

How can organic farmers benefit from plant breeding innovation - Mr. René Custers

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Recent field trials have shown the efficacy of cisgenic late blight-resistant potatoes. Such variety would not only be environmentally beneficial, but it would strongly reduce the need for fungicide sprays. That would reduce the risk of developing diseases in organic potato cultivation, says Mr. René Custers, Regulatory & Responsible Research Manager at VIB (Flemish Institute for Biotechnologies)

The organic food market in Europe is booming. With a 21% increase ¹between 2010 and 2015, today, the total organic area in the EU-28 amount to around 11.1 million hectares. Do you think this market will keep on growing?

Yes. The organic sector is growing very fast and I believe that it will play a significant role in making agricultural practices more sustainable. However, the organic movement should be more open towards the benefits that plant breeding innovation may bring to their sector, as they might miss some opportunities.

The organic movement is traditionally against the use of plant biotech since it focuses more on the genetic makeup and less on the environment. Why do you think they may benefit from it?

¹ EUROSTAT: Organic crop area on the rise in the EU - 25 October 2016. [Link here.](#)

The intrinsic value of nature and the diversity of its living organisms is undisputable, and therefore we respect a philosophy that wants to help to protect that. Plant breeding is the art of domesticating crops and the latest scientific developments offer unprecedented opportunities to make both traditional and organic agriculture more sustainable.

Could you give us an example?

Sure. The most devastating disease in the common potato is called “*late blight*” and is caused by a fungus-like micro-organism called ‘*Phytophthora*’. Late blight problems result in huge economic costs mostly associated with yield losses in developing countries and the purchase and application of fungicides in developed regions. Farmers in humid, moderate climates spray 10 to 15 times, on average, to control the disease, but this can go up to 20 times in wet growing seasons. Organic potato producers must rely on copper or sulfur products and selected biological fungicides and I believe there are more ecological ways of controlling late blight than spraying so much pesticide.

Such as?

Well, a more ecological way of controlling late blight is the use of resistant varieties. Many wild tuber-bearing potato species contain resistance genes which encode proteins that recognize effectors from the late blight pathogen and evoke a hypersensitive response to block the infection. In recent years, various genes that recognize different effectors have been isolated and characterized. It is estimated that using a combination of three or four different resistance genes can reduce fungicide use by at least 80%.

“Large-scale cultivation of late blight-resistant potatoes would not only be environmentally beneficial by reducing the need for fungicide sprays in conventional potato cultivation. This would have significant beneficial spill-over effects in organic potato cultivation by contributing to the prevention of yield losses and by reducing the need for copper-based or other organic fungicides.”

Mr. René Custers, Regulatory & Responsible Research Manager at VIB

This sounds promising, but, can’t we simply use traditional techniques?

The big drawback of introducing single genes by conventional breeding is that the 10-40 years needed to obtain a good resistant variety are often overthrown in a few years due to mutations in the pathogen, causing the resistance to lose its efficacy. *Phytophthora* produces vast amounts of spores and can produce up to 20 generations per growing season. The combination of a group of different resistant genes is a better strategy to protect the potato against the infection, but this is very difficult to achieve using conventional breeding. However, with new plant breeding techniques, it is possible to obtain similar or better results in months and not years.

So, you claim that the organic movement should at least re-consider its approach when it comes to new plant breeding techniques?

For organic farming, resilience is extremely important and that is why many breeding activities aim to bring back some of that resilience. Our knowledge of plant transformation, plant genome

evolution and plant breeding has increased significantly in the past decades and I believe the organic sector will greatly benefit from tapping into this pool of knowledge.

Mr. René Custers, Regulatory & Responsible Research Manager at VIB The VIB is a Flanders based research institute that performs strategic basic research in life sciences.

What is plant breeding?

Plant breeding is the art and science of changing the traits of plants in order to produce desired characteristics to improve the overall function of various plants and crop systems.

With the predicted growth in the global population and the effects of climate change, varieties with increased yields and resistance to drought and disease are critical if we are to provide enough food for future generations. Plant breeding is one of the tools that will help us achieve sustainable crop production in the long term.

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