

It's not my cup of...TEA

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It would have been nice to start this article by saying: since it's being widely discussed, let's try to understand something about these new genetic technologies applied to plants... but the truth is, there's very little talk about it.

One thing that chemical and seed companies learned from the great opposition to GMOs, which for about 20 years animated national and supranational decision-making bodies (and occasionally even courts), is that the less this issue becomes public, the better. God forbid that consumers—and more importantly, informed citizens—express their opinions clearly, and then politics would have to respect their wishes.

A complex topic, fan bases don't help

And so, here we are, with too few discussing TEA, or Assisted Evolution Techniques, a complex issue on which too often people take sides without question, as if it were a matter of sports team allegiance.

The choice of terminology is already significant, considering that life—and therefore evolution—has existed on Earth for nearly 4 billion years. Four billion years is quite an impressive curriculum, right? We humans only realized that DNA existed less than 150 years ago. I repeat: we realized it, we didn't invent it. DNA was there from the beginning. But no, we got it in our heads that we need to assist evolution, because it's too slow on its own. Step aside, we'll handle it.

The Terminology Problem: Is it really Editing?

The Anglo-Saxons haven't found better terminology with their New Breeding Techniques (NBTs) or New Genomic Techniques (NGTs), or—worse yet—with the so-called Genome Editing. Editing is for correcting; it's what you do before sending an article to print, cleaning it of errors, repetitions, and typos...

In short, we've started nitpicking Nature, but the problem, beyond the utter lack of elegance in calling ourselves correctors and assistants of something that has already amply demonstrated (and continues to do so every day) that it works perfectly (and in fact much better) without us, is another.

The Problem: Cui prodest?

When part of the scientific community (both private and public research) fell in love with GMOs—genetically modified organisms through transgenic engineering—they began promoting new seeds as the panacea for all the ills, not just of agriculture but of the world itself. According to them, GMOs would eliminate hunger, rid us of pests, weeds, and it would be Christmas three times a day.

But the real objectives didn't match the declared ones. No wonder GMOs have only affected four species (soy, corn, cotton, and rapeseed): the most industrially-oriented ones, useful for feeding the livestock sector and non-food sectors (from textiles to biofuels).

To this end, biotech multinationals imposed replacing conventional seeds with GM ones, and the main producing and exporting countries of these raw materials (USA, Argentina, Brazil, and Canada) now only grow transgenic plants.

These are the reasons why, with GMOs, not a single one of the originally declared goals has been achieved: because they replaced pre-existing crops and because they fed supply chains whose products are certainly not destined for countries with the greatest food security issues.



The Patent Problem

So, why were (and still are) multinationals so interested in GMOs? Because with the TRIPs agreements (Trade Related Aspects of Intellectual Property Rights), which were signed in 1994 and allowed the patenting of living organisms, these companies (the only ones capable of bearing the costs) gained the opportunity to increase their already strong power over the entire agro-industrial system through controlling the market for the main production factor—the seed.

The patent system accompanying GMOs forces farmers into submission, prohibiting them from reusing seeds from their harvests and requiring them to repurchase new ones each planting season. Not only because seeds from the harvest may be less productive (as often happens with hybrid varieties), but because the contract explicitly forbids reusing the seeds. If you do, it's like stealing, and you could be prosecuted.

In agriculture, however, which for about 12 thousand years was considered agriculture, producing one's own seeds is synonymous with freedom, self-sufficiency, the ability to adapt to the soil and climate of a specific territory, and thus identity.

The Synthetic Chemistry Backdrop

Moreover, the main protagonist of GM seeds (soy and corn primarily) hasn't been pest resistance for decades (as was originally the case with Bt corn, which was crossed with *Bacillus thuringiensis* toxins to make it resistant to the corn borer) but resistance to a chemical herbicide based on glyphosate, RoundUp (also patented by Monsanto, now produced by Bayer Crop Science, which bought Monsanto in 2018). The World Health Organization has classified glyphosate as a probable carcinogen. Later, the EFSA (European Food Safety Authority) declared its carcinogenicity "unlikely," and in 2023, glyphosate was authorized in the EU for another ten years. The reason for such pressure to keep glyphosate-based products in European agriculture is that this active ingredient, used in several herbicides (RoundUp being the most famous but others exist), is produced in Europe, specifically in Poland by Ciech Sarzyna, and despite numerous lawsuits in the US where Monsanto-Bayer lost and had to pay out millions in damages to citizens who got cancer, it remains in use.

Are GMO Fields Decreasing? Are We Sure?

After the enthusiasm that brought GMOs to 128 countries and about 200 million hectares of crops, starting in 2016, GMO areas have begun to decrease because the intrinsic weaknesses of the system became evident: health risks, the increasing and dramatic debt of farmers, especially in poorer countries (the very ones GMOs were supposed to help), deaths from chemical poisoning used recklessly, and the depletion of soil vitality from herbicides...

But this apparent reduction in GMO fields should be observed closely, as it is important to understand how these figures are calculated and with what seeds the old GMOs are being replaced. Official data on GMOs has always been problematic because multinationals have marketed them as “substantially equivalent,” so diverse data couldn’t be obtained. The only available data was from ISAAA, funded by the same multinationals to promote their products. ISAAA stopped providing data on GMO crops after 2019, but in the meantime, TEAs have come into play.

Are TEAs GMOs or Not?

Starting in the 2000s, the development of TEAs began. These are genetic manipulation techniques that, unlike the early GMOs, which introduced DNA segments from organisms of different species (thus transgenic), work on the DNA of a specific organism (editing) or on those of interspecific organisms that are interfertile. From a scientific point of view, it’s undoubtedly good news. It is indeed possible to identify the genetic trait in a plant that makes it susceptible to a certain disease or problem during its life and “cut” that trait to make it immune. This process is called editing. Alternatively, it is possible to look for resistance in a wild variety of the same species and modify the DNA of the plant we want to cultivate.



The European Court's Ruling... Sort of

In 2018, the European Court made a ruling that was supposed to be definitive. But essentially, it reaffirmed the validity of Directive 2001/18, meaning that organisms obtained through genetic engineering methods different from those that could naturally occur should continue to be considered GMOs.

This ruling is open to interpretation because it assumes that someone can predict with absolute certainty what could naturally occur (but when? under what conditions? at what times) and what cannot. Can a plant decide to amputate the gene that makes it vulnerable to a particular fungus?

What does the fungus say about this? The level of interdependence in nature is such that if someone arrogates the right to decide what can or cannot happen, they're probably just doing it for their convenience. In essence, while the ruling appeared to include TEAs in the GMO category, it actually left room for TEAs because they are not transgenic, without much clarification. All this benefits multinationals, for whom it's convenient to claim that NBTs are not GMOs.



A More Cautious and Less Profit-Driven View

A more cautious and less profit-driven perspective tells us that these DNA manipulations are, in fact, genetic modifications and therefore, these plants must also adhere to regulations (and possible bans on open-field cultivation that some countries, including Italy, have imposed based on a clear rejection by consumers). This ruling has consequences not only for cultivation but also for labeling requirements and, more generally, traceability.

These New GMOs Have a Feature the Old Ones Didn't Have

These new GMOs have a characteristic that the older ones didn't: since these are plants that could have potentially arisen through spontaneous crossbreeding or determined by farmers using traditional methods, it's no longer possible to determine from DNA analysis whether a plant was modified through TEAs or if it is a cross (or a new variety) that developed naturally or through traditional agriculture. Therefore, if we interpret that ruling cautiously, products

obtained through these techniques should be tracked and made recognizable to consumers.

But the Multinational Perspective Won

When the European Parliament, at the end of the last legislature, approved the text on NBTs, they applied the ruling in the most convenient way for multinationals. The problem is that NBT technologies are not as precise as they are made to appear, and using technology to perform genetic modifications (even when using genes from the same species) is not necessarily equivalent to the recombinations that could occur naturally. In any case, it is neither scientifically correct nor possible to assume that genetic engineering and natural evolution are the same thing.

Two Key Issues to Address

Now, the issue should be addressed by considering at least two matters:

1. **The Right of Consumers to Know What They Eat:** Food sovereignty means this too. Certainly, given the specific characteristics of this technology, health risks (such as allergies or other contraindications) posed by these products may be lower than those of their transgenic cousins; however, there remains an unpredictability that would require an approach guided by moderation, prudence, and directing research towards solutions that cooperate with nature rather than—once again—dominate it. Industrial agriculture has been tugging at the rhythms of evolution for the last 100 years, causing costs to the entire biosphere, as it's easy to understand when we observe that the agro-food chain is one of the main drivers of the ongoing climate crisis.
2. **The Perspective of Farmers:** The new varieties will be subject to patents similar to those of transgenic varieties. However, spontaneous pollination with non-modified crops will be much easier and less traceable: how will multinationals react if they find their "DNA" in fields of companies without a contract with them? Remember, we're talking about patents, and since food sovereignty concerns not only consumers but—first and foremost—farmers (and their right to grow food sustainably), the perspective shifts to a colossal expansion of multinational power over essentially every type of commercial agriculture: limiting farmers' rights to reproduce their seeds, as mentioned earlier, means reducing farms to contractors for multinationals, more than has already been done.

There's also an economic aspect: if the seed market is gradually monopolized by an increasingly smaller number of companies, it will be impossible to control seed prices from the bottom up. This represents a danger at every latitude, but in poorer countries, it puts the lives of entire rural communities at risk, despite the fairy tale that genetic technology will end world hunger. The bigger problem is that while GMOs were limited to four species, TEAs are now affecting and will affect many more; even tree crops. It's one thing to be subject to patent constraints for an herbaceous crop that stays in the field for a few months and produces commodities; it's another for a tree crop that stays in the field for years, if not decades, and can even produce high-quality products (think of the vine). In this regard, the European Parliament's statement that TEAs cannot be patented matters little. The patenting of living organisms is provided for in the TRIPs agreements signed by the EU, along with all WTO rules, and the EU certainly won't avoid respecting them and exposing itself to legal disputes at the WTO.

And Then There's Organic Farming

Another perspective is from organic farmers: how can those who practice organic farming protect themselves from these contaminations? The legal response seems obvious: stop considering them GMOs, and thus the problem for organic farmers won't arise. But we're not playing word games here. We are dealing with the future of soils, food production, and life on the planet. We have a Green Deal that—amid the mockery of those who want to continue profiting from pollution and disease—asks EU countries to reach 25% of land cultivated with organic farming within the next 5 years and halve chemical use in agriculture in the same period. The Green Deal is a controversial measure (we'll discuss it soon here on Rural Hack), but the fact remains that organic farmers are the planet's only allies right now, and their practices are in cooperation with nature, following the agroecology model.



Do TEAs Also Do Good Things?

It's certainly true that with these new crossbreeds, resistance to pests could be obtained in plants, meaning they wouldn't need to be protected with chemical inputs such as pesticides and insecticides. But it's also true that plants don't grow under glass domes. We've already seen this film with RoundUp Ready varieties, which resist glyphosate—thanks to the insertion of a genetic trait from a soil bacterium. In this way, farmers can use herbicides liberally (see the product from the same seed company) without worrying about damaging their crops.

The same story could—due to profit reasons, which drive multinational research—occur with the “creation” of a plant immune to a bacterium that could simply move elsewhere or, more likely, evolve very quickly to infiltrate that plant, which would then need further modification, and laboratories (and commercial staff) from multinationals are already working on that. We repeat: TEAs, like the previous generation of GMOs, are less precise than they are made out to be and could result in different outcomes than the ones they claim to guarantee.

The Real Question: What Agricultural Model Do We Look To?

The topic is far from simple, and if it becomes simple, it's only because someone is only telling us half the story. Sure, TEA varieties might resist drought and salinity or bacteria and viruses. Considered in isolation, ignoring any potential relationship with the rest of nature and, above all, the world of business and politics, they are objectively excellent solutions.

But they are productions that almost always require that industrial model, which, when applied to agriculture, has already shown the measure of the disasters it can cause. A model oriented to monoculture, which necessarily has negative impacts on biodiversity, soil health, and the environment in general. Global business doesn't care about small-scale farmers, and vice versa. The few chemical and seed companies that govern commercial agriculture want huge surfaces, and to obtain them, they are willing to do anything, including land grabbing operations that expel indigenous populations from their lands. And if they don't leave peacefully, chemicals can always be sprayed on the plantations surrounding their villages, putting entire communities' lives at risk, children first.

All This for a Five-Year Head Start?

Supporters of accelerated crossbreeding through TEAs claim that instead of the 6-7 years traditional methods take to develop resistant crossbreeds, TEAs only take 1. Is that it? Really? We've been bombarding the planet with chemicals for at least 100 years, and now we're anxious to find a solution that saves us 5 years? And what does it mean that we want plants resistant to drought and salinity? Does it mean that we don't want to work on mitigating climate change but just want to find a market solution to continue producing despite the disaster we've created and don't want to stop creating?

Let's Try, Really, to Talk About It

It's true that there are technical differences between transgenic GMOs and TEAs, but the implications, in terms of resource control, multinational power, and denial of rights (to information and food sovereignty, to name just two) are unfortunately very similar. The margin of unpredictability is certainly reduced, and that can only be good, but the social, political, economic, and environmental dynamics remain very similar. If TEAs are equated

with conventional varieties, control over agricultural production—and thus global food supply—and thus planetary geopolitics will increasingly be in the hands of a few multinationals, Bayer-Monsanto, Corteva, and ChemChina being the top players.

No one should touch research, but a regulatory framework is needed that prioritizes environmental protection and the most vulnerable: so let's talk about it again, let's talk about it more, let's talk about it all.

For further reading:

<https://www.science.org/doi/10.1126/science.adm7634>

<https://www.wired.it/article/tea-tecniche-evoluzione-assistita-riso-differenze-ogm/#uno>

<https://www.radarmagazine.net/il-dibattito-sulle-tea-e-sia-scientifico-che-politico>

<https://www.lifegate.it/coltivazioni-ogm-diminuzione-nel-mondo-e-la-prima-volta#:~:text=Ogm%20nel%20mondo,->

[La%20classifica%20dei&text=Le%20colture%20transgeniche%20pi%C3%B9%20diffuse,Siamo%20anc](#)

Fonte: <https://www.ruralhack.org/en/future-of-tea-and-gmos-agriculture-implications/>