



To:

Sabine Juelicher, Director for Food and Feed Safety, Innovation, DG SANTE
Irene Sacristán Sánchez, Head of Unit for Biotechnology, DG SANTE

CC:

Minister of Rural Affairs Peter Kullgren, Ministry of Rural Affairs and Infrastructure, Sweden
Carina Knorpp, Ministry of Rural Affairs and Infrastructure, Sweden
Starch Europe info@starch.eu
BEUC, The European Consumer Organization info@beuc.eu
EEB, The European Environmental Bureau eeb@eeb.org
Nicklas Amelin, Livsmedelsföretagen Nicklas.amelin@li.se

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Subject:

Comment on proposals for labelling of products where new genomic techniques have been used

On behalf of the project "Växtnoden" I'm sending the attached memorandum concerning the discussion on a system for labelling of products where new genomic techniques have been used.

With greatest interest and engagement, we take part in the intense discussion within the European Union regarding changes in the regulatory framework for new genomic technologies to facilitate the use of these technologies. We are looking forward to the proposal the Commission will deliver this year. We hope and expect the proposal to contribute to increased sustainability, greater consumer benefits and improved competitiveness for the European farmers and food industry.

Potato is a very important crop for direct consumption as food, but also as an ingredient in other food products and for industrial purposes. With new genomic technologies such as CRISPR/Cas9 potato can become even better for all these purposes.

But it is of utmost importance how the regulations will be designed. The attached memorandum describes this problem. We hope that these facts will be taken into consideration in the work with the Commission's proposal. The memorandum has been prepared by Mr. Hans Berggren, former CEO, Sveriges Stärkelseproducenter and presently Chair for SolEdits AB, a start-up research company, offering services with CRISPR/Cas9-technology: [SolEdits – solutions through crop innovation](#). We are looking forward to your response to this letter and remain at your disposal for further discussions.

Yours sincerely,

Annika Ahnberg

annika.ahnberg@ystad.nu

Chair [Växtnoden](#)

Fellow Royal Swedish Academy of Agriculture and Forestry (KSLA)

Fellow Royal Swedish Academy of Engineering Sciences (IVA)

Fellow Royal Physiographic Society



Examples on how “genetic scissors” can be used for potatoes and possible challenges depending on how the legislation is designed

18 January 2023

This memorandum has been prepared by Hans Berggren, former CEO, Sveriges Stärkelseproducenter and Chair for SolEdits AB, a start-up research company, offering services with CRISPR/Cas9-technology. The memorandum is addressing issues of importance to the potato starch industry, which should be considered when the upcoming regulation of products, based on new breeding technologies, is prepared. (<https://soledits.com/>)

Potatoes are losing competitiveness against other crops

The yield development of potatoes being a tetraploid species is lower than that of diploid crops. This is due to the fact that for many traits it is necessary to change all four sets of genes in order for the desired trait to be expressed at the targeted level. Thus, traditional crossbreeding of potatoes becomes very time-consuming.

With the help of genetic scissors in addition to ordinary variety breeding, a number of characteristics required for a new variety can be added. The breeder can thus concentrate on fewer properties and achieve a faster yield development.

Examples of properties that can be added in this way:

- Potato wart resistance
- Nematode resistance
- Virus resistance
- Phytophthora resistance
- Starch quality
- Sugar content

Development work is required before most of the above is possible, but much of the necessary knowledge about genes involved is available.

Potato breeding is carried out by many small companies. They cannot carry the costs and efforts that the current regulation demands to make a market introduction possible. It therefore becomes essential that a regulatory framework for the use of genetic scissors becomes as easy to apply as possible also for small companies, even if they don't have the facilities and expertise in-house to use this technology. One way of maintaining the structure with small businesses is to ensure that the service of using the genetic scissors can be bought from companies such as SolEdits and other service providers.

Starch quality in potatoes

When starch is used in food, it is often as a thickener, i.e., to achieve a good texture in the final product. In low-fat products, fat is replaced by starch and water. The starch is an additive with a dosage of a few percent of the finished food.

Almost all starches used today must be chemically treated to maintain their properties during storage of the final food product. This also applies to potato starch.

Using genetic scissors, SolEdits, a Swedish start-up company, has modified potato varieties so that they produce a starch that is naturally shelf-stable. The role model has been the starch composition in, for example, certain types of grain crops that are naturally shelf-stable such as waxy maize and waxy barley.

With starch from these gene edited potato varieties, no chemical treatment of the potato starch is needed, and the starch could be sold without an E-number labelling. In the starch industry, the use of large amounts of chemicals will no longer be needed. Since the starch composition is found in other crops, this ingredient is known. Production of starch from these crops is not rational and less competitive.

The Swedish potato starch industry alone could reduce its use of chemicals by 5,000 tonnes a year.

Phytophthora resistance

Chemical treatment against Phytophthora in potato cultivation is today a prerequisite for obtaining an acceptable harvest of potatoes. Varieties with improved resistance exist, but the development of them is slow. During a growing season, more than 10 chemical treatments are not unusual with the variety material we have today. At the same time, there is an extensive reduction of registered pesticides, which reduces the possibility of chemical control. Decreased use of pesticides is an important part of the Green Deal and the Farm to Fork Strategy.

Resistance breeding is a constant battle against the fungi's ability to break resistance. By working with different strategies and combining these, good effects can be achieved. A realistic goal could be to at least decrease the need for pesticide treatments with 50%.

There are several genes known to influence resistance traits. This means that the breeder now can increase the resistance against Phytophthora within potatoes with the help of genetic scissors. Continued work will then make it possible to expand the portfolio of possible interventions to build a further extended resistance to this devastating disease.

Acrylamide

The creation of acrylamide when frying or deep-frying potato products is a problem that has received a lot of attention in recent years. Simply put, acrylamide is formed through a reaction between sugar and protein under strong heat.

With the help of genetic scissors, the amount of available sugar in the potatoes can be reduced. It is thus possible to significantly reduce the risk of acrylamide formation. This is not least a demand from producers of potato chips.

Abiotic stress tolerance

Potatoes is a crop that thrives in cooler climates. If the temperature is above 25 °C, there is very little growth, even if there is enough water and nutrients.

Several genes that affect the potato's stress resistance are known. The possibilities of improving abiotic stress tolerance are therefore good with genetic scissors.

New legislation – possibilities and challenges

The industry is now expecting the proposal from the European Commission on new legislation for how to permit modern plant breeding technologies such as CRISPR/Cas9.

Considering the possibilities at hand this is positive, but this is also depending on **how** the legislation will affect the possibilities to use genetic scissors in practical breeding to develop new varieties for the EU market.

Problems that create great challenges in the new legislation:

Approval process

In a statement, on behalf of the Commission, EFSA's scientists has proposed six main criteria to assist the risk assessment of plants produced by new genomic techniques (NGT). This proposal is extensive and opens for a wide interpretation of aspects that must be taken into account in each phase of production – from growing to final food product - and what documentation is required.

The upcoming legislation must be workable for smaller companies. It is very important to create an approval process that is flexible and includes reasonable demands on documentation and risk/benefit analysis. Applications with use of genetic scissors where there are corresponding examples with the same characteristic in other varieties of the crop, or in other crops, without use of NGT:s should be equalled with traditional plant breeding and have a simplified decision-making process for approval.

Labelling requirements

It is important that the labelling has the purpose of providing information that is necessary for the consumer.

If you introduce a total labelling requirement for products produced using, for example genetic scissors, it will have the following consequences for the examples above:

- *Starch quality in potatoes*

The production of potato starch with the unique quality described above requires that the manufacturer distinguishes between the varieties used. This is possible because the starch has an added value that can pay for this extra cost.

But if the labelling also is required in the next phase when the starch is used as a small ingredient and in the final food product towards the consumer, it will be extremely difficult for the food industry to use this ingredient. The reason for this is that the labelling on the consumer packaging cannot be changed frequently, depending on which starch supplier is used for a specific product. Being locked to one specific provider will not work.

- *Phytophthora resistance*

A potato starch manufacturer buys potatoes from contract growers. In the entire grower group some 20 different potato varieties, in Sweden alone, are used, depending on the soil quality, which diseases are present in the area and how different yield levels in different areas.

The industry will not be able to establish separate processing lines for resistant potato varieties, produced with genetic scissors, because the Phytophthora resistance is not visible in the starch.

Thus, the development of Phytophthora-resistant varieties will not be possible, if the starch producer cannot replace a large proportion of the cultivated varieties at the same time. Since the cultivation is based on different varieties and production from many different breeders, this will not be possible.

Even if it was possible in the first phase of starch production it would be impossible to maintain the labelling in the next phase for the same reasons as described above concerning starch quality.

Also when it comes to elimination of *Acrylamide* and increased *stress tolerance* the same problems with labelling will appear.