, Helga and Julia Lernoud (Eds.) (2014). The World of Organic Agriculture. Statistics and Emerging Trends 2014. FiBL-IFOAM Report. Research Institute of Organic Agriculture (FiBL), Frick, and International Federation of Organic Agriculture Movements (IFOAM), Bonn. Revised version of February 24, 2014

³ Agri-exports in general (not just organic) are manifold higher, and these are also under threat from GMO open air releases.

CAN GM AND ORGANIC FARMING CO-EXIST?

Our answer is a firm NO. And this is because of a variety of reasons, including regulatory and scientific.

Organic standards disallow GMOs: International standards as well as Indian National Standards for Organic Products disallow the use of genetically engineered seeds in organic farming⁴. ("3.2.1.3: The use of genetically engineered seeds, pollen, transgenic plants or plant material is not allowed"). NPOP (National Programme for Organic Production) and APEDA (Agricultural and Processed Food Products Export Development Authority) also lay down that additives or processing aids produced by means of genetic engineering are not allowed in organic food products. It is required that Inspection and Certification Agencies should implement a system of inspection for potential use of genetically engineered products. When use of such products is detected at any stage, certification shall not be granted. GMO, as per NPOP is a plant, animal, microbe or their derivatives that are transformed through genetic engineering (by adding gene deletion, doubling, introduction of a foreign gene and changing gene position).

While this is the regulatory requirement for certified organic products, for many organic farmers themselves, GMOs are an unsustainable input for a variety of reasons, and therefore, meant to be shunned. However, all of this is easier said than done, since transgenic technology is a living technology, capable of spreading and contaminating. So, even if an organic producer does not use GM seeds, for example, her/his final produce might be contaminated from other neighboring fields, or through admixtures at the post-production handling and processing stage. In a country like India where smallholdings are the norm, minimizing the risk of contamination through isolation distances and so on is impossible, and contamination inevitable.

Contamination inevitable: Contamination is inevitable with transgenics – even if an organic farmer or any non-GM farmer for that matter does not plant transgenic seeds or planting material herself/himself, her/his crop can get contaminated if a neighboring farmer plants the same. Further, in the case of the neighbour planting herbicide tolerant GM crop — given that our agriculture consists of a vast majority of smallholdings — pesticide (herbicide) drift from the neighboring plot will have implications for the organic or non-GM farmer. Prevention of contamination is difficult even with limited use of GM so far and will be extremely difficult and costly if GM crops expand.

⁴ http://www.apeda.gov.in/apedawebsite/organic/organic_contents/english_organic_sept05.pdf

Segregation impossible: The Government of India's representatives, deposing in front of a Supreme Court-appointed Technical Expert Committee (TEC) stated that "*..it will not be possible to segregate GM from non GM material during the overall process of collection, handling and storage in India*". This is correct for a variety of reasons: in a resource-poor situation like that of Indian farmers, agricultural implements are often the same and shared between farmers (machines as well as tools for manual operations), storage practices cannot ensure strict separation when storage facilities are lacking and farmers make do with keeping the produce at home before sale, and when processing facilities are available commonly for all kinds of farmers. Segregation for organic certification and traceability will be next to impossible in such a situation. All of this increases the costs of organic farmers for good enforcement and makes organic produce uncompetitive in the market place, with consumers finding it prohibitively expensive.

While these are the regulatory and practical impossibilities with regard to GM and Organic co-existing, **there are many technical, agro-ecological reasons why GMOs do not fit into the organic farming framework of sustainable farming.**

Genetic Engineering rests on reductionist principles which ignore complex eco-systems, whereas organic farming rests on agro-ecological principles that factor in complex eco-webs in nature. We would like to explain this further by taking an example. When it comes to transgenics, the two commonly-seen traits in GM crops are pest resistance and herbicide tolerance. In the case of pest resistance through genetic engineering for instance (the Bt crops mainly, which use genes from a soil bacterium called *Bacillus thuringiensis*), the situation has reached a stage where various pests across crops are now being sought to be controlled through Bt gene insertion. This is monocropping at the gene level, which goes against the science of integrated pest management! The fact is that there is now 24X7 production of insecticide inside the plant. A scientific paper points out that the plant-expressed insecticide is higher to the extent of 625 to 1930 treatments with Dipel, a bio-insecticide's in its registered dosage⁵. The very science of trying to kill pests through such technologies where a new toxin is produced inside the plant is going to put selection pressure on a whole population of pests – sooner or later, as with chemical pesticides, the target pest will develop resistance of course (development of 'super pests'). Similarly, in herbicide tolerant crops, weeds start developing resistance to herbicides ('super weeds').

⁵ Andras Szekacs and Bela Darvas (2012). "Comparative Aspects of Cry Toxin Usage in Insect Control" in "Advanced Technologies for Managing Insect Pests" ed. by Isaac Ishaya, Subba Reddy Palli, A Rami Horowitz, Springer.

ORGANIC FARMING IS HOLISTIC

Organic Farming does not rest on reductionist science. It understands that there are complex web of relations in nature and crop eco-systems and does not try to kill pests and weeds in such linear, reductionist ways. It tries to “manage” pests and diseases. It looks at ‘weeds’ as useful biomass to be made use of. The very science being deployed in these two approaches is vastly different.

While many farmers across the world are switching over to organic farming after experiencing and understanding the adverse environmental, health, economic and socio-cultural impacts of chemical pesticides and fertilizers in our farming, given the limitations of such reductionist science, permitting the release of GM seeds will not offer even that opportunity to farmers of re-tracing their steps back to sustainable farming.

a. Soil Health: The focus in organic farming is on soil health, that too through soil biology which in turn takes care of soil chemistry, soil physics and plant nutrition. However, in the mainstream approaches including transgenics, soil fertility and productivity are propped up through synthetic fertilisers, which in turn affect soil health sooner or later. In India, it has been seen in many major cotton growing states that with the expansion of Bt cotton, use of chemical fertilisers has increased greatly with its negative impacts on soil health sustainability as well as economic viability for farmers. Several studies show that the GM protein leaching into the soil through root exudates as well as from plant litter, affects the soil microbial activity in numerous ways. This applies to both Bt and HT crops, the two transgenic traits that are presently available in the market. Further, there is evidence to show that nutrient uptake pathways get affected due to genetic modification.

On the other hand, organic farming principles expressly seek to create a favourable micro-climate or micro-environment for beneficial micro-organisms and other living organisms in the soil ecology to make nutrients available to the crop. There are numerous studies that show that in the medium and long term, it is organic farming that preserves and improves soil health parameters.

As mentioned earlier, the GM science approach ignores this aspect by focusing only on the gene of interest and trait that is sought to be transferred, and unintentionally exacerbates the problem with regard to sustainable soil productivity.

b. Diversity: Organic farming relies on crop diversity for obtaining optimal outputs from minimal, non-toxic external inputs. Diversity-based farming in organic farming creates “push and pull factors” that assist in crop ecosystem balance. This helps greatly in pest and disease management, in addition to soil health management. On another front,

this also ensures less risky farming for the cultivators, even as it provides for food and nutrition security for the farm households. On the other hand, transgenics have inevitably relied on monocropping and even 'monoculturing at the genetic level'. While such monocropping may not be directly attributable to the science of transgenics on its technical front, in practice, that is what transgenics have implied. Use of transgenics in an industrial farming model promoted monocultures on a large scale in several countries, affecting biodiversity on a larger scale in fact (not just agrobiodiversity).

For instance, use of herbicide-tolerant seeds disallow the growth/cultivation of intercrops, which would get affected by the herbicide spray. The other reason diversity in the field gets affected is because large seed monopolies are created by limiting seed choices for farmers through use of hybrids or legal privileges of securing IPRs. By preventing farmer or community level seed self-reliance, diversity is eroded sooner or later.

c. Climate Change-resilient cropping systems: For mitigation as well as adaptation to climate change, organic farming offers the best solutions as such farms represent resilient systems⁶. There is enough evidence to show that by adopting organic farming on a large scale, it would be a win-win situation for individual farmers as well as governments (in terms of reducing their public financing burden in the form of subsidies for fertilisers and other such inputs, for instance).

⁶ GV Ramanjaneyulu, Kavitha Kuruganti (2009). Sustaining Agriculture in the era of Climate Change: Civil Society Position Paper. Centre for Sustainable Agriculture. <http://www.kisanswaraj.in/category/reports/>

PROMOTION OF GMOs CHALLENGING THE SPREAD OF ORGANIC FARMING

Organic cotton in India adversely impacted: India has only one transgenic crop approved for commercial cultivation – Bt cotton, which is an insect-resistant GM cotton. Bt cotton's formal regulatory approval was preceded by its illegal spread mainly in the state of Gujarat, forcing the government to approve the crop for commercial cultivation. There was already scientific evidence within the NARS (National Agricultural Research System) about the success and desirability of organic farming approaches in cotton cultivation⁷, even as there is enough evidence to show that biosafety and other impact assessment of Bt cotton was full of lacunae.

At another level, India had become the largest organic cotton producer in the world in 2007-08 and by 2009-10, it is widely acknowledged that production in India propelled world organic cotton production to an all-time high of 241,697 tonnes (81% from India). In 2010-11, organic cotton and textiles amounted to 25% of organic exports from India, at 17,363 Metric Tonnes of export (APEDA website, Ministry of Commerce, Government of India). Organic cotton segment saw a stupendous 152% year-on-year growth benefitting nearly 200,000 farmers. However, there has been a subsequent decline in the organic cotton production and export due to non availability of non-Bt cotton seed in the market⁸ as also contamination of organic cotton with Bt cotton. In 2008, two certification agencies had their accreditation suspended with APEDA for failing to detect such Bt cotton contamination in organic cotton. These certification agencies were fined Rs. 15 lakhs and Rs. 7.5 lakhs for this failure⁹. This Bt cotton contamination scandal affected organic cotton consumption in general, as well as the Indian organic cotton exports substantially in the subsequent years too, with the controversy refusing to die down easily. In fact, the decline in organic cotton area and production in India started showing up as the reason for a decline of organic area at the Asian level. The government has not pro-actively done anything so far to address the issue, as per organic cotton industry players and the effort is falling on organic farmers' community itself¹⁰.

Seed sources in the Universities getting contaminated: A major area of concern is the fact that contamination can occur in the agriculture research institutions like the State Agriculture Universities

⁷ Blaise, D. (2006). Yield, boll distribution and fibre quality of hybrid cotton (*Gossypium hirsutum* L.) as influenced by organic and modern methods of cultivation. *Journal of Agronomy and Crop Science* 192, no. 4: 248-256

⁸ Naomi Nemes (2010). Seed Security among Organic Cotton Farmers in South India. Thesis paper, University of Hohenheim, Germany

⁹ http://www.business-standard.com/article/economy-policy/reports-of-bt-contamination-stain-premium-organic-cotton-exports-110020600073_1.html

¹⁰ A public interest report by ICCO, Organic Exchange and Solidaridad - Integrity in the Indian Organic Cotton Value Chain, February 2010

themselves, which are repositories of germplasm collections and which maintain breeder seed for various seeds, which are also taking up transgenic crop experimentation and field trials. The Sopory Committee, set up by the ICAR (Indian Council for Agricultural Research under the Ministry of Agriculture, Government of India), after a contamination scandal related to public sector GM cotton erupted, has confirmed contamination (accidental or intentional, biological or admixtures) most probably in the University of Agricultural Sciences, Dharwad¹¹. If that is the case, it is once again apparent that GMOs and their field trials certainly pose an enormous threat to organic farming.

Lack of a Liability Regime: Today, there is no liability regime worth the name (other than some Environment Protection Act clauses that apply given that this is the main statute under which regulation takes place of GMOs in India, though such clauses have not been invoked even in the most brazen cases of contravention of law) when it comes to GMOs, their experimentation and trials, as well as their commercial use. The issue of organic farmers being penalized for contamination with GM is an issue that requires immediate attention, since costs and liability should be on the contaminators and not on organic growers ('polluter pays' principle is well established in other instances). In the USA, in 2006, US farmers suffered an estimated loss of one billion US dollars due to contamination of rice crop by a field trial and Bayer Crop Science had to make a settlement of \$ 750 million. In 2013, wheat used in field trials and supposedly destroyed, was found in a field in Oregon, leading to similar losses for American exports.

The Government of India has admitted to the Technical Expert Committee of the Supreme Court that segregation of GM from non GM will be virtually impossible, but small Indian farmers do not have the capacity to litigate for compensation as US farmers did. For organic farmers who strive to keep themselves GM-free in every possible way and also put themselves through certification and guarantee processes, their right to remain GM-Free is at threat here. It is an injustice to all farmers and especially organic farmers to introduce a technology that exposes them to market and identity losses they can neither avoid nor recoup.

Huge potential for Organic Farming being jeopardised: A 2007 Conference of the United Nation's Food & Agriculture Organisation (FAO) found that organic agriculture fares impressively when it comes to food availability, access to food, stability of food supply as well as food utilisation — the four important components of any discourse on Food Security¹². The Conference presented two important findings in its conclusions: "(a) Sustainable intensification in developing countries through organic practices would increase production by 56 percent. (b) Organic farms use 33 to 56 percent less energy per hectare."

¹¹ www.icar.org.in/en/node/5511

¹² http://www.fao.org/organicag/ofs/index_en.htm

The UN Special Rapporteur on the Right To Food also emphasised agro-ecological approaches as holding the key to realisation of the Right To Food globally¹³.

In India, a study by the Associated Chambers of Commerce & Industry of India (ASSOCHAM) for Madhya Pradesh, shows that organic agriculture can lead to wealth accumulation of Rs 23,000 crore, generate exports worth Rs 600 crore and create nearly 60 lakh employment opportunities across the state during the course of next five years¹⁴. "Adoption of organic farming can increase net per capita income of a farmer in the state (of West Bengal) by a whopping 250 per cent to over Rs 15,680 per month in the next five years, thereby arresting the migration of people from West Bengal to other states in search of jobs," said an ASSOCHAM press release summing up its study in West Bengal¹⁵. Similar projections exist for Odisha and Bihar too.

Moreover, results of the ICAR's All India Network Project on Organic Farming show that in 21 of the 28 crops tested for, yield increases are reported in organic farming across all the test centres (13 in number). Yield increases range from around 5% to 20% or more¹⁶. The spread of transgenic agriculture, in the form of field trials initially and later as commercial cultivation, if approved, will affect the present and future potential of organic production.

Jeopardising stable and enhanced Income & Yields from Organic Farming: It is vital to remember that no reports of any organic farmer having committed suicide have ever been heard. Given the deep agrarian distress in rural India, the potential of organic farming cannot be underestimated. It is not out of place here to bring up the fact that the only Padma Shri-awarded farmer in India — Mr Narsimha Raju Yadav of Andhra Pradesh — has always been an organic farmer with impressive yields across crops. There is adequate evidence to show that there is greater profitability for farmers in adoption of organic farming.

¹³ <http://www2.ohchr.org/english/issues/food/docs/A-HRC-16-49.pdf>

¹⁴ <http://timesofindia.indiatimes.com/city/indore/Organic-farming-can-create-more-jobs-wealth-ASSOCHAM/articleshow/11547870.cms>, based on 'Madhya Pradesh: Inching towards Organic Farming', ASSOCHAM, 2012.

¹⁵ <http://www.orissadiary.com/ShowBusinessNews.asp?id=30741>

¹⁶ <http://www.kisanswaraj.in/2013/04/10/state-of-organic-farming-rti-responses-from-govt-agencies/>

OTHER ISSUES OF CONCERN

Further, going back to the four principles that are seen to be central to Organic Farming by networks like IFOAM, there are other matters of concern with regard to transgenics being antithetical to organic farming approaches.

GE crops de-skill farming communities: As with other 'modern' agricultural technologies, it is clear that technologies like GE lead to de-skilling of farmers to the extent that farmers' environmental learning is eroded and their own knowledge of their eco-systems discounted. While seed-related decisions in farming should ideally be disconnected from money/market power driving such decisions and should be based on the local environment and resources that the farmer has to manage, the experience with Bt Cotton in India shows that this will not remain so – the aggressive marketing that this technology has witnessed does not leave any choices for farmers to make prudent and wise decisions. Innovation will be stifled by the rapid nature of market-driven technologies and the pace at which they are imposed on farmers¹⁷. This is anti-thetical to the organic farming approaches to the extent that organic farming relies on farmers' innovation, knowledge, skills and wisdom.

GE and IPRs go hand in hand: Corporate control over our food chain will be complete when technologies are combined with exclusive marketing rights in the form of Intellectual Property Rights. There is hardly any research taken up in GE without being accompanied by IPRs. This in reality means control over communities and nature in the same breath. There is a clear oligopoly situation emerging with around five seed companies in the world controlling almost all the IPRs related to genes and process technologies. Farmers are increasingly being criminalized through legal regimes, getting strengthened with the advent of biotechnology, for doing something as basic as saving seeds from their crops¹⁸. This is once again anti-thetical to the organic farming approaches (not regulatory but in terms of ideological approaches and practice) where farmers' resources including their own knowledge is considered open source, for the benefit of others too.

GE crops displace agricultural employment: Most GE crops in the world today are created to be herbicide-resistant. In India, (de-) weeding is the most important agricultural activity that fetches employment for millions of farming women across the country. If this activity is replaced by chemicals due to the introduction of herbicide-tolerant GE crops, these employment opportunities would be lost to the women. This would have tremendous adverse impact on their livelihoods, their agency to negotiate

¹⁷ Glenn Davis Stone (2007). Agricultural De-Skilling and Spread of Genetically Modified Cotton in Warangal. *Current Anthropology*. Vol. 48 (1). <http://artsci.wustl.edu/~anthro/research/stone/stone480102.web.pdf>

¹⁸ Seed Giants Vs US Farmers (2013). Center For Food Safety. <http://www.centerforfoodsafety.org/reports/1770/seed-giants-vs-us-farmers>

for their rights, and the local economies, in addition to causing other problems related to chemical contamination. Organics, however, looks at weeds as a precious and valuable resource. Weeds are used as uncultivated foods or as bio-mass for composting or mulching or fodder. Organic agriculture does not emphasise on cutting down on labour – it tries to create a win-win situation for farmers and agricultural workers.

GE crops erode Self Reliance and Control: Organic farming puts a great deal of emphasis on farmers' self reliance in terms of resources as well as knowledge. In many places, the philosophy extends to collectivization of efforts. However, technologies like GE would make farmers dependent on profit-seeking corporations who are only concerned about expanding and sustaining their markets. Local economies would be drained to fill the coffers of corporations, with ever-increasing input costs for farmers (the technology is such that it will call for more and more inputs) and with output prices offering no guarantees at all. Such a loss of sovereignty will result in lesser choices for farmers, in addition to greater costs.

While farmers have no control over markets as is, they should note that there is tremendous rejection of GE crops/foods by consumers across the world. A majority of countries around the world today have not accepted GE crops/foods. Trade security will be seriously jeopardized and export potential lost if GM crops are allowed.

GE in our food/farming also poses many ethical and moral questions: For instance, is meddling with nature to the extent of making unnatural genetic transfer, even across kingdom barriers, acceptable, especially given the unknown nature of impacts? Should humankind be seeking control over nature in its pursuit of science & development, or should it take a cooperative approach? Does not GE violate inter-species and intergenerational equity principles by taking all the decision for the now and the present, for the so-called benefits of just human beings? GE, by bringing in genes from animals into plants (fish genes into tomatoes, for example), also confuses the socio-cultural and personal preferences related to vegetarianism and so on. It leaves very little choices to farmers or consumers. Organic, on the other hand, presents a greater integrity.

MORE REASONS TO REJECT GMOs IN OUR FOOD, FARMING & ENVIRONMENT

1. In India, we have the experience of Bt cotton, the only GM crop allowed for commercial cultivation. As a nation, it becomes very important for us to glean out appropriate lessons from this experience. Bt cotton has been brought in mainly as a pest management strategy in cotton, for a particular set of pests, claiming that this will bring down synthetic pesticide usage, and by reducing crop losses from insect attack, increase productivity. However, official data and analysis shows belying of various promises, with baseless hype around the success of Bt cotton¹⁹.

2. There is growing scientific evidence to show many adverse impacts from GMOs in our food, farming and environment²⁰. This evidence is sound reason to adopt a precautionary approach to GMOs and reject their environmental release.

3. One of the most fallacious arguments of GM proponents is around GM crops and food security. As more than 150 eminent scientists from across India have already explained to the Minister for Environment & Forests in a letter dated February 8th 2013 to Ms. Jayanti Natarajan, the then Minister for Environment and Forests, if evidence from the handful of nations that have adopted GM crops is examined, it is clear that there is no evidence to show that adoption of GM crops has improved food security in any of these nation²¹. On the contrary, the United States of America, the largest adopter of GM crops during the last decade and a half, has experienced increased food insecurity and hunger in the same period as adoption/expansion of GM crops. For the first time in its modern history, it has 50 million food insecure people (17.9 million households in 2011). From 1995, when 12% of the US population was food insecure, America has moved to a situation in 2011 where 15% of the population is food insecure, the same period that they went from zero to the current level of adoption of GM crops. Brazil (the second largest grower of GM crops) continued to see a decline in its hunger profile. However, the pace of decrease has decelerated in the years when GM area expanded. Between 1999-2001 and 2004-06 – which is the pre-GM era — the percentage of undernourished in the total population reduced from 12.1% to 8.7%; from then to 2010-12, it decelerated from 8.7% to 6.9%. Argentina, the third largest grower of GM crops, has seen no significant difference in its hunger situation, during the years of expansion of GM crops. Paraguay, which grows GM crops on 65% of its arable land, saw population experiencing hunger spiral up from 12.6% in 2004-06 to 25 % in 2010-12. South Africa and Bolivia have also not

¹⁹ 10 years of Bt cotton in India – False Hype and Failed Promises, Coalition for a GM-Free India, March 2012. <http://indiagminfo.org/?p=393>

²⁰ www.indiagminfo.org/?p=657 and <http://earthopenresource.org/index.php/reports/gmo-myths-and-truths>

²¹ <http://indiagminfo.org/?p=540>

experienced any significant difference in their hunger profile in the period that they have adopted GM crops. Latin American countries like Peru and Venezuela have on the other hand experienced tremendous improvement in their hunger situation even though they have not adopted GM crops. It is clear that GM crop adoption has not meant improvements in food security. This understanding of “food security” relying on techno-fixes for production/ yield improvements is outdated and it is apparent that it is baseless. Technically, there is no GM crop that increases intrinsic yields.

4. Indian government is not choosing to adopt certain policy directives that already exist with regard to GMOs having to be put through a need assessment and assessment of alternatives first and foremost. For instance, the Moratorium in the Decision Note by Mr. Jairam Ramesh, dated February 9th 2010, in the case of Bt brinjal mentions that²²: *“9. Clearly, Bt technology is not the only route for reducing pesticide use....how to reduce pesticide use without compromising on food security at the macro level and returns to farmers at the micro-level is an urgent public policy in our agriculture. In this connection, it is worth recalling that there are now close to 6 lakh farmers in Andhra Pradesh fully practising NPM (Non Pesticide Management) over an area of about 20 lakh acres. I have myself been seeing this initiative over the past four years. The advantage of NPM is that it eliminates chemical pesticide use completely whereas Bt technology only reduces the pesticide spray, albeit substantially....On January 19th 2009, much before I became Minister for Environment and Forests, I had written to the Union Agriculture Minister on the need to evaluate the Andhra NPM experiment from the point of view of replicability on a larger scale”.* While the evidence on the risks of Bt crops is much-documented, more importantly, the benefits of choosing alternative methods of pest management (neither chemical pesticides nor Bt crops) are well-established too²³.

The Report of the Task Force on Application of Agricultural Biotechnology (led by Dr M.S. Swaminathan), May 2004, which was accepted by the Ministry of Agriculture, in Chapter II “Application of Biotechnology in Agriculture”, stated that “(1.6) Since there is public, political and professional concern about transgenics with reference to their short and long term impacts on human health and the environment, their testing, evaluation and approval have to be stringent, elaborate and science-based. The general approach in this respect, therefore, should be that: Biotech applications, which do NOT involve transgenics such as biopesticides, biofertilizers and bio-remediation agents, should be accorded high priority. *They will help to enforce productivity in organic farming areas. Transgenic approach should be considered as complimentary and resorted to when*

²² <http://www.thehindu.com/news/national/bt-brinjal-note-by-ministry-of-environment-and-forests/article103839.ece>

²³ <http://65.19.149.141/cmsa/ui/cmsamodules/HomePage.html> (RKVY evaluation report); <http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2013/03/13/00033303720130313114055/Rendered/INDEX/759610WP0P118800agriculture0AP02009.txt>

*other options to achieve the desired objectives are either not available or not feasible*²⁴ (our emphasis)."

It is in this context that policy makers in India should realise that organic farming and transgenics do not co-exist, and the contradictions in policy approaches have to be resolved immediately.

At the grassroots, those farmers who have opted for organic farming should also appreciate the fact that GMOs are anti-thetical in their very approach to organic farming approaches; this is not just about certification requirements but about sustainability and sovereignty, without or without certification.

²⁴ <http://agricoop.nic.in/TaskForce/tf.htm>

"Organic farming nurtures science of Nature and works along with Nature; while transgenics is exploitation of Nature, against the principles of Nature. Philosophically, both are diametrically opposite. It is clear that in a post-modern world, some lessons have been learnt. The days of reductionist science are over. Humankind needs to develop itself on the principles of holisticity and sustainability. There is no other way left. Earlier we shall realize this, lesser will be the damage to Mother Earth".

- Bhaskar Save, a Pioneering Organic Farmer of India

"There is a huge threat to organic farming in India, if we allow transgenics. Transgenics is a technology creating unnatural planting material with irreversible and unpredictable consequences. This booklet describes how GM/transgenic crops will jeopardise organic farming sooner or later.

It is a direct, obvious impact - if transgenics is IN, organic is OUT."

**- Dr. Debal Deb, Ecological Scientist and
Conservator of >1000 Traditional Paddy Varieties**