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What is Different About GM Technologies ?

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I'd like to divide my introduction into 3 parts:

1. Have a look at 3 fairy tales from industry and genetists
2. Biodiversity and genetic engineering
3. Towards a sustainable future – but how?

1. Three Fairy Tales from Industry

The first is: Coexistence is possible – we can manage problems of contamination

When you plant large areas with GE plants, genetic material will disperse – like the ink in this water. Pollen will be carried away by wind or bees and contaminate neighbouiriong fields or wild plants. Seed will be dispersed by birds. And then a little storm might do the rest.

I'll show you a worst case example, but one which is about to be approved in the States.

Two companies, Monsanto and Scotts, have genetically engineered a strain of creeping bentgrass (Agrostis stolonifera) for use on golf courses; the transgenic grass is resistant to the herbicide Roundup. So groundskeepers can spray Roundup on their greens, weeds are killed; the grass looks smooth and nice, ready for golfers.

A recent study from the US EPA Environmental Protection Agency found that the genetic altered pollen of bentgrass can spread as far as 21 km! That's an awful long distance. Here in Berlin: From trainstation Zoo to this place here it's about 16 km , but the pollen travelled 21 km. Much farther than anyone had thought possible. The creeping bentgrass has a dozen or so weedy relatives. Scientists fear that this pollen could transfer its herbicide resistance to these weedy relatives; thus creating superweeds that would be immune to the herbicide. And the grass is a perennial. Furthermore: It's one of the first dispersal studies done from a big field – and researchers found that geneflow is higher , the pollen travels farther than observed from small fields.

A worst case this is; the pollen of the creeping bent grass being very light. The pollen of maize or sunflower donot travel that far, wheat pollen even less. But then again, all of you suffering from hay fever know how far pollen can be carried by the wind.

Of course there are techniques to reduce contamination through transgenic pollen, like keeping a buffer zone between the fields or sowing at different times. But contamination with transgenic material not only occurs through pollen. So coexistence techniques also have to include the introduction of 2 sets of sawing machines – one for GE, one for not GE – , 2 sets of agricultural machines, 2 sets of transportation trucks, two mills, two production sites – at enormous costs.

And there are other risks, besides contamination: Part of what makes GMOs such an environmental threat is that, unlike chemical contamination, GMOs are living organisms, capable of reproducing and recombining, and once they get out, they cannot be recalled. There is no limit to the kind of environmental surprises that can occur; damage to beneficial insects, impacts on soil food webs, allergic reactions of humans.

Contamination of non-GE plants with GE-material touches another point, and that is our democratic right to choose freely what we ant to eat. Once larger areas are planted with GMOs, all will contain traces of GMOs. Then everybody will be compelled to consume GE products. The Swiss Ethics Committee of which I'm a member, but which has a majority of GE supporters, recommends the consideration of a moratorium of commercial releases mainly because of this point: the freedom of choice , understood as a liberty right that nobody should be forced to eat GM-products – has to be granted.

The second fairy tale: GE is nothing else than breeding. Breeding means exchanging genes

Maize cobs were bred from this gras Teosinte – some 7000' years ago. Indios farmers bred and crossed these plants, thus exchanging genes over thousands of years, to finally come up with todays maize plant.

But there are some mayor differences. The first one: Genetic engineering enables a dramatic speeding up of time. It took Indios 7000 years to breed maize; it takes genetists a few hours to exchange 100 or 1000 of genes.

Second difference: With genetic engineering it is possible to overcome species boundaries. Never before was it possible to transfer genes from a fish to a tomatoe plant to render the tomatoe more resistant to frost. Or to transfer bacterial genes into maize, so this plant will produce a bacterial toxin.

So there ARE substantial differences; and nature will be confronted with new and artificial organisms it never had had a chance to coevolve with or to establish networks of dependencies and relations.

Third fairy tale: GE is precise, whereas conventional breeding is pure chance

The main technique to introduce new genes into the genome of a plant is to shoot the genes into the cells, using a sort of shotgun 22 caliber ballistics. This is clearly a „hit-or-miss" technique. You do not know how many genes integrate into the genome and where they integrate. The foreign genes break into finely tuned webs, affecting neighbourhood relations or mutual effects far away.

Last Summer I talked with a molecular biologist at the ETH Zürich, his name is Cesare Gessler; his research is marker assisted breeding with apples. He's an expert on apple genomes. In his lab they use the knowledge of the apple genome to do conventional breeding. They check with the help of genetic markers, if the young apple seedlings contain certain resistance genes or not. Gessler says that these genetic markers could speed up conventional breeding – but the researchers would not produce transgenic apple trees and certainly not plant them in nature.

Cesare supports our struggle for a GE free Swiss agriculture. He says that the technique to manipulate plants is just too crude, too unprecise, too many unpredictable risks; that we're

just at the very beginning, and genetic engineering is just only a dinosaur technique. Releasing transgenic plants could have unpredictable effects. He says he too would not like to eat tomatoes with fish genes or apples with antibiotic resistence genes or with viral genes. He would feel uncomfortable.

So then the technique is anything else than precise, and its effects cannot be predicted.

2. Biodiversity and genetic engineering

This is a difficult issue. The direct effects of transgenic plants on biodiversity – the wild as much as the agricultural biodiversity – are extremely hard to evaluate. I was at a congress dealing with these issues, organised by Angelika Hilbeck who is also here, and researchers showed slides like this one:

There are many different levels of dependencies and interactions between a plant and its predators and beneficial insects; and the interaction patterns even change during the year. So which insect should we concentrate on for research? Which could be the most relevant one? What I got out of these presentations is an immense complexity, and we still know very little about it.

The largest study ever done on biodiversity and genetic engineering was done in England: it was a 3 years project which included field studies on over 200 sites . One result was that transgenic plants DO affect biodiversity. In most cases – not in all – the skylark and other birds and insects from the red list were found to be among the losers.

But my main concern regarding biodiversity is: I'm convinced that genetic engineering leads to more monocultures, to more concentration of the seed market. These were exactly the factors that lead to a dramatic loss of biodiversity in the past 40 years, even without genetic engineering. The strategy of intensification in agriculture led to increasing production, to extended monocultures – and to huge losses of biodiversity. In India there once were 30'000 different rice varieties; today 11 high yielding varieties make up over 2/3 of the overall rice yield.

Two figures should underline my statement that GE will boost up the loss of biodiversity.

Monsanto owns over 90% of the whole transgenic seed market. One single company, over 90%! The rest is shared by a handfull other multinationals like Syngenta, our guest tonight.

Worldwide you'll only find 2 traits which make up over 98% of all crops: Herbicide resistant crops and Bt-crops, which are insect resistant because of a bacterial toxin-gene. Nothing else, just 2 traits. Worldwide.

Their dream – you see it on this add: monocultures, huge monocultures And then: There is this unhappy marriage between genetic engineering and patents. Transgenic plants can be patented; conventionally bred plants cannot be patented. Through a patent the Company gains the exclusive control over its so called „invention". Farmers planting GE plants have to pay royalties and follow the companies instruction. Many countries from the South vehemently oppose these patents; they fear the remote control over the seed market by these companies.

So Genetic engineering is the business of a handful giant companies. I like this add – some time ago, when Sandoz merged with Ciba. Modesty never was a trait industry could be blamed for.

And Big Busieness is now aggressively pushing GMOs, all over the world, looking for entry points to invade new markets. As a biotech industry consultant (Don Westfall) put it:"The hope of industry is that over time the market is so flooded that there's nothing you can do about it. You just sort of surrender." One such entry point seems to be Eastern countries to break into the Euroipean market, another one South Africa, to break into the African market. Strategic contamination is another word for this tactic.

So the question really is: Can we resist this imperial invasion, can we defend our sovereignity, all of us, our friends from farther East, or South, or right around here.

At stake is not only biodiversity and our environment, but also our livelihoods, our fundamental democratic right: the freedom of choice.

Agro genetechnology became a symbol of a highly problematic industrial agriculture made in USA. It is an important poker in a globalised competition, where the issue is control and markets, not feeding the world. This is what we have to keep in mind.

3. Towards a sustainable future – but how?

So what's the alternative? This really interested me in the last 6 years. In a long run, I'm convinced, we only can fight GE when we, at the same time, can show smarter and more economic solutions, with respect for nature.

During these 6 years of inquiries I came up with 2 interesting facts.

One, of course, is that there is huge and growing evidence of innovative solutions without GE. High tech research joining in with farmers, letting nature work for us, and making use of biodiversity. You'll see some examples on videos. Alex Hagmann, who produced them for different TV channels, will be here this afternoon. To give you a Swiss example – I'm pretty patriotic, I guess: You'll see close-ups of the European cornborer and how tiny wasps – trichogramma – lay their eggs into this pest and fight them successfully. Farmers get an envelope with wasp eggs at the right time and just hang them on some maize plants in the field – there is no need for transgenic Bt-maize. There are many, hundreds examples like this one.

Another rather fascinating fact I found: Recent studies in molecular biology show clearly, that plants are not molecular machines, always acting in predetermined ways.

A plant is a sensitive being, she is in constant communication with her neighbour plants – with the help of odours; a plant can learn, remember, even foresee future actions – a plant, molecular biology found, is an extremely sensitive and responsive and highly complex being.

Genetic engineering, against this background, looks like an outdated technique, a dinosaur technique, crudely tampering with genes, as if a plant were a machine and you could just add a screw or a gene here and exchange an exhaust valve there. A technique producing non predictable long time risks. And not necessary at all.