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Correspondence

Reply to Tagliabue

Warren Pearce[1], Sarah Hartley[2], Richard Helliwell[3] & Liz O'Neill[4]

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Reply to: **G Tagliabue**

Since our article "Why are NGOs sceptical of genome editing?" [1] was published, we received correspondence, both critical and supportive, but written in the same spirit we employed: attempting to build mutual understanding between diverse perspectives on the role of genome editing in agriculture and food production. In our article, we highlighted one strategy for building such understanding, reflecting on what Rayner describes as "uncomfortable knowledge" [2]: the knowledge that we all downplay when framing complex issues such as genome editing or food security. We presented NGOs' knowledge regarding the political aspects of agricultural biotechnology and food security, which diverges from technical arguments about yield and economic value and is uncomfortable for some correspondents, such as Giovanni Tagliabue [3]. While we thank him for his comments, we would highlight the weaknesses in his technical arguments and his overall approach to this debate. Tagliabue's response exhibits three strategies described by Rayner for excluding the uncomfortable knowledge that we presented in our paper: the denial of our key findings through non-engagement, the dismissal of a single claim we make in the paper, and diversion away from the political issues around food security towards narrow, technical matters. Following Rayner [2], we argue that acknowledging the use of these strategies can help to build a bridge from what Rayner might describe as the "wicked problem" of food poverty towards identifying "clumsy solutions".

Our article argues that NGO scepticism regarding genome editing is grounded in framing the problem of food security; a focus on technological solutions within intensive agricultural systems; and the motivations for adopting agricultural biotechnologies as the preferred solutions. Tagliabue does not argue with these findings and instead acknowledges just one of our claims: that "[d]espite nearly 30 years of research and development, the fruits of agricultural biotechnology remain largely promissory [4]". In dismissing this claim, Tagliabue makes arguments regarding yield, market share and the reality of GM benefits.

First, he asserts that yield is the primary metric of success for agricultural biotechnology. However, a key finding of our article is that many NGOs believe that a focus on yields belies the complex underlying causes of food poverty and hunger. Second, Tagliabue claims that agricultural biotechnology companies have only captured a minority share (33% on average) of the total economic value they have created, implying that companies have not excessively used patents and royalties to capture income. This overlooks the root of NGO scepticism: that agricultural biotechnology corporations extend their control over agricultural systems through the patenting regime, which limits the ability of farmers to use farm-saved seed. We note that approaches that do not privilege economic value can improve food security. For example, a participatory approach to strengthen informal seed networks on smallholder farms in Cambodia and Thailand has been found to enhance both food security and food sovereignty (the ability of farmers and wider populations to control their own food supply) [5]. Third, Tagliabue claims that if any benefits have remained promissory, this is due to the "blanket rejection" of GM crops by anti-biotech NGOs, which has stifled research, particularly the capacity of universities and charities to develop GM technologies. We are aware of no evidence to suggest that NGOs are responsible for the promissory nature of GM crops. Rather, it is market and technological failures that hold back the apparent potential of GM crops. Reviewing the available evidence, the Nuffield Council on Bioethics noted that the agricultural biotechnology innovation system has to date delivered traits of greatest commercial value, primarily herbicide tolerance and insect resistance. Development of other beneficial characteristics has suffered from a poor record of delivery due to the "limited effectiveness [of changes], such as stress tolerance, or [because changes are] of limited commercial value, such as nutritional enhancement" [6].

In summary, Tagliabue's response reverts to narrow, technical arguments in the face of uncomfortable knowledge about the politics of food security. As has been observed in other global policy challenges, such as climate change, progress depends upon prioritising "the more urgent matters of knowledge, values, policy framing and public engagement" over "minimalist claims" [7]. This observation is linked to wider questions regarding how and why scientific issues become a site of legitimate political debate [8]. It is incumbent on all actors in public and political debate, ourselves included, to reflect on our own uncomfortable knowledge if we are to construct bridges from wicked global policy problems to clumsy solutions. We are hopeful that future engagements can take place in this constructive spirit, rather than one of denial, dismissal and diversion.

1 University of Sheffield, Sheffield, UK
2 University of Exeter, Exeter, UK
3 University of Nottingham, Nottingham, UK. E-mail: lqzrh@nottingham.ac.uk
4 GM Freeze, Manchester, UK
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