FAQs

FAQ about GM technology in potato, risks and benefits

Why is the public afraid of transgenic crops?

This fear of genetically engineered crops is essentially based on 5 main reasons:

1. **Fear of a new technology.** The public has always had a certain apprehension about a new technology that is not fully understood by non-specialists. Despite the fact that security and quality about these new foods has been shown to be equivalent or even superior to their conventional counterparts, the fear that this food can harm consumer or public health in the long term is still present in consumer's minds. In other words, the absence of evidenced risks to the public is not anymore a criterion of confidence in a new product.

2. **Dominance of the transnational companies.** The public feel in general that large corporations particularly those from the USA and EU are only interested in increasing their profit without worrying about possible negative impacts. This concern is particularly strong in Europe.

3. **Distrust of regulatory agencies.** Unfortunately, in the last couple of years, the world has witnessed important failures of regulatory agencies, especially in certain countries, in charge of protecting human health as well as the environment. For instance, we can mention the case of mad cow disease or oil transport by boats.

4. **Impact on biodiversity.** Many environmentalists fear that transgenic crops will escape from farmers’ fields or cross with wild species and hence pose a threat on biodiversity. At the same time, the fear is that transgenics will impact negatively on the biodiversity of foods, in particular on those that do not have a big market.

5. **Disloyal competition with alternative agricultural systems.** Some people fear that transgenic crops by using less agro-chemicals may become competitive with alternative production systems such as organic, biological, or ecologic products. They see transgenic crops as a disloyal threat to the development of agro-ecologic alternatives because of the huge investment from both public and private sector in biotechnology.

How can we be sure that we won’t have a negative impact of transgenic potato on the environment?

What is a negative impact?

It is the invasion of the natural ecosystem by a transgenic cultivars or hybrids produced between a transgenic cultivar and a wild plant. This sort of events represents the undesirable result that all of us want to avoid. The invasion of the ecosystem is the capacity of a plant to establish itself in the wild ecosystem, to persist, and to compete successfully with endogenous species. Such natural ecosystem for the Andean potato is actually located in the mountains between the 3,000 to 4000 m, in a relatively inaccessible area with scarcity of water, often with freezing conditions and many pathogens and plagues. There, wild species have been adapted since thousands of years ago. These have established optimal relationships with the environment in order to survive. There are cases of cultivated potato that co-exist with wild species. These are the native potatoes, which have many characteristics that allow them to survive in these extreme conditions. These plants are often related to their wild relatives, and able to persist in the wild ecosystem for years. However, there are no observations until now of any case with improved potato varieties or commercial potatoes that have spontaneously displaced native potatoes. Transgenic potatoes are commercial potatoes, not native varieties. This is a very important distinction to make. Such commercial varieties as any other domesticated organism have anthropocentric characteristics that are distinct from those needed to survive in a wild environment. Domesticated plants are in general incapable to compete with wild plants. There has not been, there is not, and probably will not be a commercial potato, transgenic or not, that can invade the wild ecosystem and threaten the biodiversity. However, many people including ecologists do not accept this argument of lack of evidence from the past. It is understandable that scientists in charge of studying and protecting the biodiversity will be very skeptical, and sometimes totally opposed to transgenic crops. They are also opposed to any improved commercial variety. It is their duty to avoid any threat, even if this is only hypothetical, in order to protect
the biodiversity. In conclusion, I think that the best way is to engage joint effort to conduct environment impact studies with a broad disciplinary base approach. We need to develop more field experiments, develop scientific debates, and communicate permanently and objectively the results obtained from the use of this technology in other countries.

**Is there any experience on the performance of these transgenic crops in field conditions?**

Interviewed: There have been many field experiments with transgenic crops, including transgenic potatoes. So far there is no observation of negative performance inherent to transgenic crops. Like any bred variety, there were transgenic varieties that did not reach a good level of performance, and others that did show excellent results.

Recently, an article was published in Nature on the persistence in field of crops improved either by genetic engineering or by conventional methods. This study was done for over a period of 10 years in England, with 4 crops, corn, sugar beet, canola and potato. In each case one transgenic and one conventionally bred variety was tested. All the varieties disappeared in 47 of the 48 fields after 4 years. The only variety, which remained up to 4 years in an irregular way was a potato variety improved by conventional methods. The conclusion of these experiments is that improved varieties cannot persist by themselves in the environment, or at least in the field conditions of the experiments done in England.

Certainly, the Andean environment is very different, and we should not generalize too much based on these optimistic conclusions. What should be done is to develop a similar experiment in the Andean zone of production of commercial varieties, in order to assess the persistence of our own cultivated commercial varieties.

This is the main objective of a project that just started between Leeds University, University of Wageningen in Holland, PROINPA in Bolivia, and SENASA in Peru. CIP is assessing and supporting SENASA to develop such experiments with improved, non-transgenic varieties. With these, we will have our own results supporting presence or absence of risks but also, include a plan of vigilance in case of possible escapes.

**A huge polemic arose about the Terminator case, which was perceived as an abuse of transnational companies on farmers’ right to save and reuse seeds. What can you say to us about it?**

The Monsanto Company announced that their transgenic seeds would have mechanisms to confer sterility to avoid an unfair appropriation of their cultivars. This technology was perceived as a violation of the indisputable and secular right of farmers to maintain seeds for the next season. In the reality of modern agriculture, which uses transgenic crops, this right is no longer exercised due to the quality of certified seeds for example, hybrid maize varieties. Therefore, this case was, in my view, totally out of context.

**How could the agriculture of our less developed countries benefit from these technologies?**

Let me give you some concrete examples where transgenesis would be worth developed in order to benefit the agriculture of this region:

- Improvement of commercial potato varieties because they lack good resistance against pests and diseases. Potato tuber moth, white fly weevil, nematodes, late blight, and bacterial wilt are just a few of these pests and diseases affecting potato crops.
- Improvement of rice could include; resistance to rice blast, improvement of milling quality, and improvement nutritional content (higher Vitamin A).
- Corn suffers from pests like the corn borer, and there are needs to improve its nutritional quality in both vitamin and protein content.
- Ornamental plants could be modified to obtain new colors, greater combination of colors, modify flower shapes and lengthen or improve durability.
- Fruits like mangoes, cherimoya or avocados, could be modified to delay their maturity period and allow for better commercialization.
- Sugar cane also suffers from bugs that harm stems.
- Many cultivars can be used as bio-factories of chemicals, such as medicines.
• Biodiversity could be investigated with these new technologies and be exploited commercially without compromising its conservation.

In all these cases, transgenic technology could improve some of these deficiencies. However, we should not think that everything should become transgenic. There is no one solution to the lack of sustainability, poverty and low productivity. We need to integrate multiple strategies in order to reach a real impact that solves the difficulties that low-resource farmer face in the countries of this region.

**Based on scientific evidences, are there any documented cases about possible risks to human health?**

No, there have been only a few cases suggesting possible risks that received sensationalist coverage in the press. However, after reviewing each case through a science-based rationale, it became evident that they were just misinterpretation of experimental results.

Three cases were publicized as “evidence” of the clear dangers of transgenic crops.

• The tryptophan case. In 1989, a thousand people got sick and 38 died after the ingestion of antidepressant pills. These pills were produced from new strains of recombinant bacteria (the recombinant bacteria, in this case, is the technology equivalent in bacteria of transgenic crops). However, a serious investigation of the case lead to the conclusion that the bacteria itself was not responsible for the intoxication. In fact this had to do with the drug purification process itself that was responsible for the impurity that caused the death of these people.

• The case of the lectin gene in potato. In this well-documented and controversial case, everything started with suspicious changes in the growth and immune system of mice that were fed with a transgenic potato that contained a lectin gene from another plant to increase resistance against insects. Dr. Puzstai, in 1998, claimed that his experiments showed possible effects of food derived from transgenic potato on human health. However, an in-depth investigation conducted by a group of independent scientists demonstrated that Dr. Puzstai’s research lacked of convincing evidence to support such conclusion. Dr. Puzstai was later sanctioned for having mislead the public with his alarmist press releases.

• The StarLinkTM Case. A mixture of a transgenic corn variety (StarLinkTM) with other non-transgenic corn was detected in 2000 in the food of the fast food chain Taco-Bell by a group of opponents to the transgenic technology. As soon as the information about mixture with transgenic corn not authorized for human consumption was spread, several cases of suspicious allergenic reactions were reported. Taco-Bell had to eliminate all food derived from this corn flour, even though the mixture was less than 1% transgenic. A commission investigated the allergenic potential of this new Bt-corn, but finally could not conclude either on the existence or the absence of a risk. Neither were they able to demonstrate scientifically that the allergies had been caused by the ingestion of this Bt-corn food. The whole story ended up in the lack of evidence that any of the alleged case of allergenic reaction was true.

**And risks to the environment?**

There is just one case that is being presented as an example of negative impact of these transgenic crops to the environment: The triple resistance to herbicide canola case. In USA, canola crops resistant to herbicides have been cultivated for several years. In 1997, canola cultivars with resistance and tolerance to 3 different herbicides were planted without taking into account the recommendations to maintain certain distance between the fields of transgenic canola and other varieties. These were very fertile and hence could hybridize easily at the proximity. The result was soon the appearance of canola plants with triple resistance to herbicides that acted as weeds in canola fields. Therefore, this case is no more than a bad management of the cultivars and herbicides. There is no inherent risk associated to transgenesis because that event could have happened with non-transgenic varieties with resistance to these herbicides.

There are growing evidences that transgenic crops are not a threat to the environment. There are several examples that demonstrate the absence of negative impacts in the countries where these transgenic cultivars are produced for
Some investigators pointed out the possibility that these transgenic crops could harm some species that are beneficial to the environment. Is that true?

There is no major risk if we compare it with the use of chemicals. There is a well-known case that illustrates: The monarch butterfly case. US researchers demonstrated that in laboratory conditions monarch larvae died when fed on milkweed leaves covered with pollen from transgenic Bt-corn. According to these researchers, this demonstrated that transgenic corn threatens beneficial insects. Field tests and analyses of the real situation were done and concluded that Bt-corn pose no risks to the monarch butterfly. Moreover, the evidence obtained from these reports suggests that Bt-corn is on the contrary beneficial to the monarch butterfly due to the fact that pesticides are no longer used.