

March 2019

NEWS COVERAGE PERIOD FROM MARCH 25TH TO MARCH 31ST 2019

SUMMARY FORWARDED TO PM FOR INTRODUCING GMOs IN FOOD

RECORDER REPORT | MAR 30TH, 2019 | ISLAMABAD

Ministry of National Food Security and Research (NFS&R) has forwarded a summary to Prime Minister Imran Khan for taking policy decision with respect to introduction of genetically modified organisms (GMOs) in food. While briefing the National Assembly Standing Committee on Research, Secretary NFS&R Dr Muhammad Hashim Popalzai said the government would take final decision whether or not to introduce GMOs in food.

He said it was asked from his ministry whether or not the introduction of GMOs in food would increase import bill and if they would dent our exports. He added that following the introduction of GMOs in food “we cannot export our food items to non-GMOs countries.” MNA Rao Muhammad Ajmal Khan said the countries which had allowed the introduction of GMOs in food, had now adopted more advanced technology while “we are still thinking to introduce GMO or not.”

President Zarai Taraqiati Bank Ltd (ZTBL) Sheikh Amanullah told the committee that ZTBL massively contributes in the agriculture sector through introduction of combined harvesters, packaged milk, poultry and potato chips industry. The ZTBL had disbursed Rs 76 billion during 2018 through its production and development loan schemes and women self-empowerment programme, he added. He said the bank had 502 branches across the country and provided production and development loans to farmers. He said the items financed by the bank includes seeds, fertilizers, pesticides and insecticides while the production loans are short-term loans and are repayable within 18 months. The ZTBL president said the bank under development loan finances tube wells, farm machinery, irrigation facilities, orchards, green houses, poultry, dairy, livestock farming, fisheries, tractors and tractors’ equipments. The bank is providing loan to farmers up to Rs 0.7 million per borrower/party under Sada Bahar Scheme while it disbursed loan up to Rs 0.1 million per borrower under Kissan Dost Scheme, he added.

He said that an amount of Rs 10.66 billion had been disbursed in 87,652 cases under E-Credit Scheme. Four new special products including trout fish farming, yak farming, sea buckthorn cultivation and hybrid poplar are launched for Gilgit-Baltistan area and financing limit was up to Rs 1.5 million per borrower, he said.

Amanullah said that in order to empower the rural women, Khawateen Rozgar Scheme had been launched and financing limits was up to Rs 0.2 million per borrower. The bank was providing loan for ostrich farming up to Rs 1.5 million per borrower, he added. A representative of Small & Medium Enterprises Development Authority (SMEDA) told the meeting that the authority did not have any financial resources to assist the small entrepreneurs; however, it assisted them with research and analysis of the market. He informed that the regional offices of the authority exist in every district and necessary information and guidance were provided to the farmers who desired to indulge in small business activities.

The committee directed both the ZTBL and the SMEDA to support the agriculture sector, as well as to enhance their outreach through public interaction and media.

The committee directed the ZTBL to extend its banking network to remote areas, besides extending maximum credit to the rural women on personal guarantee. The parliamentary body asked the SMEDA to assist farmers who desire to add value to their agriculture produce on limited level. MNAs

Shaukat Ali, Chaudhry Muhammad Ashraf, Sardar Muhammad Jaffar Khan Leghari, Kamal Uddin, Shehnaz Saleem Malik, Zahoor Hussain Qureshi, Syed Mobeen Ahmed and Sardar Riaz Mehmood Khan Mazari, and senior officials of the Ministry of NSF&R attended the meeting.

<https://fp.brecorder.com/2019/03/20190330459752/>

MONSANTO ORDERED TO PAY \$80M IN ROUNDUP CANCER TRIAL

SAN FRANCISCO: Monsanto has been ordered to pay some \$80 million to an American retiree who blames his cancer on the agribusiness giant's weedkiller Roundup, in a case that could influence the outcome of thousands more like it.

A San Francisco jury Wednesday found the firm, which is owned by Bayer, had been "negligent by not using reasonable care" to warn of the risks of its product, ordering it to pay Edwin Hardeman \$75 million in punitive damages, a little over \$5 million in compensation and \$200,000 for medical expenses.

It was the second stinging legal verdict for Monsanto in recent months after it lost a case to a California school groundskeeper suffering from terminal non-Hodgkin's lymphoma and was ordered to pay out tens of millions of dollars.

The jury also found that Roundup's design was defective and that the product lacked sufficient warnings of potential risk.

The same jury had previously found in an earlier part of the trial that a quarter century exposure to Roundup, whose principal ingredient is controversial chemical glyphosate, was a "substantial factor" in giving the 70-year-old Hardeman non-Hodgkin's lymphoma.

The decision also marks a major setback for Bayer, which purchased Monsanto in June 2018 for \$63 billion.

In Frankfurt Thursday, Bayer's share price fell 1.14 percent to 55.69 euros by 0830 GMT — extending losses as Bayer has seen its market value shrink by 46 percent since it bought Monsanto. The company, which is facing thousands more similar lawsuits in the United States, said it would appeal the verdict even though it sympathized with Hardeman's plight.

"We are disappointed with the jury's decision, but this verdict does not change the weight of over four decades of extensive science and the conclusions of regulators worldwide that support the safety of our glyphosate-based herbicides and that they are not carcinogenic," Bayer said in a statement. "The verdict in this trial has no impact on future cases and trials, as each one has its own factual and legal circumstances."

Hardeman's attorneys, who cheered and hugged their client as the verdict was announced, described the decision by the six-member jury as historic and said it sends a clear message to Monsanto that it needs to change its business practices.

"It is clear from Monsanto's actions that it does not care whether Roundup causes cancer, focusing instead on manipulating public opinion and undermining anyone who raises genuine and legitimate concerns about Roundup," attorneys Aimee Wagstaff and Jennifer Moore said in a statement. "It speaks volumes that not one Monsanto employee, past or present, came live to trial to defend Roundup's safety or Monsanto's actions."

The case is one of more than 11,200 similar cases in the US alone involving Roundup.

Last August, Monsanto lost a case to a California school groundskeeper suffering from terminal non-Hodgkin's lymphoma, who had sued the company over the glyphosate weedkillers Roundup and Ranger Pro.

Monsanto was initially ordered to pay \$289 million to Dewayne Johnson, before the damages were reduced to \$78.5 million.

Bayer has also filed an appeal in that case.

Monsanto has consistently denied that the weedkiller causes cancer and challenged findings by the International Agency for Research on Cancer, an arm of the World Health Organization (WHO), which classified glyphosate as a “probable carcinogen” in 2015.

But other major agencies like the European Food Safety Authority (EFSA), the European Chemicals Agency (ECHA) or the US Environmental Protection Agency (EPA) have not followed suit.

Carl Tobias, a law professor at the University of Richmond, told AFP that Hardeman’s case was “important as a bellwether, which means it helps predict how future cases will be decided.”

Tobias said the verdict “bodes well” for plaintiffs in the thousands of other cases filed against Monsanto, and was “likely to encourage plaintiffs and their counsel to be more vigorous in pursuing their cases and will lead more potential plaintiffs to file suit.”

The Environmental Working Group, a non-profit organisation, cheered Wednesday’s verdict.

“Clearly, the testimony that informed the jury’s decision was Bayer-Monsanto hiding Roundup’s carcinogenic properties, manipulating the science and cozying-up with EPA so it would not have to warn consumers of its dangerous product,” said the group’s president Ken Cook. “This verdict puts Bayer’s back firmly up against the wall as the cost of litigation mounts and its stock price gets pummeled once again,” he added.—AFP

<https://epaper.brecorder.com/2019/03/30/21-page/773720-news.html>

REBUTTAL

RECORDER REPORT | MAR 27TH, 2019 | LAHORE

“Seed Association of Pakistan condemns the malicious and baseless accusations by Dr Muhammad Arshad, Chief Executive Officer and Director at Hi-Tech Group, during interview carried by Business Recorder to malign the local seed industry of Pakistan for his and his companies own vested interests. Perhaps it also reflects his inadequate knowledge that Pakistan is a Non-GMO food crop country.

“Members of Seed Association of Pakistan produce nearly 95% of the wheat and cotton seed in Pakistan and the production of local Hybrid Maize has been increasing exponentially. There has also been a continuous growth in the area, production and yield of Maize. The local seed companies now produce 39% of the total maize seed requirement of the country and this set to double over the next 5 years. This increase in local production also reflects the acceptability of the farmers thereby endorsing the quality of seed at affordable prices. There is no existential threat to Maize either in yield or pest that merits the introduction of a controversial technology like GMO in food crops particularly highly cross pollinated crop like Maize in Pakistan. This growth has helped to reduce the import bill of the country and provided economic opportunities in the country. Through supply of quality seed at competitive pricing the local seed companies have also helped farmers afford certified seed and protected them against the exploitation from the multinationals every increasing rates of imported seed.

“It is also pertinent to note that the proponents of GMO often cite misleading claims about great yield advantages. Take Maize for example, the yield of Pakistan and Philippines both stood at 2 MT/Ha in 2003 when GMO Maize was introduced in the Philippines, however after 15 years the yield of Non-GMO Maize in Pakistan is approximately 5 MT/Ha whereas Philippines has struggled to increase it beyond 3 MT/Ha average. It is also pertinent to note that after the introduction of GMO Maize in Philippines their local indigenous Maize varieties were all contaminated.

“It is a similar story in USA, the highest non-GMO Maize yield recorded in US was 9MT/Ha in 1994, whereas since the introduction of GMO Maize in USA in 1996, it has not exceeded before the average

of 11 MT/Ha whereas Non-GMO countries like Turkey and Uzbekistan who had average yield of 3 MT/Ha in 1996 have now achieved an average yield of 10 and 12 MT/Ha respectively. Thus making it evident that there is no yield advantage in through the introduction of GMO. It is also pertinent here to note that GMO in food crops is not been permitted by the Government of Pakistan's Ministry of National Food Security and Research. This policy is in line with all major countries in the region who have disapproved GMO in food crops.

“The wet millers in Pakistan such as Rafhan who have export Maize based products have already expressed their concerns over GMO as they fear loss of exports due to contamination of local non-GMO crops. The exogenous contamination that is caused by GMO Maize will not only affect the Maize exports but also Rice and other exports causing billions of rupees loss to our national economy and leading to exploitation of farmers by the multinationals and feed industry.

“In view of the above the Seed Association of Pakistan once again reiterates its stance of opposing the GMO in Maize and food crops in the best interests of the country and farmers and once again profoundly condemns the statement by Dr Muhammad Arshad, CEO Hi-Tech Group.”

<https://fp.brecorder.com/2019/03/20190327458775/>

MAJOR STAKEHOLDERS REJECT SOWING OF GM CORN SEEDS

By Our Correspondent Published: March 26, 2019

LAHORE: Apart from manufacturers of genetically modified (GM) corn seeds and few public sector scientists, all stakeholders including farmers, food processors, national seed companies and others have squarely rejected its introduction in the country.

The near-consensus emerged in three separate sessions held last month with various stakeholders. In February, a delegation of the American Business Council met with Prime Minister Imran Khan to voice concern over the lack of support from the Ministry of National Food Security and Research. In a meeting on commercial cultivation of GM maize in Pakistan, the Seed Association of Pakistan representative forcefully opposed the commercialisation of GM maize, claiming that there was no significant yield advantage in its cultivation.

He pointed out that the technology did not provide the advantage of low production cost and there was no pest threat, which necessitated the use of the technology.

He emphasised that many countries had not allowed the cultivation of that controversial technology. Pakistan Kissan Ittehad President Khalid Khokhar expressed concern over the commercial cultivation of GM maize. He was of the view that the health of Pakistanis should not be compromised in any way and suggested that the food ministry should constitute a committee to tackle the issue.

Khalid Aziz, an official of Rafhan Maize – the biggest processor and exporter of corn products in Pakistan – said the company supported the spring maize segment in the country and due to concerted efforts, the growth of maize had surpassed all other contemporary major crops.

Increasing demand from Rafhan and poultry has been the major driving force behind the success of maize crop in Pakistan. He made it clear that exports were exclusively based on non-GM maize, adding that the survival of Rafhan and other companies' export business only depended on the availability of non-GM maize.

“Since Pakistan's landscape does not permit the segregation of non-GM maize, its local availability will be constrained, compelling us to go for import, which will put more pressure on the country's already dwindling foreign reserves,” Aziz added.

The food ministry secretary said the question for his ministry was why permission may be granted for the cultivation of GM maize on a commercial scale when there was no significant increase in the yield and no reduction in the cost of production and import.

“The introduction of GM maize may result in enhancement of the import bill and our exports may also suffer,” he said.

Published in The Express Tribune, March 26th, 2019.

<https://tribune.com.pk/story/1937186/2-major-stakeholders-reject-sowing-gm-corn-seeds/>

‘WE CAN BE A 10-MILLION-TON SOYA BEAN MARKET IF GMO SEED IMPORT IS REGULARISED’

BR Research March 25, 2019

An interview with Dr Muhammad Arshad, CEO Hi-Tech Group of Companies

Dr Muhammad Arshad is the Director and the Chief Executive Officer at Hi-Tech Group since 1988.

He has over 40 years of professional experience in providing fiscal, strategic, and operations leadership in both public and private sector, with emphasis on operations management of poultry and cattle feeds, edible oils, grain mills, poultry breeders farms, hatcheries and pharmaceutical business. Hi-Tech Group of Companies is one of the top five poultry sector organisations in Pakistan. The group has six operational companies in its fold with vast distribution and sales network across the country. BR Research recently had a candid conversation with Dr. Arshad regarding oilseeds and poultry. Edited excerpts are produced below:

BR Research: Walk us through your business structure?

Dr. Muhammad Arshad: Hi-Tech Group of Companies comprises of 6 business segments. Hi-Tech Feeds business produces both poultry and cattle feed. Then we have Hi-Tech Poultry Breeders and Hi-Tech Farms where we breed around 6-8 million one-day old broiler chicks in a month; quality day old chicks (DOC) are produced by adopting strict standard operating procedures starting from collection of fertilised eggs, proper storage, ideal transportation, optimal incubation conditions, grading and above all, delivery of DOC in good health.

Hi-Tech Edible Oil Mills is another business segment where we import soybean seeds from US, Brazil etc. which are converted into two categories of products. We get around 18 percent salable edible oil, which we sell to the edible oil companies in Pakistan in semi-refined form. This semi refined form is achieved by processing the soybean through mechanical extraction and chemical extraction, and what’s left behind is soybean meal, which goes as a protein supplement to the feed mill industry. This is the second product that comes out of our facilities. Crushing of soybean seed started only four years ago in Pakistan and its import became viable when the government imposed 25 percent duty on soybean meal that was previously being imported from India.

Hi-Tech Grain Mills (Pvt) Ltd was established in 2016 with the sole purpose to tap in to the growing demand for premium ‘Basmati Rice’ worldwide. We have a capacity of producing 250 tons of premium quality long grain Basmati rice per day.

We also have a pharmaceutical wing called the Hi-Tech Pharmaceuticals which manufactures quality poultry vaccines and medicines for livestock and companion animals. The Group’s total turnover for fiscal year 2018 stood at Rs22.362 billion.

BRR: What is the exact nature of problems going on between soybean and the palm oil sector?

MA: First of all, keep in mind that palm oil is not a replacement for soybean oil. The palm oil sector has reservations over the duty they pay on the import of soybean oil, which is somewhere between 25-30 percent. This is compared to 16 percent taxes and duties we pay on the import of the soybean seed.

BRR: Where do you procure your seeds from?

MA: Hi-Tech Group is the largest customer of Cargill in Pakistan – an American privately held global corporation for food, agricultural, financial and industrial products. We only buy seeds from Cargill.

BRR: Total import bill of oilseed and oils in the country is around \$2.5-3 billion; and the government these days is very keen on import substitution. Do you think there will be any progress in this regard?

MA: The ideal situation is when we produce the raw material ourselves i.e. soybean in this case, especially when we have the right climate and soil. However, the problem with these non-conventional crops is that they need guaranteed marketing to attract growers. And in case of loss even during one period, farmers begin to avoid these unconventional crops altogether.

Back in 2008-09 when I was the Chairman of All Pakistan Solvent Extractor's Association (APSEA), we had the highest ever oilseed crop consisting of sunflower and canola with a total quantum of 1.2-1.3 million tons. When the two products from these crops – oil and meal – entered the local market, prices crashed, resulting in heavy losses to the growers.

Another barrier I believe for growing soybean in Pakistan is our existing crop pattern. Also, the issue is about creating demand. Last year, around 2.3 million tons of soybean was imported, and we had to sell the local soybean meal at \$80 discount in comparison to the imported meal. If you want to grow soybean in Pakistan, you first need to develop the international market for the local soybean meal to avoid supplying surplus as the domestic market is quite small.

This has two barriers: one, we cannot export without Duty & Tax Remission for Exporters (DTRE) on soybean meal; we cannot export at the cost we are currently incurring on the import of the oilseed.

Second, Department of Plant Protection has not officially legalised and regularised the import and crushing of GMO seed for unlimited time period; they have just granted permission to import for an interim period of which is 6 or 8 months.

Apart from a few European countries, GMO seed is being used everywhere; around 90 percent of the world is surviving on GMO crop.

And let me tell you this; the ongoing trade war between China and USA is an opportunity for our soybean meal to enter the Chinese market. This is the right time to enter a huge market.

BRR: What is the annual consumption of soybean locally? What is the local capacity?

MA: The consumption of poultry feed in the country is around 8 million tons annually, and at a conservative estimate of 25 percent, soybean meal accounts for 2 million tons annually, which means that around 2.4-2.5 million tons of soybean seed is required to cater to this demand to give the required amount of meal.

The capacity in Pakistan is more than 4 million tons, because the existing capacity for solvent extraction in the country is not just for soybean; it was originally designed for cottonseed, which is not being extracted anymore because of the elevated aflatoxin contamination. The soybean meal is superior to cottonseed meal not only because of its anti-aflatoxin levels, but also because of its superior amino acid profile. Hence, if the soybean seed is regularised, our existing excess capacity can be used to not only cater to domestic demand but also be part of the global value chain by exporting this superior seed's products. And I can guarantee you that Pakistan can be a 10-million soybean market in 5 years' time because of our cheap indigenous crushing technology that is compliant with global standards.

Our locally developed solvent engineering and industry is so efficient that we are still the only country producing canola seed meal with up to 80 percent KAOH solubility (digestibility), whereas the rest of the World does not produce above 60 percent maximum.

BRR: How much revenue can be guaranteed if the export landscape for the soybean seed is developed? Are you hopeful that the government will facilitate the regularisation and export prospects?

MA: The industry can earn \$20-30 per ton on exports and we would be extremely happy with that. This is also globally acceptable. As we achieve economies of scale, we can not only generate trade surplus but also create jobs. What is required to bring about all this is trade prudence.

There is also another advantage of regularising GMO seed import; with no restriction on GMO imports, 75 percent of the revenue is automatically hedged as you import in dollar and sell in dollar (export); you only bear dollar risk on the oil component of soybean.

One advantage of growing all sorts of legumes is that they require very little water. If I'm not wrong, soybean requires half the water that wheat requires. Also, since soybean is grown in the same season as wheat and corn, one issue that is raised normally is that farmers will have to replace the crop or change the crop pattern. Today, this is not true as 'Crop Rotation' is something that not only helps farmers have both crops, but also helps increase the yield per acre of each crop.

We are very hopeful that the government will seriously look into the matter for an export friendly regime. Apart from China, Vietnam and Cambodia too offer huge potentials for our soybean meal.

BRR: Is there any quality difference in the seeds being imported?

MA: The quality of seed is very critical. I always say that we stick to three-four reliable and authentic sources for seed import and not let any fifth or sixth global company sell seeds to our farmers. This will ensure uniformity and guarantee quality crop and products.

Twenty years ago, corn production in the country was around 12 maund per acre; today it is 112 maund per acre and is the third important cereal after wheat and rice. The sole reason for this increase in yield is the quality of seed being imported from reliable sources. Today, corn production is close to 7 million tons annually, and it could go up to 10 million tons easily if GMO seed plantation is openly allowed. Not only that, we can then think of exporting corn; also, we can significantly decrease the cost of our poultry; and make poultry meat and eggs viable for exports. Corn is one crop that has not witnessed acreage shifting.

The best way to achieve quality crop and increased yield is to make sure that the best seed quality reaches the farmers in at least the first five years. Once the farmer is able to reach desirable production levels, I can guarantee you that he won't buy lower quality seed to cut costs.

Local seed companies in Pakistan, on the other hand, do not have the ability or the morality to sell seeds to growers. In my opinion, we should not have any seed production in the country if we cannot guarantee quality.

BRR: You talked about exporting eggs. How is that achievable?

MA: We have been at borderline for eggs. The recent currency depreciation has now tilted us slightly towards export friendly market. Today, export of eggs has become viable. On the other hand, export of chicken meat is not viable as the industry isn't developed. Price-wise, the rule of the thumb is that if demand of such sensitive commodities increases by 10 percent, prices goes up by 40 percent.

Similarly, if supply increases by 10 percent, prices fall by 40 percent. Prices of poultry in Pakistan have been stable in the last 4-5 weeks. And the production is likely to stay stable unless a huge dent upwards or downwards is witnessed in consumption.

<https://www.brecorder.com/2019/03/25/482909/we-can-be-a-10-million-ton-soya-bean-market-if-gmo-seed-import-is-regularised/>

April 2019

NEWS COVERAGE PERIOD FROM APRIL 1ST TO APRIL 7TH 2019

DEMYSTIFYING GM FOOD CROP

BR Research April 1, 2019

“Man fears what he does not understand”. Yeats immortal words are an apt description of commonly held attitude towards genetically modified crops. The scientific community universally believes genetic modification to be a highly beneficial process, and little to no criticism exists on its merits in theory. While laypersons may find the ‘GMO’ term alien, most are familiar with its functional form, ‘selective breeding’.

The practice of artificial selection (or selective breeding) is probably as old as civilization itself. After all, humanity has cross-bred varieties of plants, birds, cattle and pets to develop desired physical and morphological traits (called phenotypes). Biologists’ favourite example is the domestication of wild wolf that thanks to careful selection led to the development of modern-day canine.

Virtually all modern grains and cereals were developed in a similar fashion, except agriculturists didn’t begin to fully appreciate the gene-based underpinnings of hereditary breeding until second half of nineteenth century.

According to Neil deGrasse Tyson, arguably the most renowned scientist since Stephen Hawking, “practically every food human consume is genetically modified. Think of all the fruits and vegetables that are part of our daily diet. Their counterparts in the wild are not as large; not as sweet; not as juicy; and have way more seeds in it”.

Why then, are GMO crops so controversial if consensus exists in principle on its merits? Part of the answer is in science, but the rest is in economics and politics of special interests. Major GM crops such as cotton, maize, soyabean and canola were developed during 90s, with their gene structure altered to either act as pesticide producers such as Bt. Corn, or as herbicide resisters, such as Roundup Ready soy.

Bt. Corn, for example, is genetically modified to release a toxin poisonous to insect & pests that could otherwise cause billion-dollar in damage to maize crop annually. Upon harvest, the toxin makes its way to human gut directly or indirectly by entering the food chain. While biotech firms insist that these toxins pose no known risk to human health, critics argue that longitudinal studies observing such effects have been far and few and are often sponsored by same biotech firms, thus compromising the credibility of conclusions drawn.

But why adopt GM crops at all if its risks are yet unknown? Because the only alternate way to protect (mass-consumption) crops against pest attacks is to encourage use of chemical-based insecticides/pesticides that have been proven to be carcinogenic, lead to worsened neurological outcomes, and indicate strong evidence for causing birth defects and reduce fertility.

Then how have GMOs managed to make itself look worse than chemical germicides? Mostly thanks to diminished credibility of large bio-tech firms accredited with their development. Instead of earning recognition for innovation and contributing to planet’s food security, US-based firms such as DuPont and erstwhile Monsanto are vilified for using bribery and influence to secure licensing of their products in other regions. Part of the trust deficit is also explained by history. After all, Monsanto was a producer of Agent Orange that led to much suffering during Vietnam War.

Even more unsettling is the economics of opposition. Developing agri-based economies that refuse to adopt GMO seeds despite obvious gains in productivity are also motivated by rational self-interest and not hysteria. And that motivation is trade.

While GM crops such as corn, soyabean and canola dominate agriculture in USA, they remain widely unpopular in Western Europe countries led by stringent EU healthcare rules. As Europe refuses to import food products from countries that allowed GM crops, developing economies enjoy a shot at exporting their grains to EU countries. Which, by the way, offer a steep premium for non-GMO/organic certification?

Since grains such as corn cross-pollinate with wind, allowing cultivation of GM maize to even a small minority of farmers risks losing EU export markets altogether because there is virtually no way to separate GM from organic fields.

Thus, governments in developing world often face a Sophie's choice between productivity gains and food security on one side, and export earnings on the other.

On ground, ever-evolving pests and worms invading cotton crop have shown to develop resistance to early generation GMOs. Prima facie, this is no different from superbugs developing immunity to antibiotics – the obvious response to which is ever increasing focus on constant innovation.

Except, since biotech firms own the patents to GM seeds, these seeds come at a high price and stringent licensing agreement. Meaning that buying next generation seeds can be an expensive business, and higher yields may mean that the return may not justify the investment. This has drawn critique from rights groups, which insist that GM seeds are only beneficial for large farmers that enjoy scale, and does little to uplift small or subsistence farmer, especially in developing countries.

Moreover, a typical licensing agreement includes clauses forbidding saving seeds for coming season or sharing them. As biotech firms often require farmers to share detailed crop data, even an unintentional breach of contract can lead to litigation.

While more of an optics problem than a serious challenge to GMO technology, this has earned bio firms a lot of notoriety as a result. Before Bayer acquired Monsanto globally, it insisted that it sees repairing Monsanto's reputation as a major challenge. Instead, it ended up dropping latter's name, finding it too 'toxic' to brand image. The irony.

<https://www.brecorder.com/2019/04/01/484610/demystifying-gm-food-crop/>

NEWS COVERAGE PERIOD FROM APRIL 8TH TO APRIL 14TH 2019

MONSANTO LOSES APPEAL IN FRENCH FARMER'S POISONING CASE

RECORDER REPORT | APR 12TH, 2019 | LYON

A French court on Thursday upheld a guilty verdict against chemicals giant Monsanto over the poisoning of a farmer who suffered neurological damage after using one of its weedkillers, the latest legal setback for the company over its controversial pesticides. Cereal farmer Paul Francois has been fighting Monsanto, a formerly US company which was bought by Germany's Bayer last year, for the past 12 years.

In the first ruling of its kind against Monsanto anywhere in the world, a French court in 2012 found it guilty of poisoning Francois. He said he began experiencing symptoms including blackouts, headaches and loss of balance and memory after inhaling fumes while using the now-banned weedkiller Lasso.

Monsanto appealed and lost in 2015 but decided to go a third round. "I won, and I'm happy, but at what cost?" Francois told reporters after the verdict. He denounced what he called years of "legal harassment" by Monsanto, which can still appeal Thursday's ruling by the Cour de Cassation, a top French appeals court.

The ruling, he said, was "a message to the government," which he urged to ban other toxic pesticides that contain glyphosate, used in Monsanto's top-selling Roundup. "History will judge them for not acting," he said, referring to a campaign pledge by President Emmanuel Macron to phase out glyphosate in France, which he backed down on last year.

Monsanto is facing thousands of US lawsuits over glyphosate exposure, and last month was ordered by a San Francisco court to pay around \$80 million to a retiree suffering from non-Hodgkin's lymphoma. Francois said he fell ill in 2004 after accidentally inhaling fumes from a vat containing

Lasso, a monochlorobenzene-based weedkiller that was legal in France until 2007 but which had already been banned in 1985 in Canada and in 1992 in Belgium and Britain.

<https://fp.brecorder.com/2019/04/20190412463632/>

NEWS COVERAGE PERIOD FROM APRIL 15TH TO APRIL 21ST 2019

‘FEARMONGERING IS IMPACTING GOVERNMENT’S ABILITY TO MAKE OBJECTIVE DECISION ON GMO’

BR Research April 19, 2019

An interview with Muhammad Asim of CropLife Pakistan Association – Part II

CropLife Pakistan is an association of multi-national biotech firms working on seed technology in the country. While CropLife members in the past have been responsible for bringing hybrid seed technology to Pakistan, they have recently been advocating the introduction of Genetically Modified seeds, specifically GM maize.

While GMO technology suffers from a public perception problem, technical and academic voices have been virtually missing from the discourse. To address the knowledge gap, BR Research sat down for an extensive conversation with Muhammad Asim, chairperson of CropLife’s Seed subcommittee. The first part of this interview focused on developing an understanding of the science behind GMOs; and was published in this section on Monday April 15, 2019, and can be accessed here:

The second part, reproduced below, focuses on the environmental safety and regulatory aspects.

Edited excerpts are presented as under:

BR Research: An oft-cited criticism on biotech companies is that they oppose collective ownership of seeds, as well as sharing and saving of seeds by farmers. Even if this makes economic sense in countries such as USA where corporate farming is the norm, do you believe it is appropriate for an agri-landscape dominated by small-hold farmers?

Muhammad Asim: The prevailing laws across Pakistan, and much of the remaining small-hold farmer geography, do not impose restriction on seed saving and the traditional barter arrangements within farming communities. This practice has also received official recognition in the most recent Plant Breeders Rights Act.

However, the commercial and unauthorised sale of saved seed poses several problems to the seed companies that invest heavily in developing them, and the farmer, that relies on quality seeds to improve profitability. Much like any other technology industry, security of intellectual property rights is fundamental to sustainable investment in R&D. The ever-changing climatic conditions, emerging pest pressures and water scarcity necessitate the provision of newer, higher-yielding seeds that are adaptive to the changing environment and consumer demands. Furthermore, proliferation of illicit commerce through saved seed puts the farmer’s interest at risk. This is primarily due to subsequent generations of saved seed losing genetic purity as a result of cross-pollination with other seed varieties in the open field. The situation is further exacerbated by the declining germination of seed that is not stored adequately when traded in this manner. It is for this reason that commercial transacting of seeds is governed by regulations for seed safety certifications.

BRR: On one hand you argued that GMO technology is scale neutral. On the other hand, you noted that cross-pollination is detrimental to GM crop’s productivity. Given the highly fragmented farming landscape, how can cross-pollination be avoided?

MA: Cross pollination between plants of the same species is a natural phenomenon which can be observed in the field every day. For example, maize crop of two different varieties can cross pollinate

in the field, if given the right circumstances. However, contrary to the myth being peddled, this phenomenon is scientifically impossible between two crops of different species, such as in the case of maize and rice.

Under normal circumstances where farmers harvest the grain for human or industrial consumption, cross pollination does not pose any challenge whatsoever. Special measures to avoid cross-pollination are only relevant when a crop is grown for seed production, where genetic purity requires preservation. This is a commonly known fact amongst the seed industry which already employs the established scientific isolation strategies to ensure genetic purity.

The existing protocols for seed production are not affected by the adoption of GM maize by Pakistani farmers. The only difference is in the case of those farmers who would want to grow non-GM maize to meet the demand of a specific buyer or market. For such farmers, well established coexistence protocols are available, including distance-isolation, and time-isolation. For example, in EU if a conventional crop contains more than 5 percent or more from GMO region, it must be labelled as such. In order to remain under this threshold, four- or five-meters distance is sufficient. To achieve absolute zero, at least 50 meters distance is required. That may not be possible in Pakistan given the average small size of farms.

In this case, farmers may opt for time isolation with respect to sowing. The two farmers may sow the seeds at 15 to 20 days interval. That's because to avoid cross pollination, a period lasting one to two weeks after sowing is critical, which is when the male and female parts of the plant sprout.

BRR: Coming to commercial side of things. As green politics becomes more dominant along with increase in absolute levels of income, do you not see a long-term tilt toward organic market, at least in the developed markets?

MA: The organic niche is driven by consumer preferences and has little to do with environmental sustainability. World's largest organic grocer, Whole Foods, is owned by none other than Amazon. It does not get more big business than that. A lot of anti-GMO lobby is funded by businesses such as The Body Shop. The conflict is due to competing commercial interests, and not rooted in science. Answering your question, the numbers from organic farming are just not sustainable, as it will never be able to provide for a growing world population. The key to ensuring global food security is producing more with less. Organic food just does not match up given the quantum of resources it gobbles up for the same level of caloric output.

You also have to take into account falling inputs: in 1960, an acre of culturable land was available per capita, which has shrunk to one-third of an acre. Freshwater available for farming is also declining. How do you feed all those people? The answer invariably comes out to be high-yield seeds technology accompanied by precision agriculture.

BRR: If GMO is such an obvious solution to fulfill growing domestic food requirements, why do we see delays in regulatory approval for its adoption?

MA: The problem is regulator's erratic regulatory behaviour. As a country we have failed to follow the science, not only in agriculture but also in other sectors. Agriculture may be referred to as the economic backbone; yet relevant government departments sometimes lack the requisite technical knowledge to take science-based decisions.

On a societal level also, we are often afraid of embracing new technology. It is regulator's job to assess whether the opposition to new technology stems from vested interests or genuine scientific concerns, yet it lacks the will and confidence to do so. GMO technology was introduced globally 20 years ago, and we are still struggling to take a consistent policy position on it either way.

Remember, the regulatory indecision has been a severe dampener for biotech companies. They have spent millions of dollars in trialing and years of effort is at stake. In our experience, the regulatory process is highly discretionary, and changes direction arbitrarily.

The continued indecision on GM crops will not only be a serious loss of opportunity, it will also create an environment of fear-mongering where future technologies are also seen with suspicion. If a decision is not taken soon, plans for introduction of future technologies in pipeline may face a fatal blow in times to come.

The few in the official quarters who have an appreciation for science, lack the confidence to speak up. On other occasions, such sane voices are stifled through accusations of collusion with technology providers, undermining our own scientists and technical bodies in the process.

There is another problem. Even though policy documents such as National Food Security Policy, 2018; and Pakistan Vision 2025; all mention biotechnology as a key priority area for agricultural growth, the policy decision has failed to cascade down from the top. As a consequence, fresh discussions on policy are often triggered at each regulatory review forum in general disregard of the existing law and underlying policy position.

The relevant regulator for GMOs is National Biotech Safety Committee, which includes members from Ministry of National Food Security; Science & Technology; Finance; Climate Change and others. But because institutional boundaries are so blurry, other authorities whose job is to comment on yield and efficacy of specific seed varieties, treat biotech safety as a subject under their purview.

BRR: By vested interests, are you referring to competition from local seed companies? These are usually small-sized firms that lack financial muscle to compete with a multinational's PR campaign.

MA: We do not view the local seed industry as competition. We believe that it is in the interest of all stakeholders that a vibrant local seed industry flourishes in Pakistan. Much work needs to be done in the way of seed research and plant breeding. Concerted efforts are required to build local capacity and general adequate investment in the required infrastructure. All of this will need to be driven by the local industry. This, however, can only be possible through technology transfer and knowledge sharing amongst the broader industry. Therefore, the multinational should not be viewed as an existential threat, but in fact as partners and collaborators. The local industry can learn a lot from the global wisdom of multinational companies. Even today, many of the local companies have benefited from the expertise and human resource first nurtured by the multinational crop science companies.

It is highly unfortunate that in the current scenario some local players do not see the value in collaboration and promotion of latest technology. The anti-GMO propaganda being fuelled by these elements has muddied an otherwise informed discussion on the issue. The fearmongering is now beginning to impact the government's ability to make objective, science-based decision.

In the midst of all this, the irony should not escape our attention. The elements labelling GM maize as 'poisonous' are the same who presently market GMO cotton, which as was clarified in the last interview, was first introduced in Pakistan through illicit channels.

BRR: Even voices from civil society have opposed GMO. Surely the opposition is much more widespread.

MA: People in general are not for or against GMO, they are indifferent to it, mostly because they lack basic awareness. If provided the right context and understanding around sustainable agriculture practices and the benefits of GM crop technology, widespread acceptance can be easily achieved.

Farmers, on the other hand, maintain a very positive outlook and await the technology in anticipation. However, final policy decision will have to flow from the government; only then will the public begin to appreciate the technology once it starts to see improved yield and productivity from it.

At present the government is seeking feedback from stakeholders, essentially pitting local and multinational seed companies against each other. In our view this is not seeking feedback, it is choosing one competing commercial interest over another.

If the government seriously wishes to involve stakeholders, it needs to obtain feedback from scientists, agriculturalists, and food security experts.

BRR: Speaking of agricultural experts, surely there are several competent technical agriculturalists associated with government run agri-research institutes. Why have you not been able to enlist support from the same?

MA: Yes, they are generally supportive because almost everyone in scientific community has in principled agreement on the technology and the science behind it. But you have to appreciate that the scientific community lacks the kind of influence necessary to force decisions. Their role is mostly relegated to that of an advisor, at best. Thus, the decision making is often done without due consideration of scientific facts and expert opinions.

BRR: Going back to the subject of safety. One concern often raised is that chemicals from GMO-based herbicides have been traced in human blood. Please comment.

MA: Every tablet of vitamins consumed can be traced into human blood after sometime. But should the mere presence of a chemical or substance in human blood be the cause to raise alarm?

GM maize or Bt maize provides protection against insect attacks. These have been thoroughly studied before they are introduced into commercial agriculture. Numerous regulatory authorities around the world have evaluated the data on Bt-protected crops and concluded that these products are safe. In fact, commercial GM crops have been grown since 1996, and more than 1,700 independent scientific studies attest to the fact that GM crops are safe for human consumption and have no links to new allergies, cancer, celiac or other diseases. This fact is reviewed and verified by third parties such as the American Medical Association, UN Food and Agricultural Organization (FAO), The World Health Organization (WHO), The European Food Safety Authority (EFSA) and the U.S. National Academies of Science. Similarly, food safety and environment protection authorities of U.S, E.U, Australia, Brazil, Argentina, Japan, Canada, Korea, amongst many others, also assess potential safety risks and continue to stand behind the overall safety of GM crops.

Bt is a protein present in a commonly occurring soil bacterium called *Bacillus thuringiensis*. For it to be active against any other living organism, it needs two things. First, the target organism should have a complementary protein (usually called a receptor) that can bind Bt, and second, it should have gut pH that is alkaline. The human gut and skin lack receptors that can recognize and interact with Bt. Moreover, the human gut is acidic, thanks to all the hydrochloric acid that our stomachs produce naturally. Therefore, Bt gets the same treatment as all other proteins of animal or plant origin get once it enters our digestive system: it is digested.

Scientifically speaking, protein cannot be digested without breaking down into amino acids; therefore, the concern is unnecessary. Even so, regulators all over the world have specified maximum threshold limits along with timing of herbicide application. This makes sure that upon harvest, level of chemical remains under maximum threshold. The grain is safe even when consumed by humans.

In Pakistan's case, it should also be noted here that cottonseed is the biggest domestic source of edible oil, and more than 95 percent of cotton grown locally is Bt. cotton-based. GMO food crop is already a part of our staple food diet, without any health or safety incident. However, the inertia only kicks in when the policymakers and bureaucracy have to take a decision on a fresh crop.

BRR: What is the strategy of biotech companies to counter the campaign?

MA: The strategy is to focus on farmer education, instead of talking about the brands. The idea is to talk about GMO's environmental sustainability and its role in mitigating water scarcity.

At the end of the day, Pakistan needs to decide whether its agriculture is going to be forward looking or not. For our nation to embrace modern agriculture technologies to increase our productivity, an enabling environment for farmer and the industry needs to be introduced. With an evolving technology landscape, a less cumbersome, yet robust regulatory regime needs to be put in place. A regime that builds the confidence of the industry and encourages investment in new technologies. For instance, if tomorrow a progressive farmer seeks to deploy drones to remotely monitor their fields, they have to deal with cumbersome laws and protocols that would make it nearly impossible to

sustainably employ drones and achieve precision farming. The indecision around the introduction of GM cotton, together with the subsequent regularization without adequate stewardship, has already led to an unprecedented decline in cotton output. India's guided launch of Bt. cotton under stewardship efforts resulted in their cotton output growing from 14 million bales to 40 million bales. Pakistan, on the other hand, saw a decline from 14 to 10 million bales. One has to wonder who has gained from the loss of productivity and who is the beneficiary.

<https://www.brecorder.com/2019/04/19/490958/fearmongering-is-impacting-governments-ability-to-make-objective-decision-on-gmo/>

‘POULTRY GROWTH MAY FLATTEN WITHOUT GM CORN’ AN INTERVIEW WITH TEAM FROM CROPLIFE PAKISTAN ASSOCIATION

RECORDER REPORT | Apr 15th, 2019 | OVERVIEW

The subject of Genetically Modified (GM) crop came to highlight once again when opposition by local seed companies made rounds in the media last month. While genetically modified cotton has been growing in Pakistan for over 15 years, farmers' experience with Bt. cotton has at best remained mixed. International biotech companies counter that GM fibre crop was never introduced in the country through official channels, and the mixed bag of success and failure is most attributable to lack of stewardship opportunity. As biotech firms gear up to introduce GM food crop in the form of Bt. maize, for the first time in subcontinent, the opposition by various quarters has come out very strongly.

To understand the context surrounding the controversy, BR Research sat down with team from CropLife Pakistan Association, a global industry body for plant science industry. In the edited excerpts below, we try to understand the science behind the technology, its challenges, opportunities, potential environmental and health risks, advantages over alternatives, and its economic and trade potential.

Due to the length of the discussion, the interview is segmented into two parts. Excerpts from the first part are presented below:

BR Research: Agronomic techniques such as precision agriculture, drip irrigation, System of Rice Intensification (SRI) have helped improved yield substantially in various countries with similar climatic conditions as Pakistan. Given the controversy surrounding GMO, why should the policy focus not be towards environmentally and biologically safer practices instead of biotech?

CropLife: There are no binary answers to the challenges faced by agriculture today. A broad-based transformation will require an integrated approach that involves introduction of biotech (GMO); improving agronomics; precision in application of key inputs such as water, fertilizers, and chemicals; and improved marketing.

Innovations in agriculture, whether under the ambit of biotech or organic farming, are all valid ways to achieve the objective of ensuring food security in a sustainable manner. In terms of nutrition and safety, scientifically speaking, it is not correct that any one of these alternatives is superior to others in all aspects.

Consumer preference between conventional, biotech, and organic farming practices across societies are based on differences in demographics, income levels, as well as cultural perceptions. While strongly held views on both side of the GM debate need to be respected, but with due consideration to the decades of scientific research behind biotech.

BRR: Biotech has been most successful in countries such as USA with large average farm sizes. In contrast, farming sector in Pakistan is highly fragmented, with median farmer surviving on subsistence. Is it the most suitable answer given the unique challenges of Pakistan's agriculture?

CL: The advocacy for biotech is based on the premise that it is "scale neutral". This means that in contrast to competing technologies that require scale in the form of larger landholdings (and are usually capital-intensive upfront), technology delivered through seed is equally, if not more suitable, for small-hold farmers.

Let me illustrate this point. Resourceful farmers are able to proactively manage their crop; for example, they pre-empt pest attacks by using insecticides; switching crop cycles etc. Given their limited resources, small farmers, in contrast, are reactive, spraying fields surgically after scouting for signs of pest attacks. Rarely does a small farmer have enough liquidity to be proactive in use of pesticides.

This is because small farmers base the trade-off between using costly pesticides and lower returns on the extent to which a pest attack may compromise yield. Beyond economic thresholds, they seldom use pesticides. Crop failures occur when farmers miscalculate the potential damage and decide against using these chemicals.

Thus, GM seeds can prove particularly useful in protecting against crop failure and sub economic threshold damage, given their built-in protection against pest infestations. And this is the core guiding principle in its marketing as well. While GMO should not be misrepresented as a "silver bullet", it brings 'peace of mind to farmers'. It enhances yield without forcing farmers to adopt any other major changes to their farming practices.

Let me add that farmers with large landholdings may not see an equally large quantum increase in yield from GM seeds as would small-hold farmers, because the latter segment is currently operating way below par. Put this another way, the high number of small-hold farmers with very low yields is why national averages of various crop yields in Pakistan are so low.

BRR: Is it correct that GMO seeds eliminate the need for pesticides and chemicals altogether?

CL: It varies from crop to crop. Conventionally grown maize, for example, requires application of insecticide at two stages. First, insecticides are used for seed treatment right after sowing to ward off shoot fly. Thereafter, pesticides are used to fight stem borer, army worms and American attacks that affect the plant for the remainder of its lifecycle. In Pakistan, national maize yield loss due to stem borer and similar insects is in the range of 15-30 percent.

Bt. corn seeds, which carries genome of a soil bacterium, expresses proteins toxic to corn borer and other lepidopteron insects, eliminating the need for pesticide use. However, as it is not effective against shoot fly, farmers will be required to do seed treatment at the time of sowing.

Similarly, conventional herbicides used on maize crop have a very limited spectrum; they either help control broad leaf weeds or grassy weeds. In contrast, genetically modified corn can tolerate herbicides such as Roundup (glyphosate) which is broad spectrum and take care of almost all type of weeds.

Practically, using GM corn seeds and Roundup herbicide does not pose a major behavioural change to farmers as it will be akin to switching one type of seed and chemicals for another, rather, they will need to use fewer chemicals than before. It is also less labour-intensive because the grower will need not keep post-emergent vigilance as under conventional farming.

BRR: One of the major criticisms against GMO technology is that pests develop resistance over time. How real is this fear?

CL: Scientifically speaking, resistance development is a natural phenomenon. Take pharmaceuticals for example, early generation antibiotics were followed by second, third, and even fourth generation antibiotics. This is because genetic mutation is a natural process; the sooner an organism reproduces, the greater the chances of it developing resistance through natural means.

Resistance can, however, be managed. Ways and means to increase the longevity of the technology through stewardship efforts are well established. With appropriate support, first generation technologies can last from 10 to up to 15 years. Longevity extends even further for second generation technologies.

On the flipside, in absence of proper stewardship, resistance will develop very rapidly. This has been witnessed globally.

In Pakistan, farmers of Bt cotton do not adopt insect resistance management practices while in contrast, in USA and Australia, regulatory pressure ensures that stewardship parameters are followed to the letter. Moreover, biotech companies in Australia perform surveys and invoice growers based on cultivated area. In some countries, farmers also receive rebates when they follow required stewardship measures.

Of course, dynamics vary in subcontinent because of high number of farmers when compared to developed regions which renders these parameters impractical. To address this, biotech companies came up with a strategy called refuge-in-a-bag (RIB) in which non-traited seeds (which serve as refuge) are pre-mixed with Bt. insect protected seeds in one bag. For example, 95 percent of seeds may contain both herbicide and insecticide control technology, while remaining contains herbicide control technology only.

In developed countries, the two types are colour coded differently; however, in subcontinent these are blended in mono-colour to deter farmers from throwing away non-Bt seeds. Thus, even in regions where farmers lack appreciation for stewardship, longevity of technology can be ensured.

In Pakistan, the two companies which have received licensing for bringing GM corn have made sure that stewardship for refuge is made of the terms of approval.

BRR: Keeping in mind lack of literacy amongst farmers, what mechanisms can be in place to restrain farmers from purchasing Bt. seeds in one season and then cross-breeding them with conventional varieties in subsequent seasons to save cost?

CL: The likelihood is at least very low in case of maize. Back when companies introduced hybrid corn in this region, farmers tried to use grain of first crop for plantation in following season. Except, this reduced yield substantially.

As a result, corn farmers in Pakistan who have pre-dominantly been using hybrid seeds for over 15 years have firmly developed a sense of purchasing fresh seeds every season, which is why national maize yield has also grown at a very high rate.

In contrast, this may not hold true for cotton, where there a lot more varieties and farmer save seeds. Keep in mind that Bt. cotton was introduced unofficially, therefore has not received a similar stewardship effort. In turn, such ad hoc practices have contributed to decline of cotton crop in the country as yield has fallen. That is where role of the regulator comes in.

BRR: What will be the price differential between GM corn seeds and hybrid varieties?

CL: Biotech companies refer to the concept of price-to-value in pricing seeds, whether GM or hybrid. Pricing follows benchmarks of incremental value (in yield terms) that a given seed hybrid offers. For example, every year biotech companies source up to 200 hybrid varieties from global repository and test their adaptability with local conditions. After a rigorous four-year process during which trials are run to assess value, one or two varieties are identified that offer substantial additional value. Internal checks and balances ensure that in case incremental value (over varieties already in the market) does not meet set benchmarks, no new variety is introduced. As a result, no more than four to five hybrid varieties are available in the market in each season.

And that's the only way of running a sustainable business. Looking at the market of hybrid maize seed varieties, it is no coincidence that multinational biotech companies not only enjoy credibility with farmers, but also have more than 90 percent of market share in Punjab for both spring and

autumn season crops. Even though seeds exist at various price points, farmers are now well-aware that a variety priced at 50 percent lower rate will also result in yield reduced by half.

BRR: The philosophy of price-to-value is well taken. Nevertheless, affordability of pricing (in absolute terms) is still relevant because of the sheer percentage of small-hold farmers in the country; over 25 percent of farm sizes in the country are less than 0.5 hectares in size.

CL: This may be true for farmers growing other major crops, but maize growers' stand out. Over the past 20 years, substantial increase recorded in maize yield is equally attributable to introduction of hybrid technology and progressive behaviour of farmers. The core belt corn in Punjab is very closely knitted and appreciates the value-add gains from using high quality seeds.

Moreover, biotech companies have invested heavily in farmer education. Farmer literacy is a critical part of stewardship effort. Knowledge transfer programs accompanied introduction of hybrid varieties and continue to this day. Similarly, techno showcasing of GMO varieties has been conducted with up to thirty thousand corn growers.

Biotech companies also contribute to farming productivity by assisting farmers in improving agronomy; for example, training them to apply water, fertilizer and other inputs efficiently (both, timing and quantity).

This is because in contrast to domestic seed companies, biotech firms invest in R&D to achieve optimal agronomy. Maximum touch points in the form of learning centres have been established to ensure knowledge transfer to farmer. In absence of the support infrastructure, even the best hybrid variety may fail to achieve promised yield.

Moreover, success cases exist in other markets dominated by small-hold farmers. In Philippines for example, GM corn has penetrated over 90 percent market share. Small average farm size in the country is not an impediment.

Lastly, the delay in regulatory approvals has been a blessing in disguise. Successful trial runs at the learning centres during this period have already created a demand because farmers understand that overall cost of production will decline due to lower use of pesticides and labour. Within four to five years of introduction, GMO maize shall capture more than 90 percent of the market because the brand already enjoys credibility with the consumer.

BRR: On the flipside, is there a possibility that a sudden substantial increase in yield and output could lead to supply glut, lowering the price farmers can fetch in domestic commodity market?

CL: By 2021, it is projected that demand from poultry segment alone will reach 7 million tons. Whereas total production currently stands at only 6 million tons, of which seventy percent is consumed by poultry.

Keep in mind that higher output seen in recent years is also a result of traditionally cotton growing areas such as in district Vehari switching over to maize. This may not continue in future as the government appears to have refocused its energies on a reviving cotton crop. This happened in 2016-17 as well when area under cotton cultivation showed signs of improvement after the government announced a subsidy program.

If the so called "bonus acres" from cotton are excluded, maize output may not continue to grow with existing technology alone. Furthermore, government is also planning to subsidize oilseed crops, which may become a lucrative alternative to maize in spring season. Given the changing dynamics, poultry sector may not be able to sustain its double-digit growth unless corn productivity increases substantially.

Acreage can also not be extended substantially into southern regions, because the salinity of groundwater poses a risk. In most southern regions, canal irrigation water is received with delays, whereas maize crop requires critical two to three critical watering periods every five days during pollination.

Note that China is the second largest grower of maize by acreage, yet it is still a net importer due to high domestic demand from poultry segment. Last year, due to the trade war with the US, it expressed interest in importing corn from Pakistan. Yet we were unable to cater to that demand

So even if there is a surplus, Pakistan will be able to export to markets in China and other South East Asian countries. Moreover, demand for silage exports to Middle Eastern and African countries can also be catered to, as maize is a key ingredient.

Interactions with poultry associations may also inform this discussion. The segment is fast reaching a threshold where it becomes export competitive. And the ability to source home grown maize will be a key driver in future as well.

Compare this to the alternate scenario where a shortage of corn will not increase forex exposure on feed import, but also increase domestic poultry prices. Supply chain can also be easily managed locally compared to relying on bulk imports.

BRR: Focusing on exports, Rafhan Maize has given their view publicly that their exports may be compromised if GMO is introduced. The potential loss of export markets catering to conventional demand also needs to be accounted for.

CL: Bear in mind that Rafhan's US-based principal Ingredion Inc itself sources GM corn. So, the decision by Rafhan Maize reflects purely commercial apprehensions. It is true that a market for non-GMO corn exists in some countries, and they must receive a premium by catering to it.

Having said that, the non-GM maize export is down to just one company. Total value of Rafhan Maize exports is close to \$3 million per annum, all of which is to Kenya which has zero GMO tolerance policy. If you work back their grain requirement for export, it is no more than six thousand tons, which can be easily managed.

The plan is to initially restrict GM maize to Punjab province only, even though KP also has substantial area under corn cultivation. Thus, Rafhan's requirement can be easily sourced from KP. With proper regulatory certifications and labelling, their export shall remain unimpeded.

In contrast, Pakistan's total export potential will become much greater once GM maize is introduced.

BRR: But it is not just Kenya that bans GMO. EU countries also have strict anti-GMO stance.

CL: That is not entirely accurate. Two types of approvals exist in EU countries. One is for GMO cultivation, and second is of food-feed processing. Countries such as Spain allow cultivation and therefore, automatically also allow food-feed processing.

EU is the second largest importer of genetically modified grain after China, which includes corn, soybean and others. However, EU parliament in a "non-binding decision" banned cultivation some years ago. While several countries wished to grow GM crops, because EU functions as a trading bloc, they are unable to do so. Countries such as Spain that consume all of their output domestically chose to grow it, without any repercussions.

There are only nine countries in the world today that have instated a blanket ban on GMO. Of these Russia is most prominent. In 2014, it took a commercial decision to become the hub of non-GMO agriculture, because they seek to cater to the organic niche.

The others are small African countries which are former French or Dutch colonies, with strong trade linkages with these EU countries. And they serve as Europe's organic food basket.

BRR: But if countries in developed world have taken a stand against GMO cultivation, it stands to reason that it may pose risk to soil health. A clear divide exists across Atlantic on GMO, and one may be less inclined to believe that the American standard is more rooted in science given their ostrich mindset w.r.t climate change.

CL: View on GMOs in EU are informed more by ideology than science. Four countries in the region allow it, as does European Food Safety Authority. In this regard, the experience in France with glyphosate is very telling.

When EU approved glyphosate, a herbicide, French government in a political move hinted that it might instate a ban. However, it had to go back on its plan. Today the product may not be marketed to household consumers but is used freely by commercial and agriculture sectors. The government went on record and noted that their agriculture will become unsustainable if this herbicide is banned. That goes on to expose the pseudo-science behind the ideology.

Scientifically speaking, the difference between GMO and conventional seed is of an extra gene sequence, drawn from bacteria that is found in soil. It is this gene that produces resistance against pest invasions. The same principle is at work as in vaccines and antibiotics.

Logically speaking, because the plant gains resistance against insects, less nutritional value is lost. As a result, crops nutritional requirement from soil is lower not higher.

Moreover, GM crops are being cultivated across the world for over two decades. And no evidence has come forth noting that soil becomes barren or loses its productivity. Similarly, Bt. cotton is being grown in Pakistan for over 15 years, even if unofficially, and no complaints of land becoming uncultivable as a result have been made. Even though Pakistan has two crop seasons, compared to US and other countries, with only single crop per year.

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May 2019

***NEWS COVERAGE PERIOD FROM MAY 6TH TO MAY 12TH
2019***

NEED STRESSED FOR A CONSISTENT POLICY ON GM MAIZE

ZAHID BAIG | MAY 12TH, 2019 | LAHORE

CropLife Pakistan Executive Director Dr Afzal has urged the government to take its decisions regarding GM Maize on the established regulatory structure and use science as the base to clarify issues, in order to safeguard the interest of the farmer and restore confidence of the plant science industry.

The maize crop in Pakistan presents a phenomenal success story as since introducing high yield maize seeds in the 1990s, CropLife member companies have maintained a firm commitment towards bringing the latest agriculture technologies and innovation to Pakistan, having already invested millions on research, infrastructure and farmer education programs across the country. The technology is ideally suited to small-hold farmers, providing protection against chewing insects and allows for improved weed management. The two traits combined, enable higher yields and reduce input costs for the farmer.

In line with this commitment, CropLife member companies initiated the process to introduce GM Maize in year 2009 adopted globally since 1990s subsequently our members completed all the regulatory requirements mandated under the National Biosafety Rules 2005, Seed (Amendment) Act 2015 and Seed (Business Regulation) Rules 2016.

However, as the member companies approached the conclusive stage of approvals for this innovative seed technology, the standard established regulatory process was stopped by the Ministry of National Food Security & Research, said the Executive Director, CropLife Pakistan Association, Dr. Muhammad Afzal, while talking to media persons the other day.

He explained that the stopping an established regulatory process has undermined the existing regulatory regime, on the one hand and hurt the confidence of the industry, on the other hand. He

emphasized that rule of law must prevail. The situation, if allowed to prevail, will only serve to block the path of future investments in the emerging agriculture technologies in the country, he lamented. Dr Afzal expressed that the Government must take its decisions on the established regulatory structure and use science as the base to clarify issues, in order to safeguard the interest of the farmer and restore confidence of the plant science industry. He remarked that the situation of country's cotton crop remains a stark reminder of previous indecision on similar technologies, resulting in a steady productivity decline over the past few years.

The exponential growth of maize crop in Pakistan owes largely to the rapid adoption of hybrid seeds in place of the traditional open pollinated varieties, with diminished yield potential. According to statistics published by Government of Pakistan, the average yields across Punjab have seen a fourfold increase, starting at 14 mounds per acre in 1996 and reaching an impressive 60 mounds per acre in 2017.

Consequently, the area under maize cultivation in Punjab alone has more than doubled and overall crop production increased eightfold, going from 0.68 million tons in 1996 to 5.2 million tons in 2017. Based on current industry estimates, CropLife member companies hold almost 90 percent of the market share for hybrid seed across the country; a testament to the superior quality and research capability of CropLife members.

However, with over 95 percent of maize crop area in Punjab already covered to hybrid maize, further increase in productivity will be marginal unless newer innovative technologies are embraced. Biotech maize or GM maize is one such technology, enabling farmers to produce more using fewer resources while reducing yield loss from pests and weeds. Existing scientific literature shows that between 15 percent to 30 percent yield advantages can be attained easily through this technology, this has been confirmed in Pakistan during the registration trials conducted by Government agencies during last couple of years.

In practice, however, the observations are far more impressive. For example, maize crop yields in the U.S. increased by 56 percent after adoption of GM technology. Similarly, the average yield of maize in Brazil increased by 102 percent through GM technology while in the case of Philippines, it increased by 72 percent.

Domestic demand for maize is also ever-growing, with poultry sector alone accounting for almost 70 percent of all grain produced locally. According to Pakistan Poultry Association, the sector is projected to grow at 10-12 percent per annum and will therefore require more than 7 million tons of maize grain by 2023, a volume exceeding annual maize production in 2017. Therefore, increase in yield and productivity, together with overall improvement of maize crop economics, will be central to Pakistan's food security.

Contrary to an often-propagated myth, GM crops are widely accepted and imported for food, feed and processing. Pakistan's National Biosafety Committee (NBC, under the Ministry of Climate Change) approved safety of the traits approved by the applicants, in 2016. In terms of health and environmental safety, GM crops have an unblemished safety record over the past more than 20 years and are approved by food safety and environment protection agencies of all major developed nations (U.S, Canada, Japan, Australia, EU, Brazil, China, Korea etc.).

In fact, four leading exporters of GM crops, namely, U.S., Brazil, Argentina and Canada, trade with more than 150 countries across the world. Even the European Union, which has a politically opposed view on GM crops, freely imports GM grain and is currently the second largest importer, consuming more than 30 million tons of GM grain each year.

<https://fp.brecorder.com/2019/05/20190512472577/>

NEWS COVERAGE PERIOD FROM MAY 20TH TO MAY 26TH 2019

US TO HELP PAKISTAN INTRODUCE GENETICALLY-ENGINEERED CORN

Amin Ahmed Updated May 20, 2019

ISLAMABAD: The Foreign Agricultural Service of the United States Department of Agriculture (USDA) has said that future collaborative projects between the US and Pakistan include using American soybean feed in poultry, fish farming and dairy industries, introducing genetically-engineered maize and working with various government departments to develop uniform food safety standards.

“Soybean from the United States will serve as raw material for poultry, fish farming and dairy industries in Pakistan. We are working collaboratively with the government and the industry not only in poultry but also in the new and exciting area of fish farming which is in the pipeline,” Casey E. Bean, USDA official based in US Embassy in Islamabad, told Dawn.

“Approval of genetically-engineered maize is currently being considered in Pakistan. It would offer farmers a tool to increase their production and reduce use of agricultural chemicals,” he claimed. Talking about the complicated relationship between the two countries, Mr Bean told Dawn, “While political highs and lows in the relations between the two countries occurs, US-Pakistan cooperation in the agricultural sector has always been an important part in our bilateral relationship of seventy years. “The deep relationship between the agricultural scientists of the two countries is evident in the collaboration on developing seeds for wheat, rice, sugarcane and cotton. Agriculture sector is an incredibly important sector in Pakistan and is a priority for the US. For these reasons the USDA mission has an office in Islamabad,” he said.

Allies in fighting terrorism, Pakistan and the US have a knotty relationship, especially over Afghanistan. In the past the Washington has accused Islamabad of playing a double game but in February this year US President Donald Trump said that the United States had developed a “much better relationship” with Pakistan.

Uniform food safety standards and food security are two other areas where the USDA is working with local government departments, Mr Bean said. USDA is working with the Department of Commerce, the Ministry of National Food Security and agribusiness sector to implement food safety standards such as food labels illustrating ingredients contained in food products.

The federal government’s food security authority would be able to provide oversight to provinces to adhere to international standards consistently ultimately benefiting consumers, Mr Bean said.

USDA will assist the ministry of national food security and research for the national food system project, as after devolution, it has become important for Pakistan to have a central food security authority. In this area, USDA is working with Pakistan Agriculture Research Council scientists for reducing aflatoxin (toxic fungus) in food crops.

USDA and USAID launched a programme sometime last year to introduce aflatoxin control in Pakistan currently at field trial stage. Aflatoxin is produced by molds, and it often grows on food crops such as corn, peanuts, chillies, ground nuts but even cotton seeds are susceptible. US scientists were working with a private sector maize company in Pakistan to develop a technology to combat aflatoxin, said the US official.

About cotton, he said this sector is tremendous win-win situation for Pakistan. Textile is a large export earner for Pakistan in which cotton as raw material imported from the US has a significant share in Pakistan’s textiles.

Published in Dawn, May 20th, 2019

<https://www.dawn.com/news/1483389/us-to-help-pakistan-introduce-genetically-engineered-corn>

June 2019

NEWS COVERAGE PERIOD FROM JUN 3RD TO JUN 9TH 2019

USDA INVESTIGATES UNAPPROVED GMO WHEAT FOUND IN WASHINGTON STATE

RECORDER REPORT | JUN 9TH, 2019 | CHICAGO

The US Department of Agriculture has confirmed the discovery of unapproved, genetically modified (GM) wheat plants growing in an un-planted agricultural field in Washington state.

There was no evidence the wheat had entered the food supply, the USDA's Animal and Plant Health Inspection Service said in a statement on Friday. The wheat is resistant to glyphosate, a widely used herbicide commonly referred to as Roundup.

"USDA is collaborating with our state, industry and trading partners, and we are committed to providing all our partners with timely and transparent information about our findings," the statement said.

There are currently no commercially approved genetically modified wheat varieties, and incidences of rogue plants are rare. However, unapproved plants were found in 2018 in Alberta, Canada, in 2016 in Washington state, in 2014 in Montana and in 2013 in Oregon.

A Bayer Crop Science spokeswoman said the latest finding may have occurred on the site of a former field trial. Last year Bayer bought Monsanto, which in the late 1990s and early 2000s developed wheat genetically modified to withstand its Roundup herbicide, a weed killer containing glyphosate. Monsanto shelved the genetically engineered wheat in 2004 amid market concern about rejection from foreign buyers. The United States was the world's second-largest wheat exporter after Russia in the 2018/19 marketing year.

"We have been informed by USDA of a possible detection of GM wheat in Washington State, possibly on the site of a former field trial," Bayer Crop Sciences spokeswoman Charla Lord said.

"We are cooperating with USDA to gather more information and facts as the agency reviews the situation," Lord said.

Samples of the wheat plants from the field in Washington were sent to the USDA's Federal Grain Inspection Service lab in Kansas City, Missouri, as well as a USDA lab in Pullman, Washington, for testing and confirmation, according to a joint statement from the National Association of Wheat Growers and US Wheat Associates, a trade group that promotes US wheat sales. Bayer, which inherited litigation over Roundup with its \$63 billion acquisition of Monsanto last year, faces lawsuits by more than 13,400 plaintiffs in the United States, alleging the product causes cancer.

A California jury last month awarded more than \$2 billion to a couple who claimed Roundup caused their non-Hodgkin's lymphoma. It was the largest US jury verdict to date against the company in litigation over the chemical.

<https://fp.brecorder.com/2019/06/20190609484256/>

GMO TUG OF WAR

Zubeida Mustafa June 08, 2019

WHY should an official of the US Embassy, representing the Department of Agriculture, be going overboard to 'collaborate' with Pakistan on projects involving genetically modified maize? This

unwanted advice seems to be seedy business at a time when there is a tug of war taking place between various lobbies in the agricultural sector.

Even more regrettable is that in the past such dubious overtures by biotech giants have been extended to too many people whose integrity is in doubt. Quite a few were elected representatives of the people who went ahead to change the Seed Act in 2016. The legality of this move has now been challenged by the farmers in a court of law. The amendments in the act paved the ground for introducing GM seeds in the country.

Moves are now afoot to win over opinion in the quarters that matter. This time the target is maize, one of our best food crops next to wheat and rice. The battleground is in the highest quarters. Pakistan produced 6.1 million tonnes of maize in 2018 showing a yield per hectare of 5MT (about 2MT per acre). This was 2MT in 2003. The Philippines which switched over to GM corn in 2003 could increase its yield per hectare from 2MT to only 3MT in the same period.

This is not the time to champion the cause of GMOs in Pakistan.

Do we still have to change over? Mercifully, our own experience and native wisdom has warned many opinion makers of the hazards of genetically modified organisms in a country like Pakistan. Notwithstanding our good record and the opinion of our experts resisting GM maize, the controversy on the issue is being raked up repeatedly.

This is not the time to champion the cause of GMOs in Pakistan when the country is in the grip of an economic crisis. The farmers' community has pointed out from time to time how our cotton production has been falling since BT cotton was introduced in Pakistan in 2010. This has also affected our textile industry adversely.

The biotech companies, however, continue to play their insidious game of luring farmers and policymakers to turn to GM seeds by holding out half-truths and even presenting downright lies. For instance, they claim that GM enhances food production at a lower cost as fewer pesticides are needed and no tilling is required because BT prevents weeds. They also claim that GMOs are heat- and drought-resistant.

But farmers have a different story to tell. They say that GMOs have created super weeds that resist glyphosate. The plants that create their own BT insecticides have also given rise to bugs (pink bollworm) that are BT resistant. And all along humans are unwittingly consuming this chemical. Another danger to Pakistan's agriculture and food security is the likelihood of cross-pollination which is high in the case of GM corn and GM canola. This phenomenon is not preventable as has been experienced in the case of BT cotton. Worse still, no action has been taken to ban BT cotton by the EPA which is required to act under the Cartagena Protocol in such cases when contamination takes place.

Above all, we have not looked into the health risks of GM corn which is an edible crop. WHO has declared Roundup, the pesticide used with GMOs, to be likely to cause cancer. Obviously, the chicken feed from GM crops will not be safe for our poultry either. How will humans who consume it be safe? What is the official opinion? A meeting of 'official stakeholders' called by the secretary of the Ministry for National Food Security and Research in February left no one in doubt about where the expert opinion stood. The minutes categorically recorded eight salient arguments against GMOs.

- 1) Biotechnology should be adopted but it is more than just GMO;
- 2) Before any decision is taken on the commercialisation of GM maize, its socioeconomic implications must be analysed;
- 3) There are serious concerns in the export of GMO from Pakistan which will hit its trade;
- 4) GMOs will lead to the monopolisation of the seed market;
- 5) After commercialisation of GMO, there will be no legal framework to separate it from non-GMOs;
- 6) There is no mechanism to educate farmers about GMO;
- 7) Food security may be compromised;
- 8) Farmers' rights will be infringed upon.

These are valid concerns. Dr Khalid Aziz, manager Rafhan Corn Products, adds an economic argument against the commercialisation of GM maize. Nearly Rs2bn worth of corn products are

exported from Pakistan every year, most of it to EU which insists on certified non-GM maize and even pays a premium for it.

At the other end is the chairman (from the PML-N) of the National Assembly's Standing Committee on National Food Security and Research and his supporters. This controversy is having an undesirably destabilising impact. The sensible move in the light of the stand taken by the stakeholders' meetings would be for the prime minister to announce unequivocally, "NO to GMO Maize".

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<https://www.dawn.com/news/1486853/gmo-tug-of-war>

GMO REDUX

BR Research June 3, 2019

After a two-month hiatus, reports on GMO seed technology have once again begun to do rounds in print media. Last week, a USDA official, speaking to English daily, noted that "approval of genetically-engineered maize is currently being considered in Pakistan. It would offer farmers a tool to increase their production and reduce use of agricultural chemicals".

Vilified as multinational biotech conglomerates may be in the developed world given the spree of lawsuits losses over cancer claims, introduction of seed technology in Pakistan makes little to no business case. Pakistan's current import bill for hybrid maize seed averages \$60 million annually, literally peanuts for giants churning billion of dollars in exports to China and South American markets. While local opposition to any controversial technology due to fears of health hazards is welcome, the truth could not be dearer.

For one, it is no secret that controversy stirred around introduction of GMO has primarily been lobbied by local seed companies, motivated by preserving market share in the face of onslaught from high yield genetically modified seeds.

Pakistan's existing seed market is highly fragmented, with most rural regions relying on small-seed companies just big enough to service district level demand. Punjab alone has over 550 registered seed companies, most of which function as proprietorships with footprint small enough that tehsil name forms part of their title.

It should come as little surprise then that most such firms have little to near-absent financial muscle to invest in R&D. Primarily functioning as traders managing the supply-and-demand needs of their area; these rely on already existing seeds developed by publicly-funded national and provincial agri-research institutes. Few medium-sized players also exist but have a tarred reputation of stealing seed technology from multinationals and marketing as 'indigenously developed technology' after re-branding.

What about the health hazards of GMOs? Suffice it is to say that we are already there. Nearly all of cotton planted in the country has been relying upon genetically modified Bt. cotton over the last two decades; that too introduced through illicit means and lacking any stewardship efforts by the multinational intellectual property/patent owners. Meaning that not only has the seed technology been compromised – often noted by the staggering decline in cotton yield – but that the likes of Monsanto and Bayer take no responsibility for it.

But cotton is only a fibre crop, one might argue. Except that cottonseed oil constitute a major part of food-grade/vegetable oil value chain, and most of Pakistan has been consuming genetically modified-based for at least past 15 years. Under what may at best be referred to as "grey area" given lack of regulation or ownership by any part of the privately-owned seed industry, whether local or foreign firms.

It is time that the law makers and lobbyists at least are honest about near absence of regulation in the seed industry. Health hazards or not, GMO is already here. Best to regularize it than to keep heads bury in the sand.

<https://www.brecorder.com/2019/06/03/500830/gmo-redux/>

NEWS COVERAGE PERIOD FROM JUN 10TH TO JUN 16TH 2019

BIO-ENGINEERED SALMON WON'T COME FROM US'S BIGGEST FARM STATE

AP June 10, 2019

PORTLAND: Genetically engineered salmon is heading to store shelves in the US, but it won't be coming from the biggest salmon farming state in the country.

Massachusetts-based AquaBounty Technologies has said American supermarkets could begin selling the much-debated fish by the end of next year. Its fish are modified with added genes from other fish to grow about twice as fast as conventional salmon.

The company modifies Atlantic salmon, a species that forms the backbone of the worldwide salmon aquaculture industry. Maine is the biggest producer of conventional Atlantic salmon in the US, sometimes producing more than 35 million pounds of salmon per year, and its industry is poised to grow. Two new major salmon farms are in the approvals process in the state.

But fish farmers in Maine are not considering using the genetically engineered fish, said Sebastian Belle, executive director of the Maine Aquaculture Association. Numerous conditions would have to be met before that would change, including customers requesting the fish in stores, he said. The group also feels the environmental assessment of the fish conducted by regulators was not rigorous enough, Belle said.

"Our competitors would have to be using them and that would have to be giving our competitors an advantage in the marketplace," Belle said. "We have no interest in growing GMO salmon, but we reserve the right to reassess that position." AquaBounty's salmon is the first genetically modified, or GMO, animal to be approved for human consumption. It has become a touchstone for the international debate about genetic engineering and food. The US Food and Drug Administration has signed off on the fish as safe to eat. The genetically modified salmon are also approved for sale in Canada.

The company's Indiana facility recently received the first batch of genetically engineered salmon eggs in the US, and they should be ready for harvesting in the final quarter of 2020, said AquaBounty spokesman Dave Conley.

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December 2019

NEWS COVERAGE PERIOD FROM DECEMBER 02ND TO 08TH 2019

GMOS: GROSSLY MISUNDERSTOOD ORGANISMS

By Naveed Hussain / Creative: Jamal Khurshid / Creative: Mohin Alam
Published: December 2, 2019

KARACHI: Walk down the aisles of any upscale grocery store and you'll find a range of 'Non-GMO' or 'Organic' labels on the shelves. The demand for non-GMO foods — either certified organic or carrying 'Non-GMO' labels — has spiked in recent years, mainly because of widespread negative portrayal of GMOs and its intuitive appeal among health conscious consumers. The organic food market worldwide is estimated to grow at a compound annual growth rate of more than 14% between 2016 and 2021, according to a recent TechSci Research report.

Ask why eat organic? And proponents would say the reasons are pretty straightforward: they are more nutritious, antibiotics-free, and with little residual levels of toxic pesticides. In the push for organic one of the most talked about buzzwords is GMOs. But why are we so scared of them?

GMO remains a hotly debated subject, even decades after the genetic engineering (GE) technology was first introduced. Concerns about the safety of GE products, especially GE food, are widespread. But GMO advocates claim these concerns are largely based on pseudoscience or unsubstantiated information available online.

Surprisingly, these concerns are more expressed in countries where the GE technology has been in use for years. A recent survey by geneticliteracyproject.org finds 43% of Americans with high incomes and 26% of lower earners avoid purchasing GE food. This is notwithstanding the fact that a 2016 study by America's National Academy of Sciences concluded that GE crops are just as safe to eat as their non-GE counterparts.

Dr Kauser Abdulla Malik, Professor and Dean of Postgraduate Studies FC College University Lahore, explains that GMOs, or Genetically Modified Organisms are living organisms such as plants, animals or microorganisms which have been subjected to genetic modification using molecular biology techniques, generally referred to as genetic engineering, in order to favour the expression of desired physiological traits or the production of desired biological products. Any food derived from genetically modified crops or animals is GM food.

The global area of biotech [read: GE] crops has increased 113 folds from 1.7 million hectares in 1996 to 191.7 million hectares in 2018. All major biotech crops, namely maize, soya bean, canola, cotton, and others, namely alfalfa, sugar beet, squash, eggplant, papaya, apples, and sugarcane, are cultivated in 26 countries. In 44 countries, the GM seed are imported for consumption.

There is near unanimity among scientists that GE crops are safe to consume.

“As reported by the European Commission, the main conclusion to be drawn from the efforts of more than 130 research projects, covering more than 25 years of research and involving more than 500 independent research groups, is that GMOs are not more risky than conventionally developed products,” says Dr Donald J MacKenzie, Executive Director, Institute for International Crop Improvement Donald Danforth Plant Science Center.

A large population has been consuming GE food for more than 23 years with zero incidents reported on its safety, adds Muhammad Asim, Lead Biotechnology and Seeds, CropLife Pakistan Association. Notwithstanding the scientific testimonies, anti-GMOs groups in Europe call it 'Frankenfood' — a phrase they have coined to emphasise perceived health hazards of GE food. Their fears stem from the perception that biotech food might be carcinogenic — that it might cause gene mutation in human beings.

But Dr MacKenzie says people's natural worries and apprehensions about genetic modification technology have been amplified and exploited by special interest groups for their own ends.

“Certainly, there is nothing from the last nearly three decades of experience and research on GE food that would give any credence to these assertions.”

Of the 28 member states of the European Union, 19 have voted to either partially or fully ban GMOs. This came after the European Commission called for each EU nation to vote if they wanted to opt out of having to grow GMO crops even if they were allowed to do so within the boundaries of the EU. So

far, the only GM crop grown in the EU — mainly within Spain and Portugal — is maize. Despite this, there are almost 60 GM crops approved for use which are freely bought and sold across the EU.

The European take on GE crops is paradoxical. “The situation on ground is in stark contrast to what is perceived as Europe’s position. The EU currently is the second largest importer of GE grain for food, feed, and processing,” says Asim.

Dr Malik blames political interests for the negative portrayal of GE foods. “In Europe, especially in Germany, it is a political agenda of the Green Party. They spend billions [of euros] on carrying out anti-GM campaigns. Even the German scientific community vigorously opposes them,” he says.

Nonetheless, not all agri scientists are convinced about the safety of GE crops. “The great majority, 98% to be precise, of dietary DNA is degraded by digestive enzymes relatively quickly but use of viruses as vectors, must increase the risk factor significantly as these are organisms which are adapted to integrating into host genomes and some represent risk factors for cancer induction,” says Dr Muhammad Khursheed, Joint Secretary at Pakistan’s Ministry of Food Security and Research.

Dr Ishfaq, a professor at the Institute of Agricultural Sciences, University of Punjab, shares the fears that GE foods might be carcinogenic. “In Pakistan, mainly women are involved in cotton picking in the fields — and we have seen a spike in cases of skin diseases among them,” he says. “These skin diseases could lead to skin cancer. This shows that even Bt cotton is not safe,” he says. Bt cotton is the only transgenic crop currently grown in Pakistan.

But Asim emphatically dismisses this claim. “It is not humanly possible for cotton pickers to get exposed to the Bt protein, unless ingested purposefully. Even then, it is an established fact that Bt protein is not harmful or allergic for human health. Over a thousand scientific studies prove that fact,” he says.

Another widespread concern is about the possible ill effects of GE crops on native germplasm and biodiversity. If genetically modified animals, plants and organisms are introduced into the environment, then they could affect biodiversity – existing species can be overrun by more dominant new species.

“It [GE crop] will affect the existing germplasm of Pakistan and may lead to disturbing the natural immune system of plants and animals against pests,” says Dr Khursheed. “A time might come when the pests and herbs will become resistant to these GE seeds and then we won’t have anything to control the apocalyptic situation,” adds Dr Ishfaq.

Asim says resistance is a natural phenomenon and by adopting trait quality assurance and stewardship practices insect and weed resistance can be managed. However, he dismisses the fears that GE crops would threaten native germplasm.

“In fact, GE traits present a great opportunity for domestic companies and plant breeders to collaborate and deliver the best seed to the farmer. The replacement of technology with its next generation with multiple modes of action provides additional safeguards,” he adds.

On the threat to biodiversity, Dr MacKenzie says that the currently commercialised GE crops have all been exhaustively studied for any potential impacts on the environment, including any adverse consequences arising from pollen-mediated gene flow; any changes in pest and disease susceptibility; any changes in potential weediness and invasiveness; any impacts on non-target organisms; and any effects on biodiversity. “In all cases, no significant impacts have been found, so these GE crops will not threaten the ecosystem of Pakistan,” he adds.

But Dr Khursheed says a one-size-fits-all approach would be unscientific. Generally, risks to biodiversity from GMOs might probably be extremely small, if the best containment measures are adopted, but in specific cases, the risks and consequences may be large.

“As a general rule and adopting a precautionary approach, it is, however, clear that each individual case needs careful study and appraisal and the best possible containment measures before approval for uptake into commercial production is given,” he adds.

A farmer's choice of seed is determined by his assessment of what is best for his farm, market demand and local growing environments. Proponents say, GE seed offers the ideal choice because it reduces the impact of agriculture on the environment, slashes costs via more targeted pesticide use, and minimises yield losses or crop damage from weeds, diseases and insects, as well as from extreme weather conditions, such as drought.

GMOs have helped to reduce pesticide application by 8.1% and increase crop yields by 22% over the past 20 years, according to scientific studies. Additionally, herbicide-tolerant GE crops enable farmers to reduce tillage, resulting in less loss of soil nutrients to dust from the farms and less use of fuels for the tractors and plows.

Apparently, farmers benefit the most from GE crops, but anti-GMO groups call it a ruse. They claim that since the genetic engineering technology is in the hands of a few multinational companies (MNCs), GE crops would lead to "corporate dominance" of agriculture.

Dr Khursheed shares these concerns. "GE technology is monopolised by MNCs; therefore, for every time sowing or rearing Pakistan will have to import GM seeds. This will deprive poor rural communities of their livelihood sources," he fears.

Dr Malik believes "corporate dominance" is already there as far as consumer goods are concerned, but in the case of biotechnology, there is a "silver lining" to it. "The entire hybrid maize and hybrid vegetable seed is supplied by MNCs... Over the last 20 years there has been a massive investment in creating infrastructure and expertise for biotechnology," he says. "Now there are several private sector agri-biotech companies which are marketing GM crops in collaboration with public sector universities and R&D institutions."

Asim agrees with Dr Malik. "These companies [MNCs] invest heavily in research and farmer education programs. Therefore, it is not a coincidence that maize was the only crop that showed positive growth these past years," he says.

Conversely, the MNCs have minimal presence in the seed market for other major crops of Pakistan, such as cotton, wheat and rice. "That is why these crops face a major challenge in terms of quality seed provision due to a lack of investment in research," he adds.

Dr MacKenzie blames stringent regulations for this "so-called corporate dominance".

Present-day agriculture in Pakistan has been able to meet the food security requirements due to the 'Green Revolution' of the late 60s. Now we are at the threshold of a 'Gene Revolution' which is based on GM crops using various techniques of biotechnology. GM or transgenic crops are an extension of conventional plant breeding techniques.

"With our ability to sequence the whole genome of economic crops we are able to devise strategies for increasing crop yield, for improving nutrition, for developing resistance against pathogens and pests," says Dr Malik.

But why take risks — even if perceived — when yields could easily be increased by other safe methods, asks Dr Khursheed. "Compared to the GE crops, other methods of breeding are safer, better, and protect the intellectual property right of our national crops."

Dr Ishfaq believes Pakistani farmers can increase yields without going the GMOs route. "We should strengthen our agriculture R&D, focus on native germplasm, work on hybrid, and introduce precision-farming. This could definitely increase the yields of various crops by 15 to 20%," he says.

Dr MacKenzie agrees that hybrid seeds, precision farming, "digital agriculture", improved agronomic practices, fertilisers, and other inputs can all make significant and important contributions to increasing productivity. But he adds that significant improvements in "harvestable yield has been accomplished by using GE crops to better manage weeds, pests, and diseases that would otherwise have resulted in significant yield losses."

Asim says no one claims the GE technology is a silver bullet and remedy to all challenges in agriculture. However, he says that farmers will have to take an integrated approach in employing all

available agri technologies if they want to enhance productivity using minimal resources. “Over 95% of maize crop area in Punjab is already on hybrid seeds and will not experience exponential gains in yields unless a new innovation such as GE traits are introduced,” he adds.

Pakistan should go for GM crops in cases where conventional breeding is not possible. And Dr Malik says all the commercialised GM crops fall in this category.

The writer is the Editor of The Express Tribune

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<https://tribune.com.pk/story/2109972/2-gmos-grossly-misunderstood-organisms/>