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I write in Hindustan Times the potential of introducing GM oilseeds in India to reduce dependence on imports and increasing farm income. India is one of the largest producers of oilseeds globally. But our consumption of edible oil is greater than domestic production, which makes us heavily dependent on imports. Over 60 percent of domestic oil demand is met through imports, and it is expected to increase further as per capita consumption has crossed 19 kg per annum now from 15.8 kg in 2012-13. India spent Rs 615 billion on the import of 13.35 million tonnes of vegetable oils during 2019-20.

If we want to reduce our edible oil imports by 10 million tonnes, our oilseeds production will have to reach 54 million tonnes by 2025. This seems difficult with the current pace. The introduction of genetically modified (GM) oilseeds is one plausible solution, that can help achieve the target of becoming self-sufficient in edible oil production sooner. The current average output from regular mustard is 1.7 tonnes per hectares while it can be 2.6 tonnes if we use genetically modified DMH-11 mustard variety. GM crops maximise crop yield. GM soybean variety developed by the Washington State University yields 36 percent more grains while the India- developed DMH-11 mustard variety produces 25-34 percent higher seeds compared to the non-GM varieties.

There have been demands from different farmer groups to allow GM oilseeds in India, it can reduce dependency on imports and help farmers earn a higher income. Prime Minister-appointed high-level committee on transformation in agriculture has already recommended allowing GM crops for oilseeds. Oilseed extractors too have joined the call and asked the Indian government to introduce GM oilseeds in the country. They say oil extracted from Bt cotton is being in use for a long time now and has been found safe. Many are even asking for replacing about 50 percent of land under wheat and paddy cultivation in Punjab and Haryana with oilseeds. Since India is producing wheat and rice in surplus amount, it makes it plausible to switch to oilseeds. Moreover, oilseeds are not water-intensive crops like wheat and paddy and can help in addressing the problem of fast-depleting groundwater levels.

Many advanced countries in Europe, Australia and the US have been cultivating GM crops for oilseeds such as rapeseed and Canola. In India, we urgently need a yellow revolution through GM mustard. Our government has increased minimum support prices for oilseeds significantly in recent years. Assured and higher yield supplemented by guaranteed remuneration in the backdrop of depleting ground water puts forward an opportunity to

farmers, to get better yields and price for their produce. The entire article can be accessed here.

We have also covered news around several important developments on agriculture across India, globally and in the area of research in this newsletter. We hope you find it a good read!

Shivendra Bajaj
Executive Director
Federation of Seed Industry of India-Alliance for Agri Innovation

News from India and Around the World

Farming Matters: Gene editing is the definition of a 'green' technology

(Farmers Guardian)

It was a Statutory Instrument, first laid in Parliament on January 20, 2022, and approved in the House of Commons by 305 votes for and two against. It will remove many of the costly and time-consuming requirements to carry out field trials of gene edited crops where the DNA changes involved could have occurred naturally or through conventional breeding. Until now, gene-edited crops were treated in the same way as genetically modified organisms (GMO), a legacy of the EU's approach to regulating new genetic techniques. It is a watershed moment, not only because it will make it easier for plant scientists, like me, to carry out research into gene edited crops – for example to help improve productivity; sustainability; climate resilience; food safety and nutrition – but also because it marks the first time in my scientific career that legislation has been passed which removes barriers to genetic innovation, rather than imposes or adds to them.

Introduction of GM oilseeds to reduce dependence on imports and enhance farm income

(The Telegraph)

India is one of the largest producers of oilseeds globally. But our consumption of edible oil is greater than domestic production, which makes us heavily dependent on imports. Over 60 percent of domestic oil demand is met through imports, and it is expected to increase further as per capita consumption has crossed 19 kg per annum now from 15.8 kg in 2012-13. India spent Rs 615 billion on the import of 13.35 million tonnes of vegetable oils during 2019-20. So we need to find a sustainable and efficient solution to improve the situation. The Government of India is making best efforts to increase edible oil production by encouraging farmers to grow oilseeds and adopt strategies to increase yield productivity. But these strategies will take time to yield results.

We are closely supervising the breeding of GM crops – Chief Executive Officer

(Modern Ghana)

Chief Executive Officer of the National Biosafety Authority (NBA), Mr. Eric Amaning Okoree says the outfit will be working closely with growers of genetically modified crops to ensure strict adherence to procedures and rules as it seeks to protect the integrity of conventional crops in the country. According to him, the organisation is putting in all efforts to ensure there is greater cooperation and collaboration between the NBA and the various regulatory institutions in the biosafety space through intensifying exchanges in knowledge sharing on modern biotechnology.

Modern crop improvement takes a historical approach

(GLP)

Sorghum, rice, wheat, maize and barley are hugely important in the human diet, with more than 50 percent of all calories consumed coming from just a few key cereal crops. Now scientists are pairing modern gene editing with a look at the past to improve the performance of these powerhouse plants. Before they occupied such a gargantuan portion of our diets, these organisms didn't look much different than the weedy grasses gardeners and farmers pluck from their plots. To make them edible, wild crop ancestors were subjected to a process known as domestication. Humans selected varieties of these species for favorable traits, such as larger and more numerous grains and loss of seed dispersal so that precious grains didn't fall to the earth prior to harvesting.

Can GM save the planet? Some farmers think it's worth a go

(Stuff)

Research into genetically modified (GM) technologies that could deliver environmental benefits needs to be reconsidered by regulators, the farming sector and consumers, the New Zealand Productivity Commission. A recent report from the commission, titled Reaching for the Frontier, said research of GM technologies was an important pathway to innovation in the primary industry and offered new opportunities to respond to climate risks, biosecurity threats and could also boost farm productivity. "Gene-editing technologies can be used to improve plant traits such as drought tolerance, disease resistance, and reducing greenhouse gas emissions in grazed animals, and animal traits such as increased disease resistance," the report said.

Public Perception Around GMOs Is Becoming More Positive, New Study Says

(The Debrief)

"This seems to be cautious good news for science," explained author Mark Lynas, head of research for the Alliance for Science (AfS). "Given the worldwide scientific consensus on the safety and utility of genetic modification, this suggests that misinformation about GMOs is losing its ability to persuade even on social media." To find this positive shift, the researchers studied the tone of over 10,000 online and print articles in top-ranked English-speaking media between 2018 and 2020. They also studied over 1.7 million social media interactions. The researchers found an average of 73% of publications were positive or neutral to the subject from their data. While the social media interactions were significantly more negative, there was still a positive shift, with 62% favorable to 78% of the interactions favorable by 2020.

A Journey from a Small Farm to Ground-breaking Scientific Research

(CALS News)

Anna Whitfield's path to studying big questions in agriculture began on a small family farm in Moultrie, Ga., where she saw first-hand the economic, societal and psychological impacts of destructive plant and animal diseases. "I study molecular virology, but my goal is always to keep one foot in the furrow," Whitfield says. "I grew up pulling weeds out of peanuts and helping my dad feed livestock, so I feel that I really understand the plight of farmers." "It was a diversified farm, but there was a lot of uncertainty, and that's what inspired my career goal to develop technologies that increase food security and reduce harm to farmworkers and the environment. I understood how drought and diseases affect crop and animal production."

New Study Debunks GMO Myths

(For Reports)

The authors note that GM technology represents just another frontier in a long human tradition of crop improvement. GM has served largely to bring efficiency and accuracy to an age-old tradition of crop and livestock improvement. "Humans have been altering plant and animal genomes for thousands of years. Selective breeding, also known as artificial selection, has been a routine agricultural practice since ancient times. Although the process of creating new traits takes time because it requires spontaneous genetic mutations, the development of genetic engineering tools has accelerated the production of GMOs," the authors note. Recent advances in molecular biology and genetic engineering technologies have produced crops with improved traits such as herbicide tolerance, insect resistance and better yields. "In addition, there is growing interest in developing GM

crops with improved nutritional properties, such as E.g. higher levels of essential microelements, healthier plants by changing their fatty acid profile or plants with delayed ripening," the report adds.

Centre's decision on genome editing to help quicker development of crop varieties

(The Hindu Business Line)

Genome editing technology has great potential in biology, including human and animal health, as well as in the agriculture and allied sectors. Since its invention in 2012, genome technology has globally revolutionised the medical and agricultural sectors.

Research scientists call for commercialisation of GMOs

(My Joy Online)

Research scientists are calling for the commercialisation of genetically modified organisms (GMOs) as it could add up to $31 million to Ghana's economy. So far, two crops have been developed using biotechnology. They are nitrogen- and water-use-efficient rice and the genetically modified cowpea. However, neither of these crops are commercialised yet, though they have gone through various stages of evaluation and field trials. Research Scientists believe it is appropriate that the nation facilitates the processes for the acceptance of GM-related technology to enhance food security.

Brazil's GMO sugarcane area to nearly double this year, company says

(Reuters)

Brazilian farmers are set to nearly double the area planted with transgenic sugarcane in the season starting this month, the world's main supplier of the genetically modified (GMO) crop, Centro de Tecnologia Canavieira (CTC) said. CTC estimates that new cane varieties resistant to stem-boring insects will cover 70,000 hectares in the 2022/23 crop cycle, up from 37,000 hectares last year in Brazil, one of the biggest sugar producers in the world. Brazil's GMO cane fields are still just a fraction of the planted area in the country, which totaled 8.2 million hectares (20.2 million acres) in the last harvest, but the planting estimates, which CTC rarely shares, underscore dramatic growth.

Malawian cotton farmers benefitting with Bt cotton seed

(Malawi 24)

The National Commission for Science and Technology (NCST) says Bt cotton – a genetically modified variety – has improved farmers' yield by 100 percent. Speaking in Lilongwe at a media workshop, NCST Chief Research Services Officer, Lyson Kampira, said since the introduction of Biotech cotton, the yields for farmers who adopted the seed have been increased to 800 kgs per hectare from 400 kgs per hectare which is a big improvement. "Cotton research biotechnology started in 2012 and today as we speak GM cotton produced through biotechnology has now reached farmers in Malawi. So the yields have been increased from 400 kgs per hectare to 800 kgs per hectare. Biotech cotton was introduced to reduce cost of production through reduced application of pesticides as it has resistance to some pests while producing more cotton fibre for improved yield," said Kampira.

Kenya's Daniel Magondu – a passionate farmer advocate

(Alliance for Science)

"I asked myself and fellow farmers in attendance, why should we keep sharing our sweat with pests and diseases yet there are crops that are resistant to them and can provide a solution?" That question was the birth of SOBIFAK — Society for Biotechnology Farming of Kenya — which advocates for incorporating new agricultural tools, including GM crops, into Kenya's agricultural system. Magondu knows these new tools can help increase production and protect farmer yields from pests and diseases.

New Research

Study: How do we reach 'food security? Biotechnology is key

(Agriculture and Food Security)

Global warming causes a range of negative impacts on plants especially due to rapid changes in temperatures, alterations of rainfall patterns, floods or drought conditions, and outbreaks of pests and diseases. These, in turn, affect crop production reducing the quality and quantity of agricultural

produce. Climatic extremes and high population growth significantly increase the world's food demand. Therefore, fulfilling the goal of attaining food security for the present and future generations is of prime importance. Biotechnology enables creating dramatic alterations on crops to withstand stress which is difficult to attain using conventional breeding approaches. It is a viable tool used to improve agricultural production. The development of biotechnological approaches such as genetic engineering, genome editing, RNA-mediated gene silencing armored with next-generation sequencing, and genome mapping have paved the way for precise and faster genetic modifications of plants. Such intensive efforts are currently underway creating desirable crop cultivars to meet the food demand and to support sustainable agricultural productivity for climate change adaptation.

A Future Without Fertilizer?
(Ag Web)
Announced in 2018, researchers from University of California, Davis, the University of Wisconsin and Mars Inc., continue to study a tropical variety of corn from Mexico that can fix atmospheric nitrogen using a mucus-like gel and bacteria from what looks like brace roots along the stalk. "I knew about this corn for a long time, but there was no way to approach it," says Alan Bennett, University of California professor. "All of a sudden, through advances in DNA sequencing technology there was an aha moment that we can do this now."

Cambridge's Crop Science Centre to begin field trial of GM and gene-edited barley
(Cambridge Independent)
A field trial of genetically modified and gene-edited barley is beginning this month. It will evaluate whether improving crop interactions with naturally occurring soil fungi could promote more sustainable food production. It is hoped the trial will show how the need for synthetic fertilisers could be reduced, which would improve soil health. Researchers at the Crop Science Centre - an alliance between the University of Cambridge and the crop research organisation NIAB - will assess whether the changes can help crops absorb water more efficiently, along with nitrogen and phosphorous from the soil - two essential nutrients often provided through synthetic fertilisers.

BioBetter develops cultivated meat with tobacco plants
(Hortidaily)
BioBetter, has assigned a new role for the much-maligned Nicotiana tabacum plant upon discovering it can overcome the greatest hurdle in cultured meat—that of scaled production. Working behind the scenes of the emerging cultured meat industry, BioBetter is repurposing tobacco plants to create the growth factors necessary for the cellular development of cultivated meat. This landmark botanical breakthrough could significantly reduce the cost of cultivated meat and advance it rapidly to scale-up. BioBetter harnessed the inherent advantages of tobacco plants by turning them into bioreactors for expression and the large-scale production of proteins. Plant bioreactors use renewable energy and fixate CO2. They are self-forming, self-sustaining, and biodegradable.

A Bold Idea to Stall the Climate Crisis—by Building Better Trees
(Wired)
In a non-peer-reviewed preprint first posted on February 19, scientists at Living Carbon claimed that by inserting new genes into poplar trees, they can make the plants grow 53 percent more quickly than their non-edited equivalents. Both sets of trees were grown under controlled conditions that differ significantly from the ones the plants would face in the wild, but Hall hopes that the edited trees will supercharge tree-planting plans by drawing down atmospheric carbon more quickly. "Our belief is that climate change is a problem of relative rates. And also, it's one that we can't just solve with man-made, intensely managed human processes like direct air capture," she says. (Direct air capture means building devices that could scrub atmospheric carbon dioxide—or others that might trap methane—but by one recent estimate it could take 10,000 such machines to make a difference in CO2 levels.) Living Carbon's eventual business model will be to plant its genetically engineered trees on land leased from private landowners, then give those landowners a share of the money earned by selling carbon credits earned against the growth of the trees.

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