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I have always been involved in agriculture.

But I have not always been a peasant farmer.
When I was little, I would help my parents at markets across Maine-et-Loire.

We sold vegetables from the family farm.

To earn a bit of pocket money and sell my own vegetables, I would collect squash seeds.

There were several varieties.

Pumpkins called Big Yellow of Paris

And smaller, Orange Hubbard.
I would sort them into Camembert boxes, on which I would write their names.

I was careful not to mix the varieties!

I would replant the seeds the following year.

And sometimes I had some funny surprises!

The seeds from certain squashes would produce squashes that were neither small nor orange!

And the seeds from the big yellow of Paris pumpkins would produce varieties of squash that were neither big nor yellow...
FROM THE PLANT TO THE SEED

Plants reproduce in different ways, some with the help of bulbs, tubers or rhizomes, others through the production of spores or seeds, and many use all of these reproduction methods.

For many plants, it is the seeds that will produce the future generations.

For fertilisation to take place, the pollen (male) has to come into contact with the stamen (female).

Insects, the wind and even gravity help plants and transport the pollen from flower to flower.

This is pollination.

For some plants, such as wheat, the transportation of the pollen to the stamen takes place within the plant itself.

This is called self-pollination.

For other plants, the pollination is “crossed”, meaning that the plant needs the pollen from another plant of the same species for fertilisation.

This is called cross-pollination.

Seeds produced through cross-pollination will produce plants that have some of the characteristics of both parent plants.

Hence the random combinations I would get as a child.
Farmers' Seeds

10,000 years ago, the first agricultural societies understood these reproduction phenomena and used them to domesticate the first cereals, for example.

They would put aside the seeds, ears, vegetables or fruits which seemed to have interesting characteristics, such as their yield, beauty, resistance or taste.

This is called mass selection.

By resowing part of the harvest every year, plants adapt to the land, to farming practices and to the local climate.

So I keep the seeds of the best adapted plants, to resow the following year.

This foundational act in agriculture enabled the development of all currently cultivated food plants.

Nearly 2 million farmers' varieties of 5,000 species have been identified.

Over the course of migrations and seed exchanges, farming communities adapted cultivated species and varieties to their local environments.

This is cultivated biodiversity!
I didn't know anything about genetics at the time...

But, it's really something that drew me towards seeds.

So I studied to become an agricultural engineer.

\[
\begin{align*}
AA \times BB & \rightarrow F1 \\
AB \times BA & \rightarrow AA \ AB \ BA \ BB
\end{align*}
\]

I wanted to improve plant varieties, adapting them to the needs of farmers.

I graduated with a specialisation in "plant improvement".
THE SEED INDUSTRY

Midway through the 19th century, the first seed farmers who specialised in the selection of cultivated plants appeared.

After the Second World War, plant breeders created new plants outside of fields in experimental stations and then in laboratories. They based their activity on a simple criteria:

Strip down the plant populations that peasant farmers use, keeping only a few separate plants to then multiply individually.

These are pure lines.

These plants are all similar: This homogeneity means that they can standardise production conditions and promote the increased use of chemical fertil and pest.

At the time, these new methods were presented as genuine progress for agriculture...

FI HYBRIDS

Following the introduction of pure lines, the seed industry very quickly began to use FI hybrids.

FI means first generation.

They concern the first generation from two pure lines after cross-pollination.

In addition to being standardised, hybrids are difficult to reproduce. If we resow them, the following harvest is unpredictable because the cross-pollination has not been stabilised.

Therefore, a farmer has to buy new seeds every year.

And becomes dependent on the purchase of seeds.
THE OFFICIAL SPECIES AND VARIETIES CATALOGUE

In 1949, the registration of agricultural crop varieties in the official catalogue became compulsory.

Only seeds from varieties registered in the official catalogue are authorised for sale and exchange!

The catalogue organises the seed market by creating a monopoly.

Only "elite" varieties are developed.

Farmers' varieties cannot be registered in the catalogue because they do not pass the entry test! They are not standardised enough...

To register a variety in the catalogue, it must satisfy certain criteria of the "PLUS" test:

DISTINCTION, UNIFORMITY, STABILITY.

- **Distinction:** The variety must be distinct from other existing varieties.
- **Uniformity:** All the plants from the same batch must possess the same characteristics.
- **Stability:** With each generation, the seed producer must be able to cultivate seeds that grow into identical plants.

Moreover, registering a variety in the catalogue comes at a price...

That penalises small-scale seed selectors as well as small-scale farmers who want to register their own variety.

60% of registered varieties in the catalogue are F1 hybrids.

All of them are calibrated and standardised in order to adapt them to intensive agriculture.

One of the direct consequences is loss of diversity.

Over 50 years, estimates suggest that 75% of cultivated biodiversity has disappeared.
PLANT VARIETY RIGHTS

To make their stranglehold over seeds complete, plant breeders developed a property right for their varieties:

PLANT VARIETY RIGHTS.

It guarantees the plant breeder, the one who bred the new, protected variety, a quasi-monopoly over sale of the seeds over a period of 20 to 30 years and leaves the genetic resources freely available to the other seed companies to create new varieties.

However, plant variety right does not allow peasant farmers to keep part of their harvest in order to resow it.

They can still do it for some species (such as wheat).

But they have to pay ...

COMPULSORY VOLUNTARY FEE

An overwhelming majority of the varieties registered in the catalogue are now under the protection of a new variety certificate.

From the 70s onwards, local varieties have been disappearing in industrialised countries.

Little by little, peasant farmers become dependent on the varieties in the catalogue and lose their expertise in seeds.

At the same time, the seed industry tries to prevent them from resowing commercial varieties (F1 hybrids, seeds that are under the protection of a plant variety right) through every means possible.
For 8 years, I worked for a big seed company, near Angers, to develop varieties of rape seed.

And then, in 1996, the first GMOs appeared on the market.

At that time, my company worked with a biotechnology firm.

We were in charge of inserting genes that the firm provided in order to create new varieties.

Transgenic GMOs.

GMO (Genetically Modified Organism)

An organism, with the exception of human beings, whose genetic material has been modified in a way that does not occur naturally through multiplication and/or natural recombination.

For plants, some prefer to use the term GM: Genetically Modified Plant.
**Transgenesis**

Transgenesis is the transfer of one or several genes from one species to another.

Essentially, we take the genetic information within a certain organism, the gene of interest. For example, a gene that produces insecticidal proteins.

It is extracted from the genome of an organism that possesses this characteristic.

After a few additions and modifications, it is sent into the cells of another plant.

The receiving organism.

Once the modifications are complete and the results are conclusive, the resulting organism is regrown from the cell in vitro.

The gene can then be incorporated through cross-pollination with a commercial variety.
More than 99% of GMOS currently cultivated in the world, or GMOS waiting for authorisation, are pesticidal plants.

Plants that are resistant to herbicides,

Plants that produce their own insecticide (Bt plants)

Weeds in your harvests?

No problem, we sell containers of herbicide and the GMO that goes with it!

Tired of dealing with insect pests? GMOS take care of them for you!

GMOs are the solution to your problems! They are the future!

There are even plants that possess both properties.

This is how certain firms claim to solve problems linked to intensive agriculture...

By promoting the use of chemical products that they themselves have developed.

The pesticides that are used are highly toxic and they accumulate in the ground, water, plants and on our plates!
It is impossible to predict how a gene introduced into an organism in a laboratory will behave in the environment.

There is a significant risk of contaminating non-GMO crops and wild plants, which could have serious consequences.

It is possible for some insects to end up disappearing because they have come into contact with pesticidal plants.

As nature would have it, other insects and plants mutate under the strain of these pesticides and end up becoming resistant to these molecules.

As a result, the use of these products increases, as does land and environmental pollution.

The genome of the plants that have been destabilised through transgenesis can restructure itself from generation to generation. No one knows what this could produce!

For the time being, there have been no "long term" studies on the health and environmental risks linked to consuming GMOs...

Even though the damage of these first GMOs is increasing following two decades of cultivation in certain parts of the world.
The company that I worked for thought it could sell its GMO technologies to all seed companies.

It wanted to sign agreements so that seed companies could integrate the genes that it had developed into various varieties.

All of this under the protection of patents.

Therefore, thanks to the patents, it could receive the royalties without having to worry about producing the seeds.

For the company, that was the added value!
PATENTS

THE PATENT IS AN OWNERSHIP TITLE ON AN INVENTION.

IN THE PLANT SECTOR, IT GIVES THE OWNER A MONOPOLY TO EXPLOIT THE SEEDS AND PLANTS IN QUESTION FOR A PERIOD OF 20 YEARS.

TO FILE A PATENT, THERE HAS TO BE AN INVENTION, RATHER THAN A DISCOVERY, WHICH IS A SIMPLE OBSERVATION OF AN EXISTING PHENOMENON.

UNLIKE PLANT VARIETY RIGHT, THE PATENT APPLIES TO A PART OF THE PLANT (OR TO GENETIC INFORMATION WITHIN THE PLANT), TO THE BIOTECHNOLOGICAL PROCESSES THEMSELVES (FOR EXAMPLE, TRANSGENESIS), OR BOTH.

EVEN IF THE GENETIC INFORMATION PATENTED IN THIS WAY ALREADY EXISTED NATURALLY.

IN ITS FINAL STAGE, THIS PATENTED GENETIC INFORMATION IS PART OF THE PLANT'S IDENTITY. IT GIVES THE PLANT THE DESIRED CHARACTERISTICS.

BY EXTENSION, THE PATENT ALSO PROTECTS THE PLANT.

SIMILARLY, A PLANT THAT NATURALLY HAS THESE CHARACTERISTICS, THAT HAS BEEN CONTAMINATED OR THAT HAS OBTAINED SIMILAR CHARACTERISTICS TO THOSE SET OUT IN THE GENETIC INFORMATION THROUGH CROSS-POLLINATION, ALSO FALLS UNDER THE PATENT'S SCOPE.

THE PATENT THEREBY ALLOWS THE BIOTECH INDUSTRY TO CLAIM OWNERSHIP OF PLANTS AND ANIMALS WITH THE SAME CHARACTERISTICS AS THOSE PATENTED.

THIS IS AN ENORMOUS THEFT OF NATURAL, PEASANT FARMERS' RESOURCES.
GMO REGULATION

AT EUROPEAN LEVEL, GMOs Are MONITORED, EVALUATED, GIVEN OR DENIED AUTHORISATION, AND LABELLED.

MEMBER STATES THEN HAVE THE POSSIBILITY TO BAN A GMO ON THEIR TERRITORY.

IN FRANCE, THE CULTIVATION OF TRANSGENIC CORN, THE ONLY GMO AUTHORISED IN EUROPE, IS FORBIDDEN.

HOWEVER, IT CAN BE IMPORTED.

THIS IS THE CASE FOR MOST OF THE FOOD FOR LIVESTOCK (FOR EXAMPLE, SOYA) AND SOME CONSUMER PRODUCTS

WHICH MUST BE LABELLED IF THEY ARE MORE THAN 0.9% GMO

 BUT THERE IS NO OBLIGATION TO LABEL FOODS THAT COME FROM ANIMALS THAT HAVE CONSUMED GMOs.

HIDDEN GMOs

MOREOVER, THESE REGULATIONS DO NOT AFFECT CERTAIN GMOs WHICH ARE NOT CREATED THROUGH TRANSGENESIS.

THIS IS THE CASE FOR GMOs CREATED THROUGH MUTAGENESIS OR CELL FUSION.

THEY ARE, BY DEFINITION, GMOs. THEIR GENETIC MATERIAL HAS BEEN MODIFIED IN AN UNNATURAL WAY.

WE EXPOSE AN ORGANISM TO RADIATION OR CHEMICAL PRODUCTS.

WE SELECT THE CELLS THAT HAVE THE MUTATION IN ORDER TO MULTIPLY THEM AND THEN WE DEVELOP THEM TO MAKE A PLANT.

ALL THIS HAS NOTHING TO DO WITH NATURAL MUTATIONS.

CERTAIN RAPESEED, SUNFLOWER AND CABBAGE VARIETIES CURRENTLY CULTIVATED IN FRANCE ARE HIDDEN GMOs!
In France, at the end of the 90s, the general public became aware of the GMO issue.

Important fights took place, including the destruction of fields, hunger strikes...

Since GMOs were not as successful as expected, the big biotech companies that own the patents gained fewer benefits than they had anticipated.

In the context of such widespread competition, these seed companies bought the small and medium-scale plant breeders.

In a few years, almost the whole of the seed sector belonged to only a small number of firms specialised in the agrochemical industry.
The company I worked for was bought and I was a GMO researcher.

As someone who wanted to help peasant farmers feed the world, working with GMOs was not the solution...

The way in which patents take ownership of living organisms was the final straw for me.

No Entry
Private Property

I stayed for two years and then I resigned!
I took over the family farm and, little by little, I turned towards organic farming.

Transgenic GMOs are regulated and labelled...

But for a few years now, we have been talking about NBTS...

New breeding techniques.

They are also GMOs, new GMOs that could bypass some regulations.
NEW GMOs

The NBTs "New Breeding Techniques" are a group of new biotechnologies that appeared in the 2000s.

They enable the activation or deactivation of a part of the genome, the insertion of DNA fragments or the imposition of a genetic characteristic on every descendant of the modified organism.

There are various techniques, with nice, simple names...

- Zinc-finger nuclease
- Site-directed mutagenesis using oligonucleotides
- Agroinfiltration
- CRISPR/Cas 9
- Gene modulation through RDDM
- Meganuclease

Similarly to transgenesis, these organisms are developed to respond to the needs of the agro-industry.

These manipulations are presented as being so precise that it would be impossible to detect the human intervention.

However, these are modifications that are targeted, chosen and carried out in an unnatural way.

CRISPR-Cas 9 enables the localisation and selection of a genetic sequence in order to remove it or modify it, for example.

Indeed, they are GMOs!

And as with all GMOs, the human interventions that affect the genes cause numerous non-intentional modifications.

We do not know what affect a plant created in this way in a laboratory could have on the environment or on our health!
Since it is not an issue of "traditional GMOs", such as those produced through transgenisis, the companies that produce them would like us to forget that they are GMOs.

How can we sell GMOs to people who want nothing to do with them?

We just don't tell them that they're GMOs!

So they talk about new breeding techniques and go so far as to claim that their techniques do the same as nature...

But... if they're natural, they're not an invention... they can't be patented!

They do the same as nature, but on top of that, they're targeted and quicker!

They're new!

And yet to this day, these new GMOs are still patented.

The big agrochemical companies are looking for ways to profit from the loophole that hidden GMOs have opened up in order to sell nameless GMOs under the radar without hindrance.

Without taking account of the possible damage that multiple unintentional genetic modifications could cause,

these new GMOs could be grown freely and the products containing them could be placed on the market without any particular evaluation or label.

Therefore, some big firms are going to increase their number of patents, continue to confiscate peasant farmers' seeds, take ownership of living organisms, monitor production methods and, as a result, our nutrition.
A Few Examples

This doesn’t just happen in graphic novels.

Various varieties created through NBTS are awaiting authorisation to be put on the market.

For example...

Each year, big fast-food chains lose a large part of their stock of potatoes because they cannot store them long enough in rooms.

Indeed, this storage method favours the production of acrylamide, a carcinogenic substance that makes the potatoes turn brown when they are fried.

As a result, a biotechnology company has seized the opportunity and developed a type of potato that supposedly produces less acrylamide with the help of new genetic modification techniques.

This variety could be on the market by 2019...

This is only one example, but it demonstrates how the GMOs are not created to guarantee better nutrition.

They are designed to respond to the agri-food industry’s demands.
We can also look at various cases where living organisms have been patented.

For example, there is a variety of wild pepper from Jamaica that is resistant to whiteflies. These are one of the “harmful” insects responsible for the damage to pepper crops.

A big company introduced this resistant characteristic to another variety through controlled cross-pollination.

As a result, the new variety is also resistant to whiteflies!

This is where the patent comes in!

Once filed for the gene that creates this characteristic, it guarantees that the firm has exclusive rights over all peppers that have this resistance:

The new variety and all the other pepper varieties that could resist this “pest”

Even if this characteristic originally came from a natural, random mutation or from a peasant farming selection.

We are witnessing the absolute privatisation of living organisms:

A few industrialists can monopolise all the characteristics that wild and domestic biodiversity has to offer.

This is biopiracy!
IT IS IMPORTANT TO FIGHT AGAINST PATENTS THAT TAKE OWNERSHIP OF LIVING ORGANISMS AND AGAINST THESE NEW GMOS...

THROUGH THE GMO FIELDS THAT WE RAze, BY FOILING THE STRATEGY OF BIOTECH COMPANIES, BY MAKING PROGRESS THROUGH A LAW...

But also on a daily basis on farms!

Here, I cultivate a large number of farmers’ grains.

Recently, I have been working on organic market gardening. In addition to grains and milk,

I offer high-quality, local and seasonal products.
Peasant Farming and Farmers' 

So I am involved in peasant farming

And there cannot be peasant farming without the independence to make decisions!

Being able to choose your own seeds, resow them, exchange them and sell them are the foundation of all types of agriculture...

Plants that come from farmers' seeds do not meet the industry's criteria. They are neither uniform nor stable.

In contrast to pure lines, F1 hybrids and GMOs, farmers' seeds have no rights imposed on them, which means that I can reproduce them however I like.

In case of unforeseen events, I am always guaranteed a harvest because my plants are a population of different individuals rather than clones!

They also possess a lot of genetic diversity thanks to which they can adapt to their environment, so they require less fertiliser, treatments and expenses.

I become more independent!!

However, the majority of them are not registered in the catalogue and are not on the market.

Therefore, I exchange them with other peasant farmers and I rediscover traditional expertise.

Together we can produce our own seeds!
Obviously, the stakes are very high and managing it all is not always easy.

But I am rewarded, I have rediscovered the meaning of my profession and I get a lot of recognition from my clients!

Farmers’ seeds are the seeds of the future!
To Find Out More:

Confédération paysanne
Trade union for peasant farming and protecting farm workers
www.confederationpaysanne.fr
- Booklet on the varieties that have been made tolerant to herbicides and on new GMOs
  http://www.confederationpaysanne.fr/mc_nos_positions.php?mc=26

Réseau Semences Paysannes
Network for biodiversity that is cultivated in farms and gardens
www.semencespaysannes.org
- 10 common misconceptions about farmers’ seeds

Inf’OGM
Citizen watchdog for information on seeds and GMOs.
www.infogm.org
- New GMOs
  www.infogm.org/les-nouveaux-ogm-
- Labelling and public information
- GMOs and health
  www.infogm.org/OGM-et-sante

Via Campesina
International peasant movement
www.viacampesina.org
- Our Seeds, Our Future
  https://viacampesina.org/fr/les-semences-notre-futur/

European Coordination Via Campesina
The European branch of La Via Campesina.
www.eurovia.org/main-issue/seeds-gmos/

ETC Group
Monitors the impact of emerging technologies and business strategies on biodiversity, agriculture and human rights
www.etcgroup.org
- “Who Will Feed Us?” report, November 2009
  http://www.semencespaysannes.org/bdl/docs/qui_nous_nourrira_etc.pdf

Free Pepper
European coalition against a patent on peppers granted to Syngenta
- “Free Pepper” campaign
  https://www.publiceye.ch/fr/themes-et-contexte/agriculture-et-biodiversite/semences/free-pepper/

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