A Study on Genome Editing

Population sees clear benefits of Genome Editing

Fewer pesticides and more regional products

gfs.bern

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Table of Contents

1 Introduction

1.1 Mandate

gfs.bern conducted the GENOME EDITING study on behalf of swiss-food.ch. The main focus of the study is on the question of to what extent will this technology be accepted by the Swiss population.

The study centers on the new genome editing technology, with questions having been posed on the application, use and acceptance of this technology in comparison with other technologies. The study is based on a previous study with a similar focus that was carried out in 2021.

1.2 Survey Concept and Method

The results of this study are based on a representative survey of the population of a final number of 1060 persons who are entitled to vote and can speak one of the three national languages. The survey was carried out via the proprietary "Polittrends" online panel. Following the review of the data, nine online interviews that were unsatisfactory in terms of quality were excluded to increase the data quality (original number=1069). The three language regions were represented slightly disproportionally in the sample to ensure that the French and Italian-speaking regions of Switzerland could also be guaranteed a solid data base. For the analysis, the answers were weighted according to age/gender by language region, canton, settlement type, level of education, political party and voting behavior in connection with the pesticide initiative. This ensured that the actual structure of the Swiss voting population was reflected in the evaluations.

The survey was held between 26 August and 6 September 2024. With a reported value of 50%, the sampling error is ±3.0 percentage points.

Table 1: Methodological details

Client	swiss-food.ch
Universe	Universe of the Swiss voting population who speak one of the three national languages
Data-collection	Online via the “Polittrends” online panel
Type of sampling	online: stratified sample according to age x gender x language region
Weighting	Age/gender by language region, canton, settlement type, level of education, political party, voting behavior in connection with the pesticide initiative
Survey period	From August 26 to September 6, 2024
Sample size	Total number of people surveyed = 1060 (no. from DCH = 745, n. from FCH = 252, no. from ICH = 63) Prior to quality control = 1069 (no. from DCH = 750, no. from FCH= 253, no. from ICH = 66)
Sampling error	±3.0 percentage points with 50/50 and 95% probability

In a sample, two factors have a huge influence on the quality of the statements subsequently obtained: First, the data quality is defined by the size of the SAMPLING ERROR. This identifies the probability of an error and the magnitude of the error for a statistical statement. The sampling error is dependent on the size of the sample and the distribution of the variable in the population, whereby the smaller the error is, the larger the sample is. Second, a confidence level of 95% or a probability of error of 5% is usually set in survey research. This means that the proven statistical correlation is present in the population with a probability of 95%.

Table 2: Sampling error

Selected statistical sampling error by sample size and distribution

Sample size	Distribution of error rate	
	50% to 50%	20% to 80%
N = 1000	±3.1 percentage points	±2.5 percentage points
N = 600	±4.1 percentage points	±3.3 percentage points
N = 100	±10.0 percentage points	±8.1 percentage points
N = 50	±14.0 percentage points	±11.5 percentage points

Example: In approximately 1000 persons surveyed and a reported value of 50%, the actual value is in the range of 50% (±3.2 percentage points), while with a basic value of 20% it lies in the range of 20% (±2.5 percentage points). In survey research, a confidence level of 95% is usually set, i.e. a probability of error of 5% is accepted that the proven statistical correlation does not exist in the population.

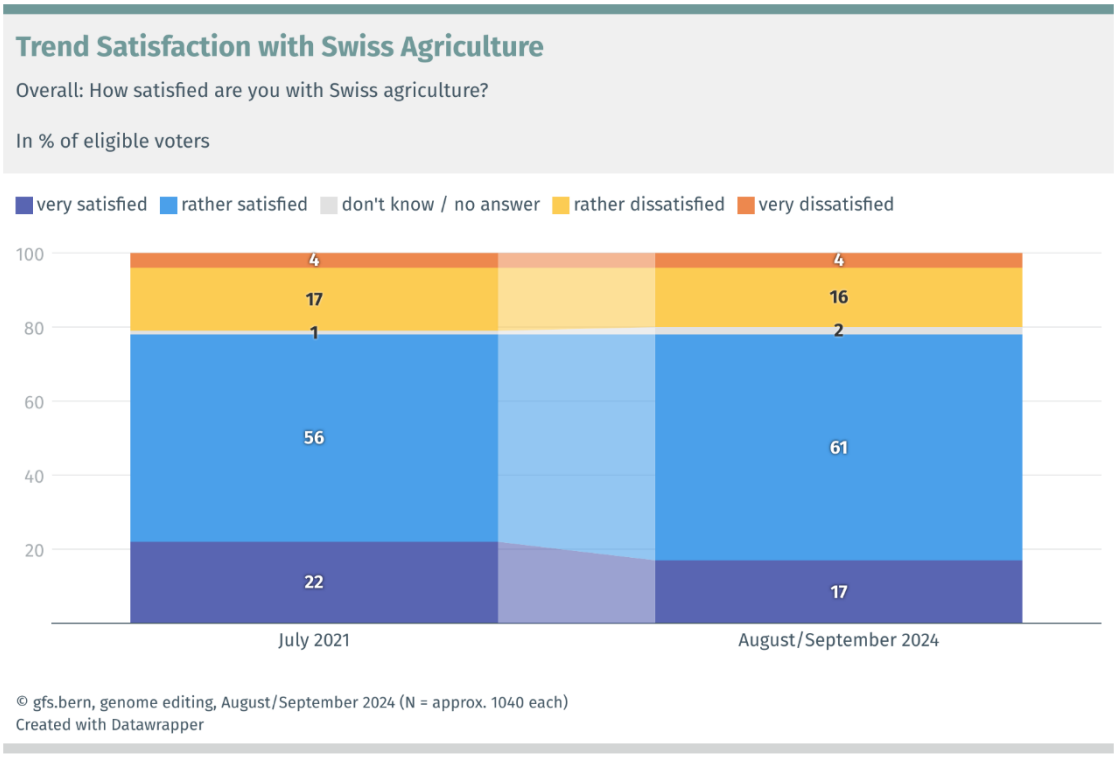
2 Background

The Swiss population has always enjoyed a close relationship with agriculture, as it is a characteristic feature of the Swiss landscape and a huge part of the country's identity, for example. In this respect, it does not come as much of a surprise that almost every Swiss voter is generally satisfied with Swiss agriculture.

The general level of satisfaction with Swiss agriculture among the voters also remains high in 2024 (78%). Some 17% are very satisfied and approximately 60% declare themselves to be rather satisfied. Three years ago, the proportion of voters who said they were rather/very satisfied also stood at 78%.

One very small difference in the figures recorded in 2021 was that slightly fewer people declared themselves to be "very satisfied" (-5 percentage points [pp]) and slightly more were "rather satisfied" (+5 pp). Only 1 percentage point fewer people are "rather unsatisfied", but this difference lies in the error band and is therefore negligible.

Figure 1

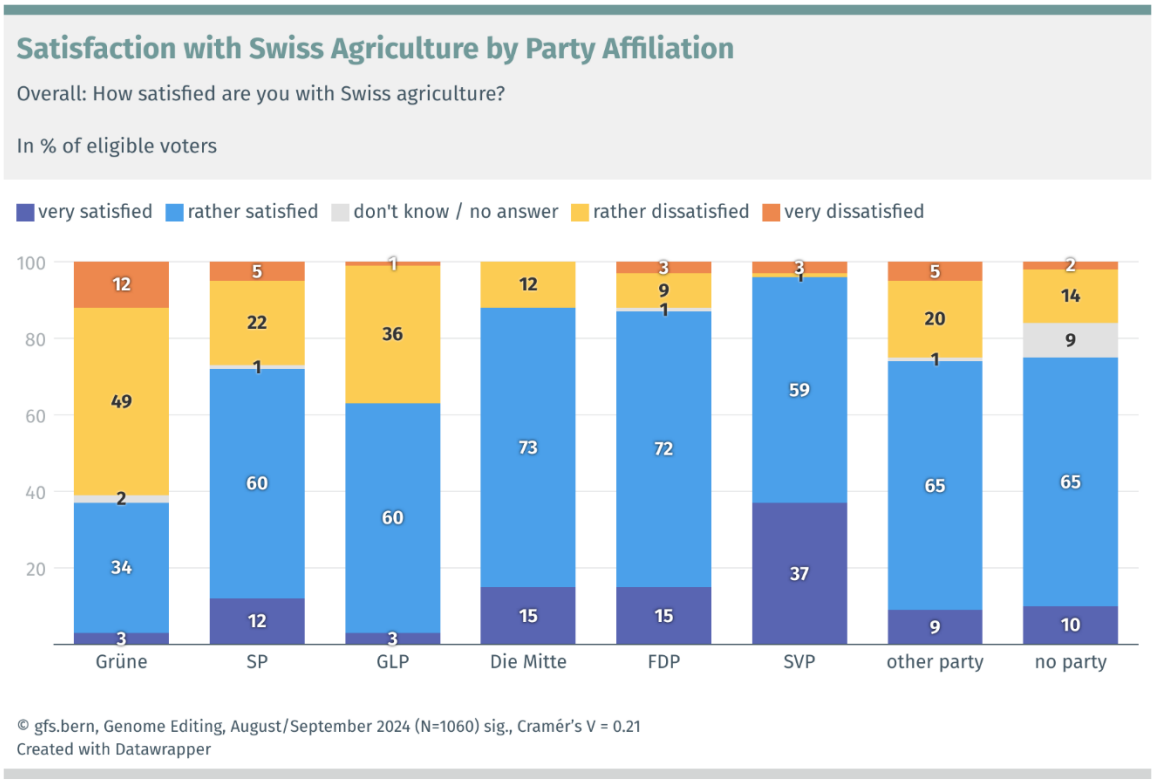


The high level of satisfaction also remains in place in almost all subgroups when the question is broken down by political party.

In this regard, there are two groups that stand out in particular: Some 37% of people who sympathize with the Swiss People's Party (SVP) are "very satisfied" with Swiss agriculture and 59% are "rather satisfied." At the other end of the satisfaction scale and the political spectrum are sympathizers of the Green party, with only 37% of these voters being "very satisfied" or "rather satisfied." Approximately 61% of these voters are "very unsatisfied" or "rather unsatisfied."

While sympathizers of the Green party are the only subgroup in which the majority of people are unsatisfied, sympathizers of all of the other parties are for the most part satisfied: 72% of sympathizers of the Social Democratic Party of Switzerland (SP), 63% of sympathizers of the Green Liberal Party of Switzerland (GLP), 88% of sympathizers of The Center party and 87% of sympathizers of The Liberals (FDP) are satisfied with Swiss agriculture. Even among people who are not closely aligned with any of the six major parties or do not support any of the parties, the majority are satisfied with Swiss agriculture. In comparison to 2021, the proportion of people who are dissatisfied among supporters of the Green party has risen significantly (+10 pp). SP supporters on the other hand are exhibiting greater levels of satisfaction than they were three years ago (+12 pp).

Figure 2



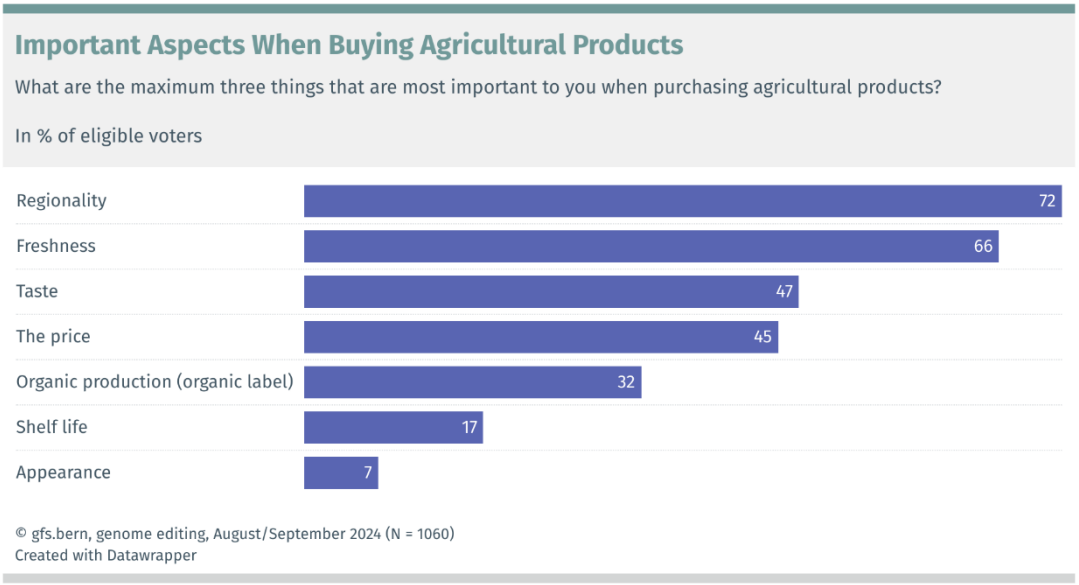
When asked which three aspects are the most important when purchasing agricultural products, regional produce, freshness and taste all scored highest (with taste almost dead level with price).

When seen in terms of figures, regional produce and freshness are clearly the most important aspects: 72% of voters say that regional produce is one of the most important criteria. 66% also believe freshness to be one of the three most important aspects.

47% chose taste and 45% price. These two criteria therefore share third place, as there is not much difference between them.

Organic production methods only come in fifth place (32%). The survey respondents state that the shelf life of the products (17%) and their appearance (7%) are lowest on their list of priorities.

Figure 3



Much like the whole of society, Swiss agriculture is undergoing constant technological change. In this area, new technologies that could prove beneficial for farming operations are constantly being developed. Voters are for the most part amenable to new technologies being used in Swiss agriculture. Most of the technologies were rated similarly back in 2021 (Figure 4 shows the figures from 2024, while Figure 5 draws a comparison between 2021 and 2024):

- Once again, the use of drones to localize and combat seats of disease received the greatest approval this year (86% very much in agreement/tend to agree, +0 percentage points [pp]).
- Ranked in second place once again was the targeted breeding of resistant plants (74%), although the acceptance rate in 2021 was slightly higher (79%).
- Around two-thirds of voters supported data-based crop management (67%), the targeted use of plant protection products (likewise 67%), vertical farming (66%) and the use of the 5G mobile network for robots to combat weeds (67%). The level of acceptance recorded for data-based crop management was slightly below the figure recorded three years ago (-6 pp), while more people stated that they agree with the agricultural use of 5G technologies (+4 pp). This is mainly due to the fact that fewer survey respondents stated that they were not familiar with the technology (-3 pp).
- Some 62% of voters are in agreement with the use of autonomous agricultural machines (+1 pp).
- However, there was little spontaneous approval for genetically modified plants (20%, -4 pp) and genome-edited plants (18%, -4 pp). The big difference between the two is that most people are familiar with genetic engineering, but very few people are aware of what genome editing is (44%, -1 pp, not familiar with the technology). The proportion of ´people that have negative views of the technology is at a similarly high level as for other technologies that enjoy greater public acceptance (e.g. “autonomous machines”).

Figure 4

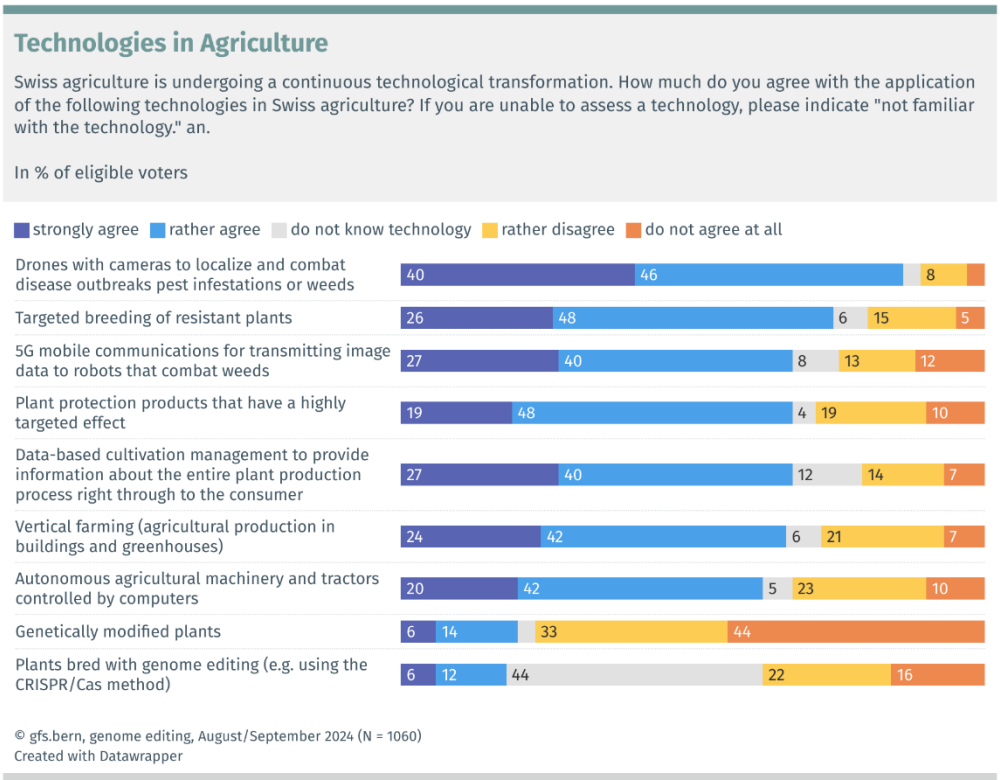
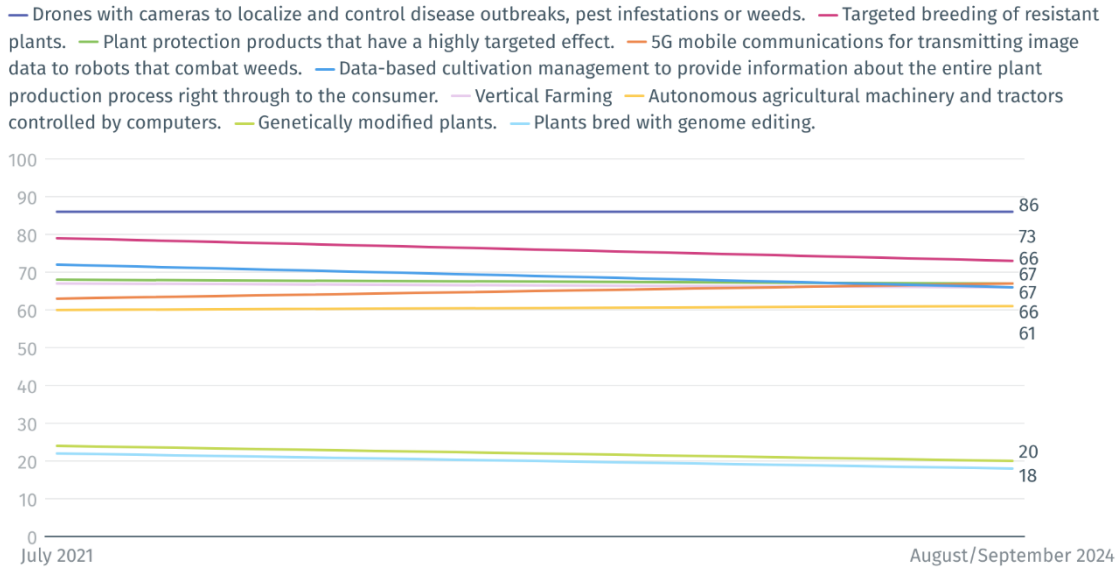


Figure 5

Trend technologies in agriculture

Agriculture in Switzerland is subject to constant technological change. To what extent do you agree with the following technologies being used in Swiss agriculture? If you are unable to assess a technology, please answer 'don't know the technology'.

in % of voters, share of 'somewhat/very agree'



© gfs.bern, genome editing, August/September 2024 (N = approx. 1040 each)
Created with Datawrapper

Unknown genome editing: Similar to three years ago, many people are not familiar with the principle of genome editing. Accordingly, the spontaneous acceptance of this technology is also low.

All in all, the Swiss population is open to a wide range of technological innovations in agriculture – the number of people that are outright skeptical is small. Nevertheless, voters continue to be clearly and singularly opposed to genetically modified plants.

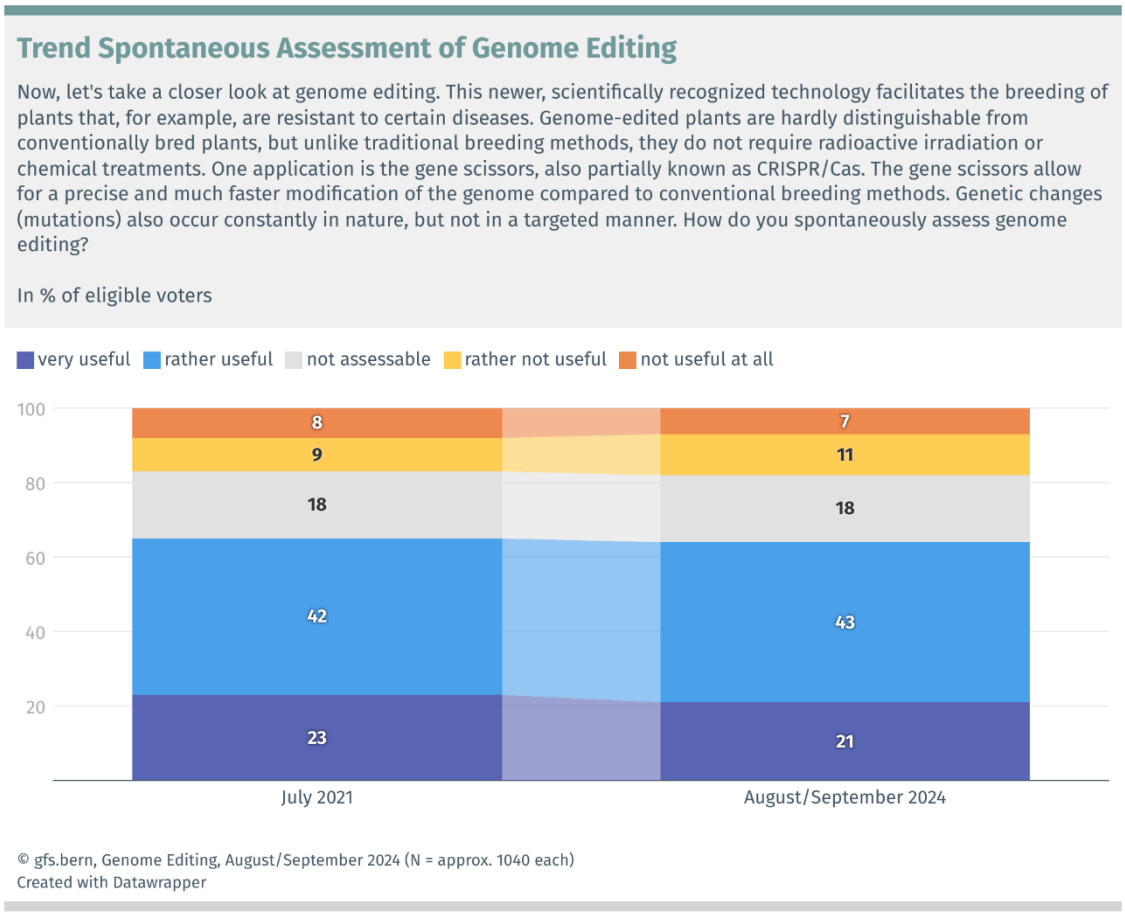
3 Gene editing

After receiving a brief explanation about what genome editing entails, voters were clearly in favor of this technology, with a majority of voters (64%, -1 pp) of the opinion that genome editing is very or rather useful.

People under 40 years of age are more likely to consider this technology as being useful (71%) than people aged between 40 and 64 years old (63%) or voters aged 65 and above (59%). Voters with a high level of education are much more in favor of this technology (73%) than those with a moderate (59%) or low (57%) educational level. Furthermore, men (72%) deem this technology as being more useful than women do (57%).

Fans of all of the political parties mostly consider genome editing to be useful. The lowest acceptance figures can, however, be found at the two opposing ends of the political spectrum, with just 55% of sympathizers of the Green Party and 58% of SVP-sympathizers being in favor of this technology. The greatest level of acceptance was recorded among GLP (81%) and FDP supporters (77%).

Figure 6



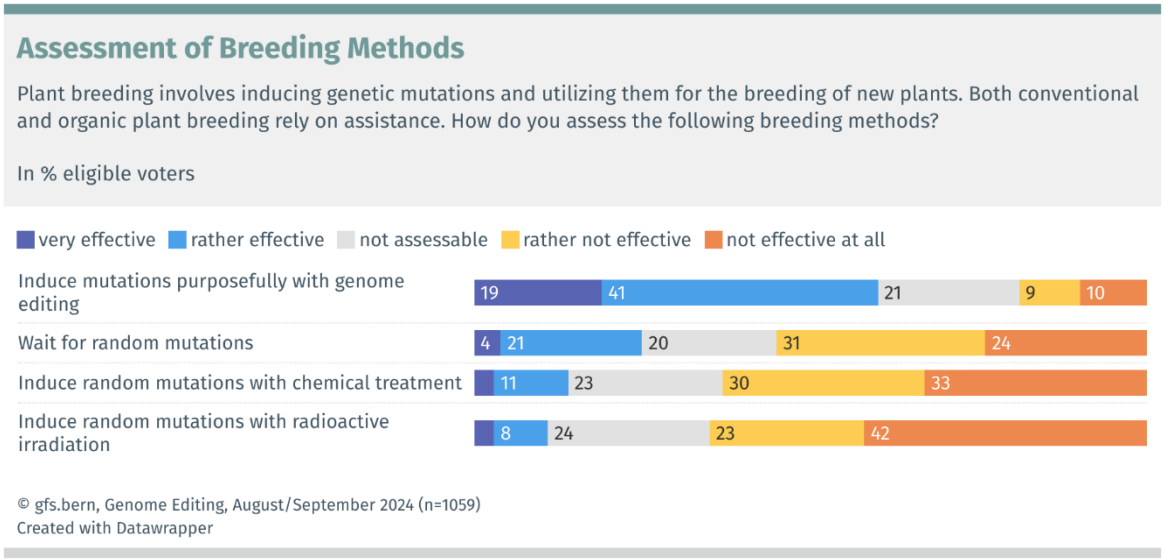
After being provided with an explanation of what genome editing involves, the spontaneous assessment given by survey respondents was generally positive. With an approval rate of approximately two-thirds, it has similar acceptances levels to most other technologies, such as data-based crop management, the targeted use of plant protection products, vertical farming and use of the 5G mobile network for robots to combat weeds.

There are many different ways of breeding plants. The different methods include mutations with genome editing, random mutations, mutations with chemical treatment or with radioactive treatment.

The opinions on the different types of plant breeding are clear: Three-fifths of the voting population believe that using genome editing to deliberately cause mutations is very effective or rather effective. Only 25% feel that we should wait for random mutations to occur naturally. Even fewer voters are of the opinion that causing random mutations through exposure to chemicals (14%) or radiation (11%) is an effective method.

Compared to other breeding methods, genome editing is therefore considered to be much more useful. This assessment proves interesting, as voters seem to be against the breeding methods that are commonly used today (including in the organic sector). The level of skepticism shown toward genome editing is lower, despite this breeding method still not being permitted in Switzerland.

Figure 7



In addition to the spontaneous positive sentiment toward genome editing and the healthy levels of acceptance of breeding using genome editing in comparison with other breeding methods, the voting population also recognize the benefits of genome editing in cultivation farming as well as in the use of genome-edited agricultural crops.

The large majority of voters recognize the benefits of genome-edited agricultural crops, if as a result fewer plant protection products need to be used and indigenous plant varieties are protected.

In comparison to 2021, the various statements on the benefits of genome editing in cultivation farming as well as in the use of genome-edited agricultural crops were judged very similarly.

- Some 86% believe that genome-edited plants are beneficial, if this would result in a significant reduction in the use of plant protection products being able to be achieved (+6 pp). This is the case, for example, in the breeding of wheat that is less susceptible to mildew (82%, +1 pp), potatoes that are more resistant to late blight (82%) and in the reduced use of pesticides by small scale farmers in developing nations (79%, -1 pp).
- Approximately 85% were in support of using genome editing to preserve traditional apple varieties (+3 pp) and 82% (+3 pp) believed it should be used to provide better protection to regional fruit and vegetables.
- The use of genome-edited plants that can adapt quicker to climate change was likewise considered as being beneficial by the lion's share of the survey respondents (78%, -2 pp). For example, breeding crops with more robust stalks that won't be destroyed in storms was considered as being useful by 71% of voters (-4 pp). The proportion of people who were unable to say whether the use of genome editing to create more robust crops is useful or not did increase, however (11%, +5 Pp.).
- For 74% of voters, lower prices for regional products would be a good reason to use genome editing (+5 pp).
- Around 70% look favorably on the use of genome editing to fortify staple foods with essential vitamins in developing nations (-3 pp),
- while 69% see genome editing as way to extend the shelf life of products and thus reduce food waste (-1 pp).
- Some 60% of the survey respondents support the production of ingredients for medicinal products with the help of genome editing.
- Meanwhile, the cultivation of wheat with lower gluten content for people with allergies or intolerances is considered as being beneficial by 55% of the voting population.
- Lastly, 54% of voters believe that genome editing is more cost-effective than conventional genetic engineering and is thus also viable for SMEs (-3 pp).

Figure 8

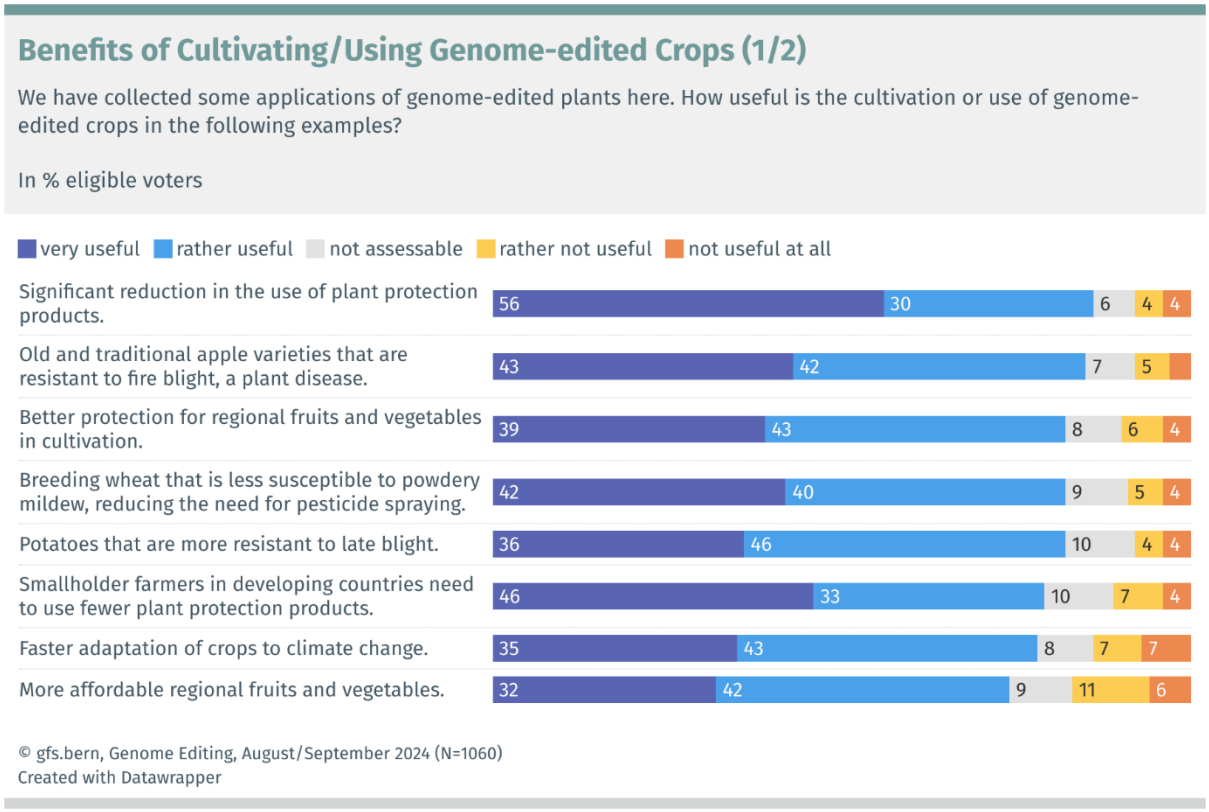
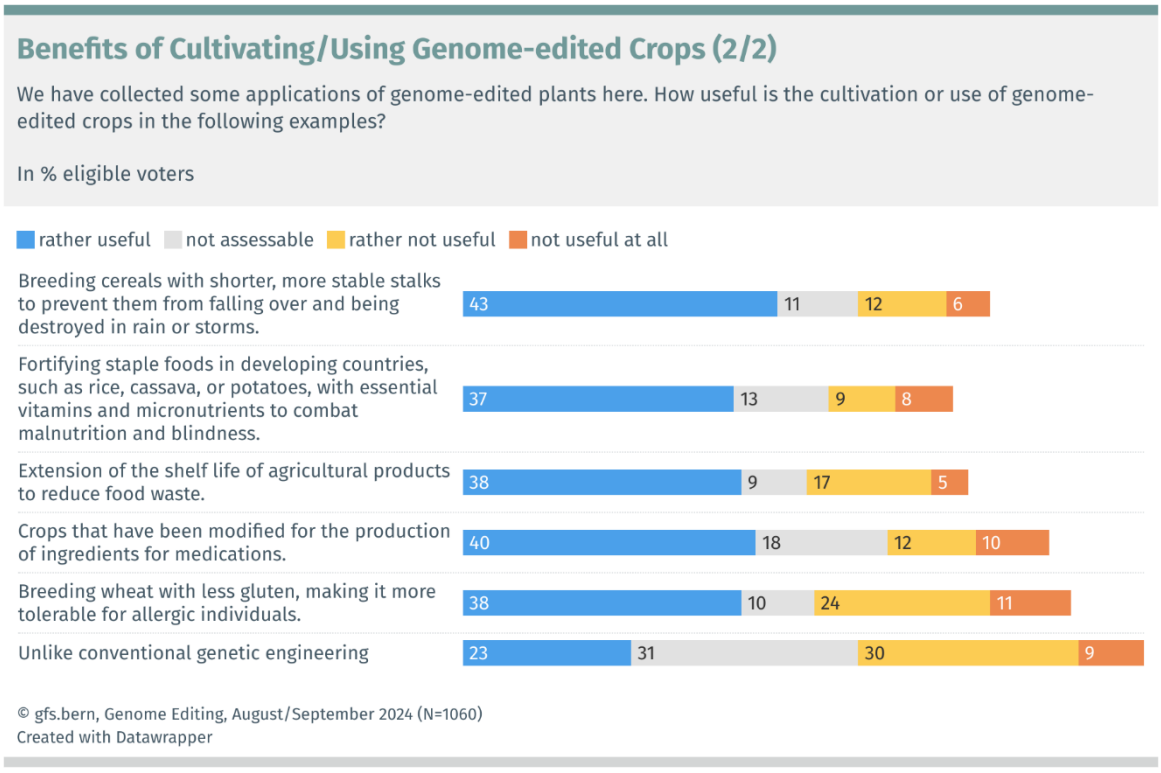


Figure 9



Most of the arguments in favor of the use of genome editing were met with widespread approval. Arguments concerning the FUNDAMENTAL LEGAL FRAMEWORK FOR THE USE OF GENOME EDITING were particularly well received,

- with 75% of the voting population agreeing that the risks posed by the technology should be assessed on a case-by-case basis – and not with a general ban (+3 pp).
- Only around one-third of voters continued to hold the opposite view that human intervention in the genetic material of plants should generally be banned (35%, -7 pp).
- For 68% of respondents, Swiss agriculture would be at a disadvantage if it is unable to benefit from the advantages provided by the technology and EU countries could.
- Some 60% of the voting population believe that it will be difficult to correctly evaluate the advantages and disadvantages of genome editing until it is no longer banned.

ENVIRONMENTAL ARGUMENTS were met with a great deal of approval:

- A total of 73% of voters see genome editing as beneficial, because more-resistant plants result in fewer imports from outside of the country.
- Meanwhile, 68% are of the opinion that genome editing can reduce the use of pesticides (+4 pp).
- Almost as many people think that more-resistant agricultural crops could reduce food waste in the field (67%).
- A majority of the respondents also believe that the ban that is currently in place prevents Swiss agriculture from being able to adapt to climate change (55%, +0 pp).
- Voters also are of the opinion that genome editing would promote biodiversity by reducing the area of land used for farming (53%).

In two rather PRAGMATIC ARGUMENTS, there was only a slim majority:

- Some 58% think that genome-edited products should be permitted in Switzerland, provided that they do not differ from conventional products (-3 pp).
- For 56% of the voting population, trans-splicing genes is no different than using modern targeted breeding methods (-2 pp).

However, voters are divided when it comes to the MEDICAL APPLICATIONS of genome editing, for example in combating AIDS. Half of them agree that it should be able to be utilized for these purposes. Three years ago, this figure stood at 56%, with the difference being that more people confessed at the time that they weren't familiar with the technology (+6 pp). In terms of using the technology on human beings, the population is more cautious.

A minority of people (44%) agree that the ban on REGIONAL PRODUCTS is raising prices for the middle classes.

Lastly, only 37% agree with the statement that if a genome-edited plant has NOT HAD ANY GENES THAT ARE FOREIGN TO THE SPECIES inserted in its DNA, this should not be considered genetic engineering. However, 41% do not agree with this. This technical detail may be difficult to understand and therefore causes increased levels of uncertainty.

Figure 10

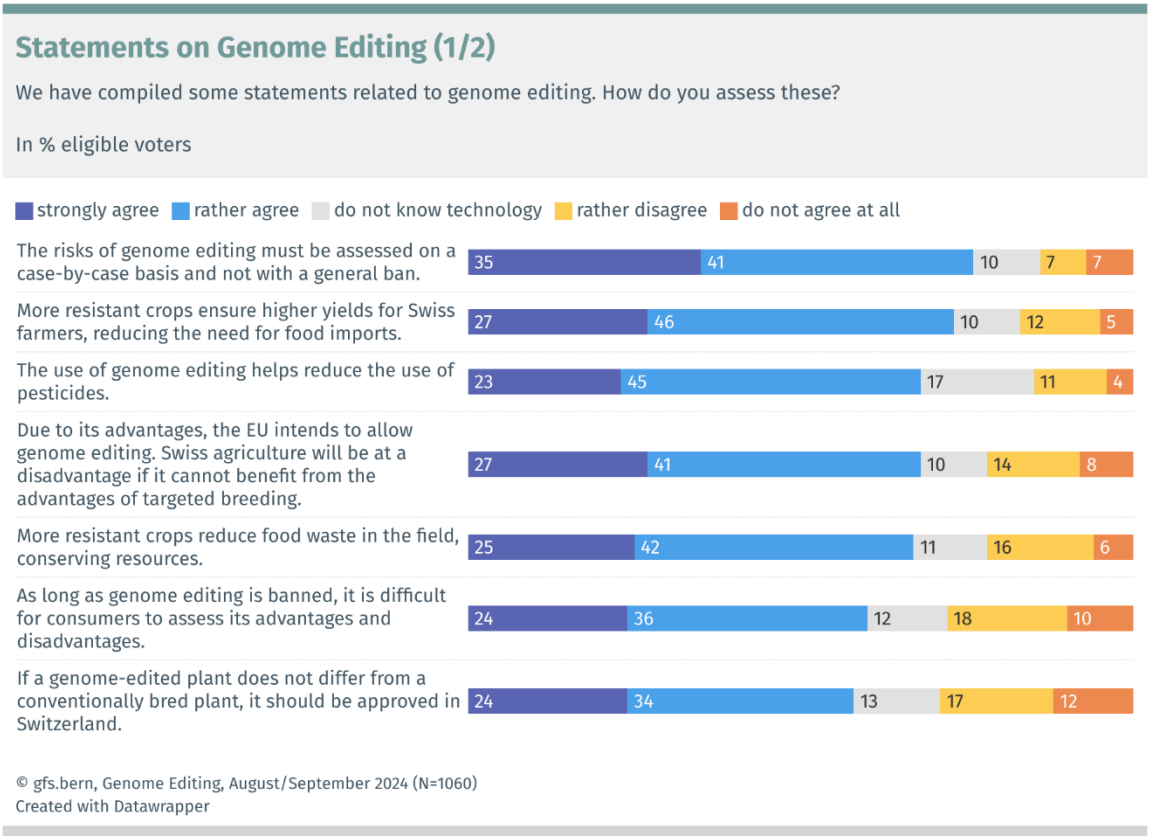
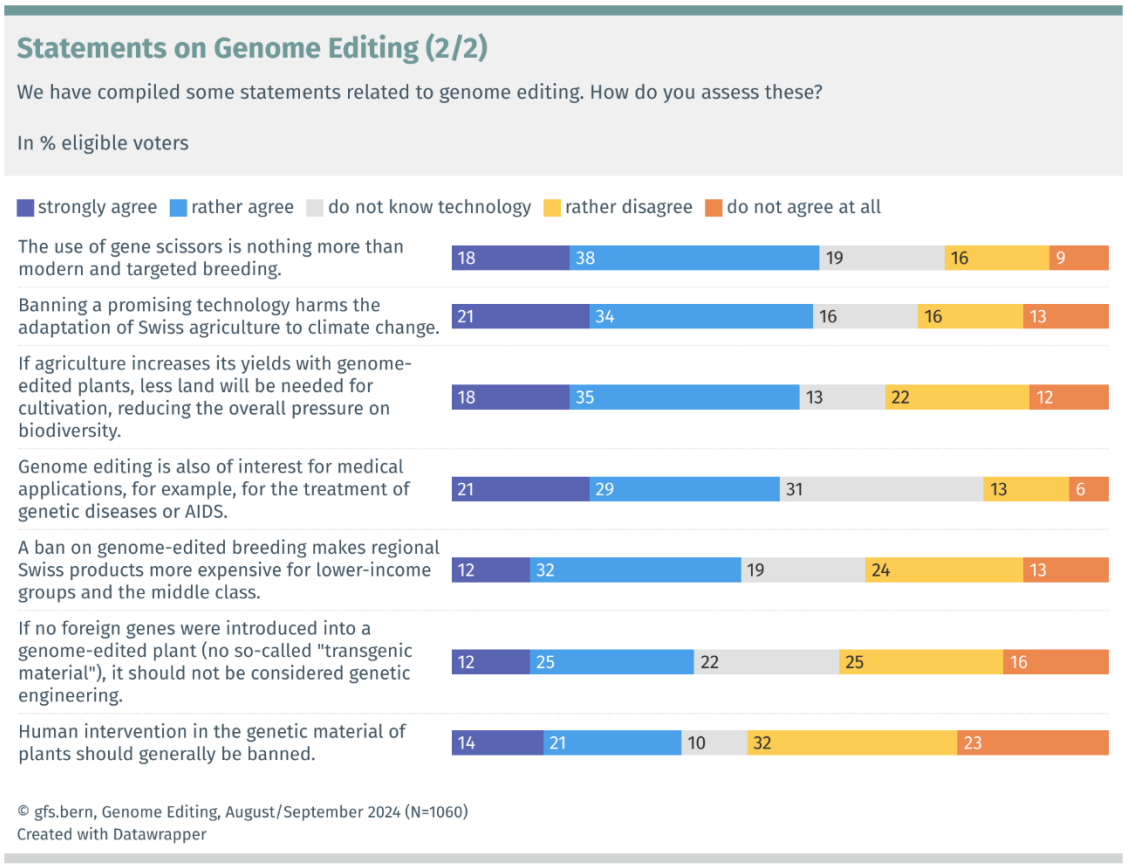


Figure 11



The statement that genome-edited products should be permitted in Switzerland if they do not differ from conventional products is supported by a majority in almost all subgroups when broken down by political party (50% or more). One exception to this is from the supporters of the Green party, whereby "only" 49% of this group of people agreed that the products should be permitted.

Among SP sympathizers, 64% agree the such products being permitted, with 69% of GLP sympathizers and 74% of FDP sympathizers also holding the same view. A majority of the supporters of The Center party are also behind genome-edited products being permitted (62%), while 50% of SVP sympathizers think likewise.

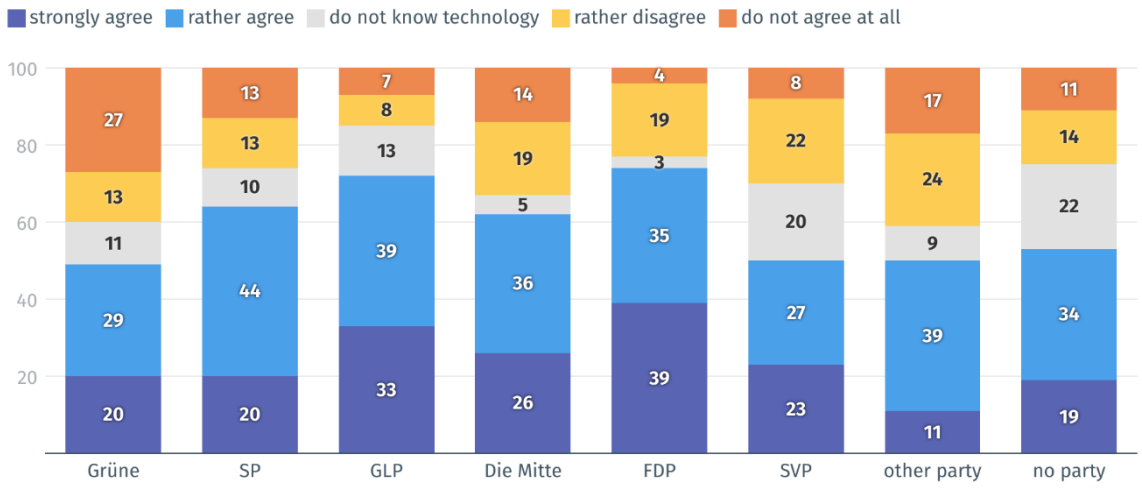
A majority of the supporters of "other parties" (50%) and "No party" (53%) agree to the products being permitted.

Figure 12

We have compiled some statements related to genome editing. How do you assess these?

If a genome-edited plant does not differ from a conventionally bred plant, it should be approved in Switzerland.

In % of eligible voters



© gfs.bern, Genome Editing, August/September 2024 (N=1060) sig., Cramér's v = 0.14
Created with Datawrapper

A multi-variant regression analysis can show which of the statements on genome editing are most strongly associated with a positive assessment of the technology. The statements that do not touch zero on the vertical line are significant:

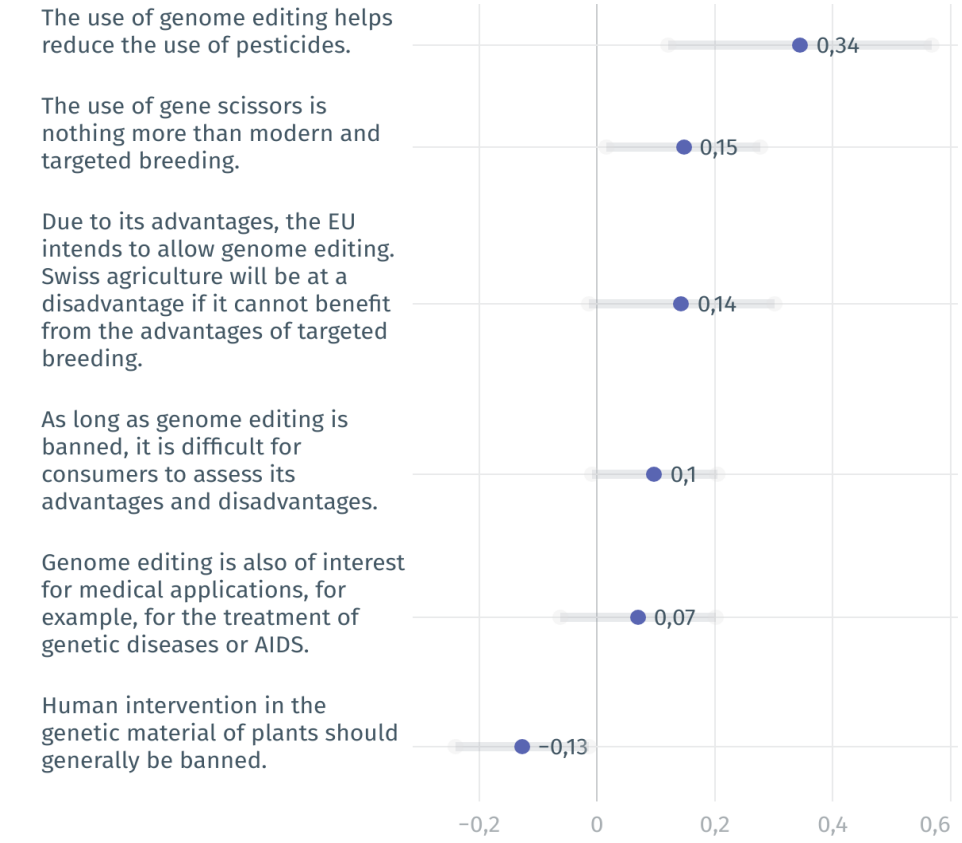
- People who think that the use of pesticides can be reduced thanks to genome editing feel that the technology is beneficial significantly more frequently. There is a strong correlation here.
- Also, voters who consider the trans-splicing of genes to be a modern method of breeding plants have a more positive view of genome editing.
- On the other side, voters who generally disapprove of human intervention in the genetic material of plants are much less likely to find genome editing beneficial.

Figure 13

Influence of statements on the assessment of genome editing

Influence strength of various statements on the spontaneous assessment of genome editing

Example: People who believe that the use of genome editing reduces the use of pesticides have, on average, a 34 percentage point higher likelihood of assessing genome editing as rather/very useful.



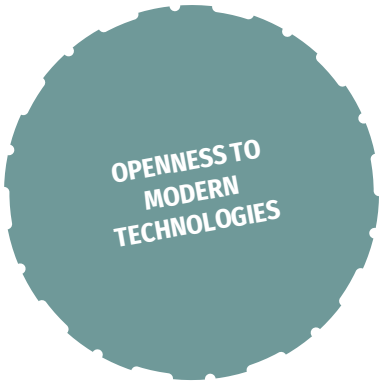
© gfs.bern, Genome editing, August/September 2024 (N = 592). Additional control variables: Gender, age, language regions, type of settlement. The gray area represents the 95% confidence interval / adjusted R^2 = 48%.

Erstellt mit Datawrapper

The two arguments that genome editing helps to reduce the use of pesticides and that the the trans-splicing of genes is nothing more than a modern breeding method yield a spontaneous positive assessment of genome editing. On the other hand, the survey respondents who think that human intervention in the genetic material of plants should be fundamentally banned also spontaneously believe that genome editing is not a good idea.

4 Synthesis

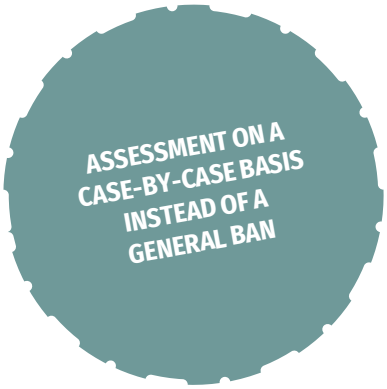
In the form of a thesis, we would summarize the findings from this study as follows:



Voters remain very satisfied with Swiss agriculture. With respect to agricultural products, they appreciate regional produce and freshness. However, organic production is less of a priority for them. The voting population is open to a wide range of technologies being used in the manufacture of high-quality products, with the proportion of outright skeptics being relatively small. Genetic engineering is the only technology that is massively disapproved of. Many people, however, are not familiar with genome editing, with 44% of the population not having heard of the technology.

After a short explanation on what genome editing entails, a clear majority of the population considers the technology to be beneficial. This statement holds particularly true among younger male voters with a high level of education. The benefits were recognized by a majority of voters, regardless of the political party they support. In comparison with other technologies used in the breeding of plants, the voting population clearly prefers genome editing, despite the fact that other breeding methods are more commonplace at present. In addition, the argument that the technology could reduce the use of pesticides brought about a more positive perception of genome editing in the voting population.

The reduced use of plant protection products and the protection of traditional and regional products were the most popular reasons for using genome editing among the statements presented to the survey respondents. Other areas of application also proved important to voters, including adapting to climate change, the reduction of food waste in the field and the fortification of staple foods with essential vitamins in developing nations. The sentiment among the population is that the benefits of the various applications outweigh the disadvantages.



A large majority think that it would be expedient to assess the opportunities and risks presented by the use of the technology on a case-by-case basis instead of applying a general ban. The proportion of the population that generally disapproves of human intervention in the general material of plants has decreased in comparison with 2021. The fact that EU countries will authorize genome editing in the future also plays a role for many voters, as they believe that Switzerland should equally be able to benefit from the advantages provided by this technology. In addition, genome editing is seen as a way of increasing the country's level of self-sufficiency. Most respondents are in favor of a gradual movement toward adopting the technology and do not want Switzerland to be left behind by other countries.

5 Attachment

5.1 The gfs.bern Team

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