Viewpoint: ‘Even if it seems like breaking a taboo, CRISPR gene editing techniques and organic farming are an excellent match’

Even if it sounds like breaking a taboo, new gene editing techniques and organic are an excellent match.

People don’t like pesticides. They are even less fond of genetic engineering. But they don’t want to convert natural areas into new farmland either. How are we going to feed ten billion people in the near future? Austrian science journalist Alwin Schönberger makes a plea to embrace the latest methods of crop genetic improvement.

He saved millions of people from starvation and yet is almost unknown. Norman Ernest Borlaug began experiments in Mexico in the mid-1940s aimed at increasing crop yields. Finally, the American biologist bred a particularly high-yielding wheat variety, which at the same time was short in stature so the plants did not bend under the increased weight of the ears. This dwarf wheat led to a tripling of the harvest, which benefited countries such as Mexico, India and Pakistan. Borlaug was awarded the Nobel Peace Prize in 1970 for his innovation. No single person in history, it was said, had saved more lives than him.

Borlaug had intervened in the wheat genome and changed its genetic profile to maximise yields and for the benefit of feeding the world – admittedly at that time using conventional breeding techniques. Today, the same undertaking is certainly much faster, more efficient and more cost-effective: with new methods of genetic engineering such as CRISPR/Cas9, the so-called gene scissors. This makes it possible to precisely target selected sites in the genome and, for example, mute genes – such as those that influence the growth habit, are responsible for heat and drought stress or susceptibility to pests.

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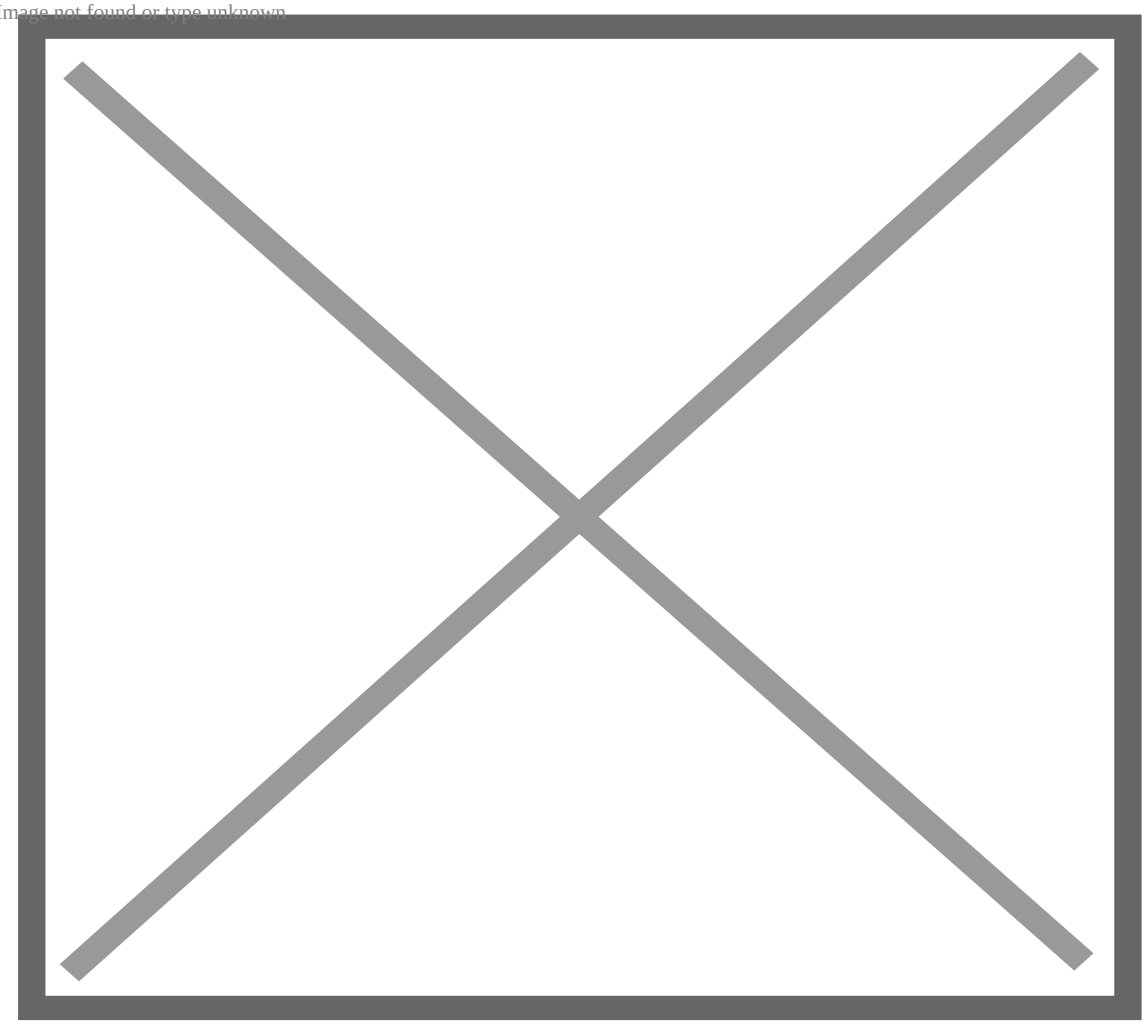

Credit: Michael J. Ermarth via Methods of Plant Breeding and FDA and CC0-1.0

The result could be climate-friendly crops that are resistant to diseases – without having to spray vast amounts of pesticides because the protective mechanism is already genetically built-in. The CRISPR intervention leaves no traces: it is not possible to determine whether it came about with gene editing, conventional breeding or natural mutation.

But there is a problem with genetic engineering: people, especially in Europe, reject it outright. Between 80 and 95 percent of the population in Austria and Germany say in surveys that they are against any form of genetic engineering. At the same time, almost 80 percent of respondents are against pesticides in agriculture. And a majority of people also consider it unjustifiable to convert natural areas into arable land – which in view of its importance for CO2 sequestration is a very justified position. However, organic farming, which is also preferred by a large number of people, requires more land on average because yields are lower.

So how does it all fit together? Not at all, especially when you consider that the world’s population will grow to almost ten billion people by 2050.

Now there are good reasons to advocate a reduction in insecticides and herbicides. Although volumes alone are not meaningful, because the toxicity, effectiveness and form of application of the individual substances also count (although glyphosate performs pretty well despite common assumptions), it is nevertheless important to try to avoid chemicals in fields wherever possible. There are also good reasons to take a critical view of classical genetic engineering. Traditionally, crops have often been modified to be tolerant to pesticides, with the result that many people’s horrors appeared in combination: genetic engineering and chemistry, sometimes even more of them than before. On a case-by-case basis it can be argued that this makes sense, but it cannot be the solution to make plants resistant to substances that should be avoided as far as possible.

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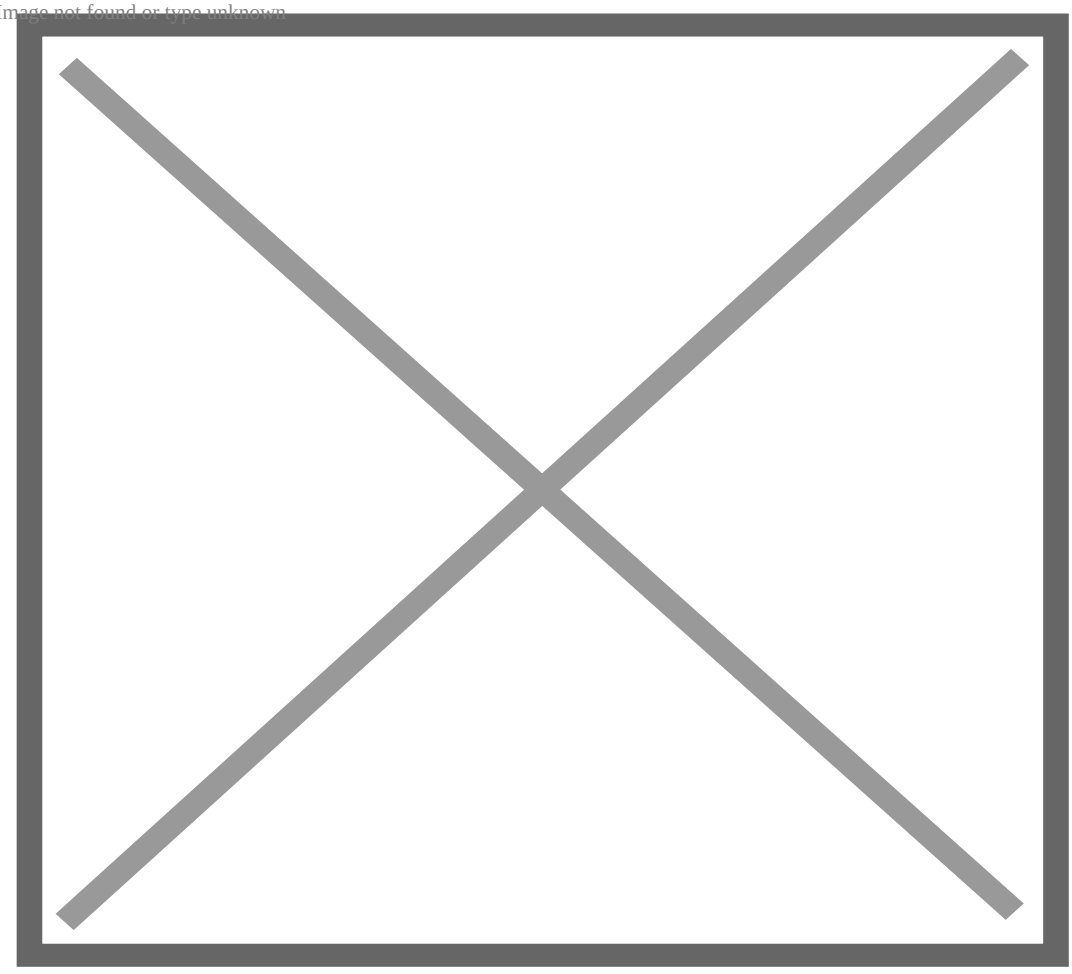

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The idea of influencing plants in such a way that they no longer need such substances at all sounds more convincing. Gene editing in particular can bring us a good deal closer to this goal.

As a result, vegetables can be kept fresh and durable for longer, cereals contain less gluten, and the deactivation of individual genes can protect plants from viruses, bacteria and fungi, such as wheat from powdery mildew. Overall, the aim is to make crops robust, productive and nutrient-rich. The method is also not exclusive to corporations: CRISPR is relatively simple and inexpensive, so that even medium-sized companies can afford to cooperate with specialised laboratories.

And even if it sounds like breaking a taboo, new genetic engineering and organic are an excellent match. It is precisely this combination that could represent a cornerstone of the agriculture of the future – with plants that can withstand climatic changes and, thanks to pest and disease resistance, deliver high yields without requiring a lot of chemicals or significantly more land.

Agriculture as it was practised 100 years ago might seem more appealing. At that time, however, there were not even two billion people living on our planet. If we accept the major challenges facing food production – climate change, a growing world population and the principle of soil conservation – we must embrace the possibilities of genetic engineering, at least as part of the solution.

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