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Eco researcher on new genetic engineering method

"CRISPR has great potential"

URS Niggli is the most important scientist of the organic scene, which rejects any genetic manipulation.

Now, he makes public his inner turnaround.



The wine farmers could benefit from the new genetic engineering methods, says Urs Niggli
Photo: dpa

Taz: Mr Niggli, you have fought for decades against genetic engineering in agriculture. Now, with the new "CRISPR/Cas" genetic engineering method, you can manipulate plants and other organisms much easier and more accurate than with the previous procedures. Do you have to change your attitude towards genetic engineering?

URS Niggli: CRISPR/CAS has great potential. It has risks like any technology and can be used incorrectly. You should assess each application individually instead rejecting this technology generally. I know already now applications that make sense. You have to look how the risks are compared to those other solutions for the problems where they will be used.

Which applications would be it helpful?

You can turn off genes for susceptibility to disease or insert from the related wild plant resistance genes back into modern varieties. These are properties that have been lost in large parts by the breeding towards yield or quality in the last hundred years. Because you actually could reduce pesticides on a large scale.

Plants that defend themselves better against disease-causing agents - that would be something for the organic farming, indeed?

Yes, in organic farming, for example, the fungal disease of Downy Mildew is an unsolved problem. It reduces yield of potato, vine, many vegetables or the hops and increases the cost. When you drink organic beer, the hop was treated with a copper-containing pesticide. The end of the EU approval for copper is foreseeable because it is a metal that does not degrade in the soil, and because it can inhibit bacteria and fungi there. We work at the Research Institute of organic agriculture on plant extracts, to replace copper, but it is still a long way to the market.

IN THE INTERVIEW:

URS NIGGLI



Photo: FiBL

A plant scientist (62), he works since 1990 as [Director of the Research Institute of organic agriculture](#) (FiBL) in the Switzerland. The organization is the most important scientific institution for the organic farming. In addition, the professor teaches organic agricultural sciences at the University of Kassel Witzenhausen.

The organic associations reject CRISPR/CAs. What you say to the argument you could breed disease-resistant varieties through traditional crossbreeding?

It would require probably 30, 40 years of breeding work and large funds. I doubt that society is willing to finance it. It takes typically 20 years to breed an Apple variety which is resistant to scab disease. Often the germ changes within 5 years, so that he may again damage the fruits.

Do you recommend the organic industry to accept CRISPR/CAs?

The organic farmers decide that on their own, but presently there dominates a dismissive skepticism. Not only technical considerations are relevant to the organic farming, it is also about the naturalness and authenticity of the food. CRISPR-Cas could be already a step too far.

THIS IS CRISPR/CAS

CRISPR/CAs is currently the most popular trend in gene technology: many scientists are almost euphoric because they can alter genes better, faster and cheaper than previously with the method used for the first time in 2012.

Researchers used older genetic engineering procedures such as the gene-gun method inserting dissimilar genes in the genome, and sometimes destroyed also functional DNA parts. Also, genes had to be incorporated with these methods for technical reasons which were not actually wanted.

With CRISPR/CAs, however, a protein routinely cuts the genome at a particular location with high accuracy. Then the repair systems in the cell reassemble the DNA – according to a template created by the scientists. So precise genome parts can be removed, inserted or new ones can be created.

What are the consequences if your organizations continue to reject CRISPR/CAs plants?

I assume that the organic industry remains consistent in basically rejecting the technology and disagree to any case to case assessment for individual applications. This means that the eco-scene must multiply their efforts for their own breeding. It would be unfortunate, if the conventional farmer could use a potato variety which does not need pesticides and organic farmer must continue to use a potato variety, which he must spray with copper.

The old genetic engineering is mainly used to make plants resistant to chemical pesticides and facilitate conventional monocultures. Why do you think that the new genetic engineering can now create a more meaningful agriculture?

The old genetic engineering is driven by the large corporations, because it is very expensive - partly also because of all the safety requirements needed. These companies have an industrial agriculture in mind and interest, in order to not sell just seeds, but also the suitable weed killer. CRISPR/CAs can apply to small farmers: it is technically extremely easy, and an application costs only about 50 to 60 euros.

Also Monsanto and other seed companies are involved in CRISPR/CAs. Will they expand their already huge market power with these methods?

I don't see that. CRISPR/CAs is a democratic method. Now already it is in use by thousands of State laboratories.

But also the new genetic engineering could be patented so that breeders can develop it only with the consent of the patent holder?

The patent situation is currently completely unclear. Applications which I have in mind, only a tiny fraction of the genome is changed: less than 20 base pairs, of which a plant has a total of about 70 billion. And the mutation is indistinguishable from natural mutants. Therefore, it will be difficult to prove a patent infringement.

How should we label seeds and food from CRISPR/CAs plants?

I support the organic associations, that the breeding method should be labeled. If you label it as "genetically modified", the method will die before it is even started. Because hardly anybody in Europe would buy such food. Perhaps, you could develop a new labelling, for example "CRISPR/CAs".

Should CRISPR/CAs plants be regulated according to the same rules as products of the old genetic engineering?

No. I advocate for a new, very sophisticated test procedure. There will be properties as disease resistance which are based on minute genomic modifications which can be transferred from an American grape variety to an European one and consequently contain probably only a low-risk. Therefore, the requirements should be not so strict as when, for example any genes are introduced.

Why a "authorisation procedure light" for some CRISPR/CAs plants?

Otherwise, breeders for each CRISPR/CAs product registration must submit a gigantic file with test results and analysis. Then above all only the big corporations are can afford it. The authorisation must be transparent, it must be tested also for risks. But if each CRISPR/CAs plant is treated as a variety of old genetic engineering, then that will stifle reasonable applications and small farmers.

We don't know what happens exactly when CRISPR/CAs in the genetic material, - so that there is a risk very well, or?

You don't know that even for traditional breeding. So, also an apple, crossed in from a modern type of Japanese scab-resistant wild variety may have a slightly increased allergy potential.

A further counter-argument is that even the new method of CRISPR/CAs would produce sometimes unwanted mutations and therefore was an incalculable risk.

I find it unrealistic to pursue a policy of zero risk. Hunters began to breed the cow 10,000 years ago, and discovered that grass grew better on their fields due to cow dung. If you would proceed according to the scale of zero risk, you would have never allowed the cow manure on the field.

What do you think about it, to apply the technique in organic animals?

You can completely solve the problems in animal husbandry on the normal way of breeding. I see no need. Since major ethical problems arise for me in contrast to the plants.

The organic lobby is fighting that CRISPR/CAs plants are classified similar to the old GM plants. Is your plea for a new authorisation procedure not treason?

I have fought before 25 years on the front lines against genetic engineering and helped in Switzerland to install a moratorium on genetically modified crops. CRISPR/CAs differs from the genetic engineering including numerous criticisms of that time. With a more sophisticated look at it, I don't give up my ideals.

To reject the campaign of the organic industry against CRISPR/CAs?

No. It is clear that one must make pressure now politically, so that compulsory labelling is installed and so freedom of choice remains. But the danger is that you completely overreact and promotes irrational fears.

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COMMENTS

EIN ALTER KAUZ 11 MINUTES AGO
11 Minutes ago

Indeed it is plausible that once a genetic engineering is launched on the market which is controllable 100%. This, no Frankenstein plant will be created by error or similar. The problem remains that the more you concentrate on an ideal trait (which is facilitated by Gene Technology), the traditional trait diversity would loose support. And what happens, if you would need it back?

[MANFRED STEIN](#)

before 1 hour, 33 minutes

CRISPR/CAs is undetectable. That drains the business basis of anti-genetic engineering fear industry. Truly regrettable.

[WALTER B](#)

Today, 12:28

Finally a balanced contribution to the topic of genetic engineering.

I see great potential for organic agriculture in the new method of CRISPR/CAs, because it can be used just to avoid pesticides. Unfortunately, ideological indoctrination regarding genetic engineering has been used to put a contrast between organic agriculture and genetic engineering to be contradicting which is actually not the case.

The required labelling probably assumes that there is a difference between conventional breeding and CRISPR/CAs as a result. This not the case, except that the transfer path is faster and more targeted. Insisting on labeling genetic manipulation is only ideologically motivated and results in stigmatization.

[GREY AREA](#)

Today, 10:55

"...der most important scientist of the organic scene..." So? By which body has he been elected?