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The valorization of GMOs and the de-valorization of farmers' contributions to biodiversity—Synthesis paper

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Genetically modified organisms (GMOs) are deeply contested with respect to their implications for food security and environmental sustainability. The three papers in this section effectively capture the present-day focal points of the debates over the undeniably vast topic area of genetic resources and agricultural biotechnology and their implications for food security and the environment. Noah Zerbe outlines the value of (and contestation over) plant genetic materials and rights to their use. Matthew Schnurr explores the current push into a second wave of genetically modified (GM) crops, particularly focused on developing countries. And Taarini Chopra looks back at 20 years of experience with commercialized GM crops, focusing on GM technology's consistent failure to address issues of food security.

This truly is a timely moment for taking stock of the state of global agricultural biotechnology, and it is in this moment that we find ourselves moving beyond an ideological debate on GM technology to more nuanced discussions: Does this technology make sense in the current context? Is it solving the problems underlying food insecurity and actively contributing towards environmental sustainability and the improvement of livelihoods? The three contributions in this section provide strong arguments for why agricultural biotechnology does not make sense in the current context. In this synthesis paper, we take a closer look at the role of narratives, their implications, and opportunities for course correction. Two interrelated points of focus summarize this discussion: (1) the valorization of agricultural biotechnology and a persistent dedication to technological problem-solving, and (2) the de-valorization of farmers' contributions to biodiversity.

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The valorization of agricultural biotechnology and genetic resources

Thematic to all three papers (and workshop presentations) was a problematization of core ideological structures that underpin the current system of agricultural biotechnology and genetic resource procurement. Zerbe addresses the need for fundamental shifts in values in the policy framework; Chopra debunks the myths of the pro-biotech narrative by referring to 20 years of experiential knowledge; and Schnurr stresses the need to move beyond a pro-biotech versus anti-biotech mindset. These three unique lenses applied to the state of agricultural biotechnology and genetic resources capture different aspects of a narrative that pushes for the valorization[1] of agricultural biotechnology and genetic resources.

For Zerbe, this narrative relates to the economic value ascribed to plant genetic resources, which is shown to be considerable. As plant genetic resources become valorized for their economic contributions to new crop varieties, which are developed using increasingly advanced biotechnologies, we should take seriously the possibility that "the contested claims over control of such materials—is only likely to increase in the future." Schnurr's exploration of the GMO2.0 push outlines the narratives that accompany the second wave of GMOs directed heavily at developing countries in Africa. This new era of biotechnology faces a wide range of new issues regarding regulations and intellectual property (IP), along with a familiar narrative of technological innovation being assigned *a priori* value and merit. Chopra identifies a pro-poor narrative in discussing this second wave, arguing that this "new rhetoric" is not "accompanied with new technologies", and also recognizes that GM technology (including its newly associated philanthropic value) is situated as the focal point instead of "the needs of the farmers it claims to be helping." We are witnessing a strengthening of the narrative that GM crops are needed, with critics being accused of being immoral. Power and control remain prevalent arenas of contestation in the areas of agricultural biotechnology and genetic resources, and the narratives maintaining their valorization are integral to this contest.

The workshop session's discussion raised important ideas related to this narrative of valorization, such as the role of research and the concepts of farmer and consumer choice. Discussion centred on whether there is value in research into biotechnology, or if this investment is fundamentally misdirected. Schnurr mentioned the challenges associated with conventional breeding in the context of banana production, while recognizing the potential offered by biotechnology and the need to "carve out a middle ground" when it comes to research. This is an important point, as it provokes reflection upon the types of projects and products that are assigned value. For Chopra, there is little justification for this type of research given the immense investment it requires. More specifically, it isn't the technology itself that is problematic—it is the underlying paradigm that prioritizes technological fixes to socio-

[1] For the purposes of this paper, valorization is used in a wide context as the creation and/or assignment of value and merit, whether economic, social, political, philanthropic, etc. We acknowledge the use of the term "valorization" by Karl Marx (see Marx, 2004) and associated scholars, as a reference to the production of surplus value (Jessop & Wheatley, 1999), but do not find it necessary to engage with their work specifically for the purposes of this paper.

ecological challenges in the food system. As Schnurr noted the second wave of GMOs is borne from the same paradigm wherein technology is positioned as the only solution. Zerbe echoed this thought more generally, explaining that in the current context it is difficult to imagine biotechnology outside of the mainstream system.

It was also noted that there is a narrative of choice, even though we are seeing that there are not two roads to follow for farmers (they are the passive recipients of inputs and technology); we need to change the narrative from "choice" to "no choice". We must also consider what we've learned on the consumer end after 20 years of experience with biotechnology. Zerbe reminds us that the narrative of consumer choice implies consumers have the information on which to base their choice. Consumer and farmer perceptions are key to the acceptance of biotechnology, and the push to inform and educate the public is a priority of both pro-biotech and anti-biotech voices alike. The rhetoric of choice is a key aspect in the discursive valorization of biotechnology; the narrative of choice effectively maintains the value of GM crops and foods.

The topic of rights was another important workshop discussion point, particularly with regard to group/collective rights, as well as the possibilities of open source technology. These ideas are outlined in the following sections regarding the de-valorization of farmers' contributions to biodiversity. However, the concept of rights itself is a useful point for concluding this illustration of biotechnology's narrative of valorization. A discussion of farmers' (and/or consumers') rights arguably exists within a tyrannical context, as seeds are defined as property and thus become treated as such (Kneen, 2009). In this context, corporations and universities accomplish the "real" breeding work (which receives the associated valorization), while farmers "are tolerated (or even required as a source of 'genetic resources') but not valued" (Kneen, 2009, p. 68). Here, Brewster Kneen usefully reminds us that even discussions of farmers' and breeders' rights must consider processes of valorization that are deeply embedded in the language of the global corporate food system.

The de-valorization of farmers′ contributions to biodiversity

The valorization narrative (as outlined above) prioritizes the development of modern varieties over the conservation of farmers' varieties and the farming systems in which they are embedded. Farmers' contributions to plant genetic resources for food and agriculture (PGRFA) in the forms of biodiversity conservation and variety development are de-valorized (devalued and discredited) within a paradigm that views technological advancement in agriculture as a global imperative. Even the language used to describe farmers' varieties as "traditional" implies lesser value than their 'modern' successors. However, Zerbe asserts that farmers' varieties outperform modern varieties outside of test conditions and have more stable yields (see also Mooney and ETC Group, this issue). Chopra reminds us that it is almost entirely farmers' varieties that feed the world today, contrary to the popular perception that GM technology has proliferated over the past 20 years. But despite the role that farmers' varieties play in global food production and

livelihood security, their value is obscured by the dominant narrative and promise of agricultural biotechnology.

As farmers' contributions to PGRFA are de-valorized, there is a conceptual shift with regard to their role in agricultural production. Small-scale farmers are viewed as passive recipients of technology rather than innovators themselves. As Chopra notes, farmers become "implementers of instructions" and need to be taught how to use technology, and, if it does not yield the desired results, are blamed for its failures. In such framings, farmers are reduced to users of inputs rather than being active participants with agency to make choices among various options. This narrative, as Chopra highlights, shifts power away from small-scale farmers in favour of the owners of technology.

When cast as passive recipients by powerful actors, farmers are not engaged in discussions regarding GM technology. Without incorporating farmers' voices into discussions, the value preferences of vulnerable populations, which the technology proposes to target, are ignored. Schnurr illustrates how the failure to reflect farmers' priorities in how technology is employed can undermine its potential to have positive impacts, even when the technology itself is not corporately owned. In this case, biofortification initiatives have received significant donor support on account of their consistency with the narrative that GMOs are needed to feed the world and respond to a global food crisis, while priority traits of farmers are not predominant in the debate.

This sort of narrative has a number of implications. First, resources tend to be diverted away from solving systemic causes of threatened livelihoods and food insecurity and instead are funnelled towards GMO research and development. The case of *Golden Rice* to combat vitamin A deficiency (VAD) provides a strong illustrative example of this resource diversion. Chopra noted that the cost of developing the variety reached $US 136 million after ten years, and is still underdevelopment 20 years later, even though VAD can be overcome much more cost effectively in the short-term with medicine and in the longer-term with diet diversification. Schnurr likewise highlighted the cost-effective solution of using sterilized knives when grafting banana trees to stop the spread of disease, rather than investing in the development of modern varieties. These examples illustrate that the focus on technological fixes detracts from finding longer-term solutions to systemic problems.

Second, farmers' varieties host immense genetic diversity, which is being de-valorized. As farmers' contributions to PGRFA are devalued, the *in situ* conservation that is intrinsic to small-scale farming systems is devalued by extension (see Ahmed, this issue). Farmers' contributions to biodiversity conservation are especially discounted in light of advancements in synthetic biology. Proponents of "cloud breeding" boast the ability to create genetic diversity where required rather than relying upon conservation measures. The discussion brought up the potential impacts of a range of new technologies (some not even considered GM), like synthetic biology and gamma irradiation, which pose the possibility of making our own diversity. Zerbe asserts that most technological advancements in agriculture still require physical inputs and that the value of biodiversity conservation remains immense. Farmers' roles as custodians are

undervalued within a paradigm that places limitless faith in the technological development and the production of diversity.

Third, the de-valorization of farmers' contributions also takes fuel away from negotiations regarding Farmers' Rights. The narrative emphasizing the superiority of modern varieties valorizes plant breeders' contributions to PGRFA over the contributions of farmers. This detracts from the importance of recognizing Farmers' Rights, as enshrined in the Convention on Biological Diversity (CBD), and provisions detailing access and benefit sharing (ABS) in both the Nagoya Protocol to the CBD and the Multilateral System under the International Treaty for Plant Genetic Resources for Food and Agriculture. Provisions for ABS represent opportunity for farmers' contributions to be recognized and rewarded, and for *in situ* conservation to be incentivized. It is imperative that farmers' contributions to PGRFA be adequately valorized in order for them to be reflected in policy. In light of the Nagoya Protocol entering into force in October 2014, it is of the utmost importance that national legislation is implemented that reflects the contributions of small-scale farmers.

Opportunities for course correction

Conversations about the state of play of agricultural biotechnology and genetic resources involve a vast range of debates that are in constant movement. For the moment, we can envision this debate as comprising (at least in part) contests over the necessity and importance of GM technology, the prioritization of dominant interests and values, and the rhetoric surrounding these contests. It is clear that we need a broader conversation about helping farmers to improve their livelihoods rather than starting with the solution, a technological fix that de-valorizes farmers' contributions to biodiversity.

An important theme that emerged from the workshop discussion was opportunities for course correction—how might farmers' contributions to PGRFA become re-valorized vis-à-vis agricultural biotechnology. First and foremost, small-scale farmers reclaim power through the implementation of Farmers' Rights. The idea of "collective rights" over resources has replaced the "common heritage of mankind" doctrine. However, Chopra noted that in practice, varieties perform best within their local contexts and collective rights have more value as a theoretical concept.

Open source was identified as a way of regulating the use of PGRFA. Although open-source strategies do not inherently provide recognition and reward to custodians, they represent an opportunity to increase access to diversity. Kloppenburg (2014) explains the sharing of germplasm through the Open Source Seed Initiatives (OSSI) may revitalize public plant breeding, and potentially "integrate the skills and capacities of farmer breeders with those of plant scientists" (p. 2). Friedman (this issue) describes the institutionalization of such alternative ownership structures (pertaining to customary land tenure arrangements) as a new politics of

resistance—a *commoning* movement—by which practices and perceptions are shifted regarding how resource access and use is regulated.

Community seed banking initiatives were also highlighted as important sites of power retention and resistance against GMOs. In such initiatives, farmers retain their agency that is otherwise lost when becoming "implementers of instructions"; they retain their ability to choose, as well as their traditional knowledge associated with farmers' varieties and small-scale farming systems. It is a timely moment to take stock and acknowledge that GM seeds and technology don't exist outside of the paradigm in which they are created. It depends upon a particular way of framing the problem—outside of this framing GM technology does not make much sense, as Chopra reminds us. Two decades of experiential knowledge can now be put to work to recognize the value of farmers' varieties and small-scale farming systems which promote farmers' choice, resilience and biodiversity conservation.

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