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Europe must embrace GMOs to address the UN SDGs

Written by Jonathan D.G Jones on 26 November 2019 in Opinion Plus
Opinion Plus

Jonathan D.G Jones argues why the EU should replace chemistry-based agriculture with genetic methods.

Photo Credit: UN

Nobody contests the need to address the UN Sustainable Development Goals (SDGs): Zero hunger; Good health and well-being; Responsible consumption and production; and Climate action.

However, there is less agreement about how best to meet these challenges, particularly for agriculture.

There is lively debate between advocates of “agroecology”, and those who argue for deployment of the most advanced plant breeding and cultivation methods.

In my view, we cannot meet the SDGs without judicious deployment of the full range of crop

improvement technologies.

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Agriculture is in the eye of the storm. Agrichemicals reduce losses to pests and diseases but can have unintended consequences for non-target organisms.

Every tractor trip adds to the already-excessive CO2 levels in the atmosphere. Ploughing releases stored organic carbon into the atmosphere, while the destruction of forests for land cultivation has devastating consequences for wildlife and the atmosphere too.

Like it or not, extensive forms of agriculture for grain crops, like organic agriculture, are not the silver bullet.

They result in lower productivity per hectare than conventional, with or without more advanced methods using Genetically Modified Organisms.

If the world were to switch to organic agriculture, we would need even more land to produce the same amount of food.

> "We cannot meet the SDGs without judicious deployment of the full range of crop improvement technologies"

The most devastating ecological impact of agriculture is the replacement of forests with land brought under human control to produce food for ourselves or our domestic animals.

Agriculture; we need less of it, not more of it. To achieve that, where we have agriculture, we must make it more productive, while minimising its environmental impact and making it more sustainable.

Pests, diseases and weeds can reduce yields by 50 percent or more. Agrichemicals are widely used to manage these challenges.

However, as unintended consequences of their widespread use become clear, policymakers have strengthened regulation of agrichemicals, particularly in Europe, creating new problems for farmers.

For example, neonicotinoid seed treatments are no longer permitted for controlling flea beetles in oil seed rape, resulting in reduced yields and prompting many farmers to switch to other crops.

In my lab, we aim to create a more durable and sustainable approach to disease control by replacing chemistry with genetics.

Plants have extremely powerful defence mechanisms against disease, but they only work if switched

on early enough and this depends on them being able to detect the invading microorganism via dedicated receptors.

Plant genomes typically carry hundreds or thousands of different genes for these receptors, but these receptors have tremendous heritable genetic variation, both within and between plant species.

Using the advances in our understanding of plant genes and genomes of the last 40 years (much of it funded by the EU), it is now feasible to identify unique receptors in wild relatives of our crops that recognise important diseases, and move these receptors into crop species, allowing us to create disease resistant varieties.

For example, by moving three genes from wild relatives into potato, we have come up with a potato variety immune to late blight, the cause of the Irish potato famine of the 1840s and which currently requires 10 – 15 sprays per year.

Others have created wheat lines immune to the devastating wheat stem rust disease **(see www.2blades.org [6])**. There is just one problem; we used the method known as genetic modification (GM) to move genes from one plant to another, and so these lines are subject to an excessive regulatory burden.

Others, such as Dirk Inzé, scientific director of the VIB Centre for Plant Systems Biology, have made the case that current regulation of novel plant gene editing methods, under the original GM regulations that date back to 1999, is irrational, disadvantageous to European science and technology, and renders European farmers uncompetitive.

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This European posture also damages the interests of African countries who tend to follow European leads on regulation of agricultural technologies.

These regulations also damage Europe by making it near-impossible to use the method to replace chemistry with genetics, to enhance agricultural sustainability and help meet the SDGs.

When I started to use GM in 1983, we did wonder whether its use carried unknown risks. We wonder no more.

There is no credible mechanism by which the GM method itself creates environmental or human health risks; this is not just my judgement, but that of every learned society that has evaluated the question.

However, each deployment of the method requires assessment on a case-by-case basis for its utility and scope for unintended consequences.

For example, it’s possible to use genes from sorghum to increase resistance in Brassica to flea beetle, but this involves production of dhurrin which could reduce the utility of the meal for animal feed.

Europe needs to re-evaluate its position on advancing the UN sustainable development goals using the GM method.

Current legislation not only abolishes Europe’s capacity to make the most of recent dramatic

advances in gene editing to improve agricultural sustainability, but it also prevents us from enhancing crop disease resistance by moving receptor genes between plant species.

Does the EU really think it is in the best interest of our citizens that we continue to rely on agrichemicals when we could avoid doing or at least reduce doing so by embracing GM methods?

About the author

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