Why are NGOs sceptical of genome editing?

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Abstract

NGO arguments against agricultural biotechnology are often dismissed as based on emotion and dogma. This article draws on qualitative research to understand these arguments and shows that NGO opposition is grounded in three types of scepticism concerning the problem framing, the solution framing and the motivations.

Introduction

In 2016, 107 Nobel Laureates signed an open letter calling on Greenpeace to desist from campaigning against agricultural biotechnology and for governments to reject and resist such campaigning, arguing that "[o]pposition based on emotion and dogma contradicted by data must be stopped" (Support Precision Agriculture, 2016). The letter marked the latest, heated chapter in a long-running and apparently intractable debate around agricultural biotechnology (Burke, 2004; Kuntz, 2012; Tagliabue, 2016). Genome editing is an important case within the broader portfolio of agricultural biotechnologies. The European Commission has delayed deciding on the regulatory status of genome editing and New Plant Breeding Techniques (NPBT) for use in agriculture. Numerous groups are attempting to shape the debate through representations to the Commission, including biotechnology companies, scientists and NGOs. In contrast to previous public debates around agricultural biotechnology, scientist representations have been particularly prominent in contrast to a more muted position from commercial interests, reflecting commercial companies' adopting a wait and see strategy with regards to the pending regulatory decision on genome editing (Nuffield Council on Bioethics, 2016). As with genetically modified (GM) crops, NGOs have become the subject of intense criticism from leading scientists advocating genome editing in agriculture. The subsequent debates have aroused passions on all sides, but rarely appear to result in greater mutual understanding. In this paper, we use the case of genome editing to show that the Nobel Laureate letter may have mischaracterised opposition to agricultural biotechnology as rooted in emotion and dogma. Rather, our results suggest this opposition is grounded in three specific types of scepticism concerning: 1) the framing of food security; 2) the focus on intensive agriculture and scientific and technological solutions to the problem of food security, and, 3) contesting the motivations for adopting agricultural biotechnology.

Our findings are based on the results of a one-day focus group and nine additional semi-structured interviews involving fourteen participants from UK and EU-based NGOs with an interest in genome editing in agriculture. These NGOs include, Beyond GM, Compassion in World Farming, Corporate Europe Observatory, Econexus, FARM, Food Ethics Council, Friends of the Earth, GeneWatch UK, GM Freeze, GM Watch, Greenpeace, Logos

Environmental, Sustain, and Permaculture Association. Due to the small nature of several participant NGOs, to remain consistent with the consent provided by participants at the start of the project, and in accordance with the ethical procedure approve by the host institution (University of Nottingham), all quotes have been anonymised.

We draw on the concept of framing as a means of clarifying and improving understanding of NGO scepticism towards agricultural biotechnology. Framing is described as the process through which some aspect of a perceived reality is emphasised in such a way as to promote a particular problem definition, motivation for action, and solution recommendation (Entman, 1993). Frame analysis is therefore a means through which to analyse how groups articulate and promote a particular understanding of an issue and mode of action, while excluding alternatives. To identify NGO framings the data analysis focused on delineating key framing tasks, diagnostic framing (identification of problem and its cause/attribution of blame), motivational framing (impetus for action), and prognosis framing (presentation of solutions) (Morris, et al., 2016) undertaken by NGO participants when constructing their arguments for opposing agricultural biotechnology. Following this methodological approach we have identified how NGO participants expressed an alternative framing of agricultural biotechnology that was sceptical of the dominant problem and solution framing as well as articulating their motivations for rejecting agricultural biotechnologies. The analysis highlighted a large amount of consensus between the NGOs although some areas of divergence exist which we identify here.

The focus group and interviews examined the social and ethical issues raised by NGOs in the context of agricultural biotechnology with a specific focus on genome editing techniques as a newly emergent subset of this broader category. The interviews highlighted that NGOs are not a unified group. NGOs undertake different roles dependent on their organisational structure and mission statement, and with different emphasis on the issues at stake. We report the most prominent themes expressed by NGOs related to their scepticism of the problem and solution framing of agricultural biotechnology and the anticipated outcomes. Quotes are presented where they represent key messages from the wider data set and have been lightly edited for clarity.

Scepticism 1: Contesting problem framing

a) Food security versus food sovereignty

Food security frames the problem of hunger as stemming from a lack of sufficient quantities of food to feed all people, now and in the future. Consequently, farmers need to produce more food by increasing crop yields. Genome editing is offered as one such promissory technology to achieve yield increases. However, the majority of NGO participants contested this framing of the problem arguing that the problem is not one of quantities but one of access and control. As well as contesting the dominant food security framing, a smaller number of NGOs outlined an explicit alternative framing, that of food sovereignty.

> "We more and more promote food sovereignty, so it's about farmers being in control of the system and consumers having a safe, fair food supply to buy or to grow themselves." (Interview P4)

> "[T]o me it's about, food sovereignty is about giving people the right to own food systems, it's about preserving the genetic heritage we have, it's about giving control to farmers to grow the way they need to grow …" (Interview P8)

In contrast to food security, food sovereignty draws attention to who controls the way food is produced and the implications for access to food, land and decision making (Mooney & Hunt,

2009). With the problem defined as access, not supply, agricultural biotechnology is no longer the solution. NGOs suggest further potential problems of increased corporate control of agriculture through patenting regimes and diminished consumer control through de-regulation by removing labelling requirements. Consequently, NGOs predict the adoption of genome edited crops will diminish food sovereignty and thus exacerbate the underlying issue of access to food and control of food production.

b) Food security as a crisis

> "… a guaranteed phrase whenever I read a paper, it always starts off, there are so many billion people in the world, by 2020, we need to feed them. If an article starts like that, I can guarantee … it's going to tell me I should be developing GM." (Focus Group R1)

NGO participants repeatedly questioned whether framing food security as a crisis, which often constituted the fundamental justifications for genome editing should be taken at face value. The most prominent example was the pressing need to achieve food security in the context of emerging global threats including climate change and population growth. Participants were sceptical of the motives for declaring a food security crisis and thus questioned the alleged urgent need for genome edited crops to increase yields.

Participants argued that the use of 'crisis' or 'emergency' frames to justify genome editing was not simply a declaration of fact, but a political claim used for political means. In the context of a global crisis, opposing genome editing has been framed as *unethical*. Claims of an impending emergency were given as the reason to suspend normal controls, heightening demand for sweeping de-regulation. Participants suggested declarations of a crisis were used to silence critics, with proponents of genome editing claiming the moral high ground. The current political climate encourages the development of emerging technologies to address societal problems and impact-led research, but NGO participants argue that declaring a global crisis may steer publics into accepting controversial technological trajectories, obscuring a political choice behind a façade of necessity.

Scepticism 2: Contesting solution framings

c) Food security necessitates intensive agriculture

NGO participants argued that genome editing fails to address the inherent unsustainability of monoculture systems. They saw proponents developing genome editing to solve the managerial problems of intensive monocultures by providing new avenues of managerial control through changes to specific plant traits, most notably the addition of insect and herbicide resistance.

> "[I]n a sense genetic modification is a response to how do we solve the problem of monoculture. … new plant breeding techniques are still trying to solve problems that actually we don't really need to have in the first place." (Interview P8)

As some participants noted, even if new genome editing techniques deliver plants that solve the managerial problems of intensive monocultures they cannot solve the negative externalities that intensive monocultures produce. These externalities include issues of biodiversity loss, displacement of local peoples, land tenure disputes, environmental degradation and pollution, many of which contribute to wider human and environmental problems of food vulnerability. Participants argued that previous agricultural biotechnologies such as GM crops have been developed with neither the intention nor the capacity to address these issues. Intensive agriculture is situated as propagating many of the problems that NGOs argue cause systemic food vulnerability. If intensive monocultures are the problem, then

genome editing is not the solution. Instead, NGO participants argued for the need to consider alternative forms of agricultural production which were perceived as more sustainable and equitable.

d) Reliance on scientific and technological solutions

All participants argued that industry and government responses to the problem of food security rely heavily on technological solutions such as genome editing. Although some alternative agriculture NGOs saw this as a necessary part of future sustainable transitions in agriculture, all NGOs saw this continued reliance on scientific and technological solutions as crowding out much needed discussion of alternative means of addressing global food vulnerabilities.

> "I think there will be a significant body of people out there who don't think it'll be worth the bother really and that there are other ways that we can tackle the problems that the technologies purport to solve." (Interview P1)

The majority of participants argued that because agricultural biotechnology was entangled with delivering intensive systems of agriculture, it also closed down discussions of alternative systems of agricultural production that, in the long term, were more socially, environmentally and economically sustainable.

> "So whilst new plant breeding techniques can offer some potentially really significant breakthroughs … I think it's the small scale, diversified agro-ecological farming systems which are actually mostly the future of farming in the world." (Interview P8)

Overall, investments in agricultural biotechnology were seen as out of step with these alternatives systems. Rather, emergent interest in genome editing was seen as drawing in research funds that could be better spent elsewhere if the debate was opened up to a broader discussion of alternatives. NGO participants argued that this reliance on scientific and technological solutions to foods security was shaped by special interests capturing policy-making and the reliance on technology for economic growth.

> "[T]he way that global capitalism works … progress is always good and growth is driven by technology and any kind of debate about which technology we want to choose as a society is seen as a barrier to growth" (Interview P5)

The reliance on scientific and technological solutions was therefore linked strongly to commercial and national economic interests. Participants argued that one major consequence of this linkage between technology and economic growth was that public engagement did not function to arrive at publicly acceptable solutions, but instead to persuade the public that the chosen technologies were indeed the right ones, and were safe and useful.

e) The terms of debate

All participants were sceptical about claims that genome editing was a novel and sufficiently dissimilar solution to past techniques and the extent to which it requires the revisiting of past decisions with the intention of de-regulating genome edited crops. In particular, they pointed to the use of language, arguing that advocates had attempted to create a rhetorical space between genome editing and 'traditional' genetic modification, through the use of categories such as New Plant Breeding Techniques.

> "Industry basically planned the name to divorce the new techniques from what people generally see as a bad old GM story." (Focus Group P5)

> "And they describe this technology as very precise … But they were describing that as meaning it's going to be so much better" (Interview P4)

NGO participants argued the goal of this use of language was to de-stigmatise genome editing and separate it from possible links to first generation GM technologies, increasing its acceptability to policy makers and the public.

Scepticism 3: Contesting Motivations

f) Challenging commercial interests

NGO participants made repeated reference to the commercial dimension of genome editing and were highly sceptical of the way in which this matter was routinely marginalised in debates.

> "[O]ur primary concerns were that these technologies were being used to make rich people richer, not to make the world less hungry or more bio-diverse or more resilient to climate change." (Interview P8)

Specifically, they argued that crops produced through genome editing will be commercial products and continue to offer ambiguous benefits to the people, places and systems that are most vulnerable, particular farmers in the global South. Even in instances where there was considerable public and charity involvement in funding research, this publicly funded research is shaped through representatives of industry providing advice towards research policy agenda setting, as well as opening up avenues for future private commercial innovation to take forward to later stage development and commercialisation (Nuffield Council on Bioethics, 2012).Consequently, NGO participants perceived public and private agricultural biotechnology research as creating opportunities for increased corporate capture of the agricultural and food system at the expense of farmers, citizens and consumers. Ultimately, the scientific advancement of genome editing could not be disentangled from privileging the advancement of commercial interests within agricultural regimes.

NGO participants argued that this dynamic also played out through the narrowing of debate to scientific appraisals of risk and safety. Rather than engaging with this commercial dimension, advocates for genome editing support narrow scientific appraisals of safety as the sole basis upon which to make decisions about genome editing (see Support Precision Agriculture, 2016).

> "Well there's a vested interest in those that are trying to promote the technology to not talk about those wider issues and they are more complex … they are about power…. It's much easier to talk about whether it's safe or not" (Interview P4)

NGO participants argued that the sole reliance on scientific appraisals came at the expense of social, economic and political considerations, something they found deeply frustrating and self-defeating. For participants, it was not possible to disentangle the science of genome editing from these political dimensions. Even if genome edited plants were proven safe, current regulations cannot demonstrate that these broader concerns have been resolved.

Genome editing: An opportunity to build understanding?

Our research suggests NGO opposition to agricultural biotechnology cannot be dismissed as being solely emotional or dogmatic as the Noble Laureate Letter contends. Instead, NGO participants' opposition to genome editing is rooted in three areas of scepticism: 1] scepticism regarding how the problem is defined as a lack of food rather than a lack of access to food, and the urgency of this crisis which closes down alternative solutions in favour for yield increase; 2] scepticism about the solutions, particularly whether further entrenching intensive agriculture through science and technology can address an issue rooted in political and socio-economic inequalities; and, 3] scepticism about the motivations for removing genome editing from GM regulations.

Frame analysis draws attention to an important characteristic of environmental controversies: that they cannot always be reduced to matters of fact. In adopting frames, individuals and organisations inevitably emphasise some issues and downplay others, resulting in the exclusion of 'uncomfortable knowledge' (Rayner, 2012) which does not correspond with a given frame. The exclusion, for example by the Nobel Laureates, of uncomfortable knowledge pertains to the poor practical efficacy of crops produced through agricultural biotechnology. Despite nearly 30 years of innovation the fruits of agricultural biotechnology remain largely promissory (Nuffield Council on Bioethics, 2012). Long standing promises of more stress-resistant or nitrogen-fixing plants have not been delivered (Nuffield Council on Bioethics, 2016). Conversely, for NGOs uncomfortable knowledge includes the potential for genome editing to 'democratise' science due to is increased accessibility, relative ease of use, and 'off the shelf' characteristics (Nuffield Council on Bioethics, 2016), which undermines the framing of corporate control over the food chain. The NGOs did not discuss the democratising potential of genome editing technologies such as CRISPR/Cas. Instead participants' focus on the current state of ownership regarding the products and proceeds of agricultural biotechnology precludes consideration of the way genome editing may challenge this status quo. The way to cope with this uncomfortable knowledge is to ensure diversity in decision making processes, otherwise decisions will lack robustness (Rayner, 2012) and find themselves challenged outside of formal decision-making processes. The history of agricultural biotechnology provides a powerful illustration of such social dynamics.

Sceptical NGOs present alternative problem and solution framings with different anticipated outcomes, as part of a broader political discussion about the distribution of policy impacts within society. An age-old political question underpins all the NGO scepticisms described above: who gets what, when and how (Lasswell, 1936). Increasing food production through agricultural biotechnology to meet imagined future demand is a political choice with political consequences for access to food, land and control over how food is produced. There is ample social science evidence that environmental controversies cannot be adequately addressed through science alone, and that political issues and the values underpinning them must be acknowledged (Sarewitz, 2004). Yet there is a danger this evidence is being ignored, miring genome editing in a similarly polarised and intractable debate as the wider field of agricultural biotechnology. Understanding and accommodating different positions is vital (Hartley, et al., 2016). Opportunities are needed for considering alternative technologies, systems of agricultural practice and political solutions to food vulnerability. Open and constructive debate building mutual understanding of opposing positions is needed if the goal is to truly assess the potential for genome edited crops to play a role in addressing the problem of global food vulnerability.

Conflict of interest

The authors declare that they have no conflict of interest. LO'N facilitated contacts with research participants who have been traditionally hard to access. LO'N was a focus group participant/facilitator, was not interviewed and played no part in research design or data analysis. WP and SH designed the research, conducted data analysis and contributed to writing the paper. RH conducted data analysis and led the writing of the paper.

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References

Burke, D., 2004. GM food and crops: what went wrong in the UK?. *EMBO reports,* 5(5), pp. 432-436.

Entman, R., 1993. Framing: towards clarification of a fractured paradigm. *Journal of Communication,* Volume 43, pp. 51-58.

Hartley, S., Gillund, F., van Hove, L. & Wickson, F., 2016. Essential features of responsible governance of agricultural biotechnology.. *PLoS Biol,* 14(5), p. e1002453.

Kuntz, M., 2012. The postmodern assault on science. *EMBO reports,* 13(10), pp. 885-889.

Lasswell, H., 1936. *Politics: Who Gets What, When, How.* New York: Whittlesey House.

Mooney, P. & Hunt, S., 2009. Food Security: The Elaboration of Contested Claims to a Consensus Frame. *Rural Sociology,* 74(4), p. 469–497.

Morris, C., Helliwell, R. & Raman, S., 2016. Framing the agricultural use of antibiotics and antimicrobial resistance in UK national newspapers and the farming press. *Journal of Rural Studies,* Volume 45, pp. 43-53.

Nuffield Council on Bioethics, 2012. *Emerging biotechnologies: technology, choice and the public good,* London: Nuffield Council on Bioethics.

Nuffield Council on Bioethics, 2016. *Genome editing: An ethical review,* London: Nuffield Council on Bioethics.

Rayner, S., 2012. Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourse. *Economy and Society,* 41(1), pp. 107-125.

Sarewitz, D., 2004. How science makes environmental controversies worse. *Environmental Science & Policy,* 7(5), p. 385–403.

Support Precision Agriculture, 2016. *Laureates Letter Supporting Precision Agriculture (GMOs).* [Online]
Available at: http://supportprecisionagriculture.org/nobel-laureate-gmo-letter_rjr.html
[Accessed 23 January 2017].

Tagliabue, G., 2016. The meaningless pseudo-category of “GMOs”: The trouble with the “new techniques” for genetically modifying crops demonstrates the illogical process-based definition of GMOs in EU regulation. *EMBO reports,* 17(1), pp. 10-13.