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## Tensions at the Boundary: What Defines 'Organic' Plant Breeding?

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### About This Brief:

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### Key Findings:

- In the face of emerging genomic biotechnologies, the organic sector is reaffirming and deepening boundaries between 'organic', 'genetically modified' and now 'gene edited'.
  - Some of the organic sector's main arguments against gene editing include: its lack of necessity, ownership concerns, and opposition from consumers.
  - There are many concerns around the contradiction of allowing older forms of genetic modification (irradiation and chemical-based breeding) while excluding gene editing, highlighting the need for clearer definitions of "organic".
  - The act of boundary making is prioritizing some opinions over others, namely those with the capacity to take part, drawing attention to the need to be more inclusive in defining the organic sector.
  - The organic sector has spent considerable energy, time and resources responding to the new wave of gene editing technologies, which are perceived as an affront to organic integrity.
  - The challenge for this multi-faceted community in the face of ongoing technological development will be to engage in generative boundary work that articulates what organic is, and a vision for what it could be.
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### Introduction:

Genomic technologies are developing rapidly and continue to impact the food and agriculture industry. The organic sectors in both Canada and the United States (US) have long been considered strongholds of resistance to the genetic modification of organisms. The goal of this study was to examine the conversations the organic sector is having around gene editing technologies, and to utilize the theoretical concept of

boundary work (any work that defines and maintains distinctions) to illustrate how the sector distinguishes organic breeding from gene editing. The common definition of genetically modified (GM) is insertion of DNA from a non-sexually compatible organism into an organism's DNA. Gene editing, on the other hand, involves making more targeted changes to genomes, which may be as simple as a short deletion. Gene editing is also much more efficient and thus cheaper, than GM. As gene editing technologies are being introduced into the food system, the organic sector finds itself needing to articulate its stance on the technology.

The organic sector has long cited a multitude of arguments in defense of their anti-GM policies. These biotechnologies carry intellectual property restrictions and copyrights, which the organic sector has objected to on the basis of seed sovereignty and farmers' rights. The limited accessibility of these complicated and costly technologies are also likely to restrict certain groups from participating in their development and benefiting from their use. Moreover, many communities (including but not limited to the organic sector) point out that issues of food insecurity can not be solved by simply producing more food. For some in the organic community, direct gene modification essentially violates the integrity of living organisms, and goes against foundational organic values and principles. Consumers of organic products have also expressed their concerns over the uncertainty of potential health outcomes that could result from these biotechnologies.

Proponents liken these new techniques to older breeding methods that use chemicals, radiation, or selective breeding to introduce mutagenesis (the mutation of genetic material), most of which are still considered acceptable under organic standards. Proponents also argue that the resulting modifications to DNA from these techniques are no different than those that would occur naturally (DNA spontaneously mutates routinely), the process has just been sped up and selectively chosen. They also argue that these technologies have the ability to produce more food more efficiently, requiring far fewer inputs of fertilizers and other chemicals that harm ecosystems. Lastly, proponents assert that because these methods are inexpensive and effective, they will be easy to implement and could be used by anyone.

This study explored how the organic sector is responding to new gene editing technologies, which are requiring the sector to redraw and bolster boundaries around what "organic" really is.

### **Research Process:**

The research draws from semi-structured interviews with representatives from the organic sector, a review of organic organizations' public documents, and participant observation at organic sector conferences. The sampling pool was individuals involved in standard setting, convening, research, or advocacy within the organic sector in the US and Canada.

Nineteen interviews were conducted with four representatives from organic standard committees, six members of organic and food sovereignty civil society organizations, six plant breeders and researchers at publicly funded institutions, and three plant breeders at private companies. In the interviews, participants were asked both about their individual views and the debates held within the organizations they represented.

The review of public documents helped to understand the decisions and discourse regarding gene editing by relevant organizations to date, and how these compare to conversations had with key informants.

Participant observation occurred at the Organic Seed Growers Conference from February 12 - 15, 2020 and at the Certified Organic Associations of British Columbia conference from February 28 - March 1, 2020.

## Results:

In response to new genomic technologies, the organic sector continues to affirm existing boundaries between biotechnology and organic breeding, and the sector even seems to be deepening them.

Arguments in opposition to gene editing include:

- 1.Environmental risks and uncertainty
- 2.Health risks and uncertainty
- 3.Lack of holistic or ecological integration
- 4.Violates the integrity of the cell wall
- 5.Corporate control
- 6.Intellectual property concerns
- 7.Alignment with industrial agriculture
- 8.Simply not necessary
- 9.Not a 'silver bullet' or the answer to all agricultural problems
- 10.Only successful because of disproportionate funding
- 11.Jeopardizes farmer livelihoods
- 12.Consumer opposition
- 13.Doesn't align with Indigenous rights and worldviews
- 14.Doesn't address food insecurity

There are also increasing concerns around gene editing due to the fact that gene editing is untraceable (there is no test to detect it), making it hard to regulate. Lastly, many organic sector participants are fundamentally against the private ownership of seeds, genes or traits.

Not everyone within the organic community is opposed to gene editing, but conversation around this topic has been narrowed by the need to maintain consumer trust in organic certification. For instance, several plant breeders expressed optimism that gene editing could help both organic and conventional agriculture reduce inputs and increase efficiency. However, these interviewees acknowledged that the organic sector needs to "draw a line" in order to present a consistent message around biotechnology. This drive to offer consumers a clearly defined product can lead to black-and-white debates about gene editing rather than nuanced conversations.

The researchers also found that conversations over gene editing have opened questions around other techniques commonly utilized in organic breeding. These include irradiation and chemical-based breeding. These techniques have existed for nearly 100 years, and if these forms of breeding were to be banned, many important commercial varieties of certain crops (namely broccoli) would have to be eliminated from organic certification. This boundary work challenges stakeholders to "more fully articulate and even redefine...what constitutes acceptable forms of human intervention in nature" and exposes philosophical rifts between subsets of the organic sector.

Lastly, the researchers found that the act of boundary making and the debates surrounding it were excluding important actors from the deliberation processes. This sort of work requires large amounts of time and resources that farmers often do not have. In this way, the act of boundary making is prioritizing some opinions over others, namely those with the money and resources to take part.

## **Implications:**

This study found that in the face of emerging genomic biotechnologies, the organic sector is reaffirming and deepening distinctions around acceptable breeding methods for the organic sector, but this act of boundary-making may narrow the range of voices that are included. The researchers suggest that more inclusive conversations could be more productive. The research also suggests that while boundaries are necessary to define what organic is, the current mode of drawing them may be too restrictive and may be perpetuating internal contradictions. Moving forward, a challenge for the sector may be finding the time and resources to respond to new genomics-based technologies while not losing the opportunities for more proactively focus on broader value- and principle-based discussions about what organic ought to be.

## **About This Research:**

This brief is based on the following journal article:

Nawaz, S, et al. 2020. Tensions at the boundary: Rearticulating 'organic' plant breeding in the age of gene editing. *Elem Sci Anth*, 8: 34. DOI: <https://doi.org/10.1525/elementa.429>

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