The cosmopolitics of food futures: imagining nature, law, and apocalypse

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Biographical Notes

Jocelyn Bosse, Xan Chacko, and Susannah Chapman are members of the ARC Laureate project "Harnessing Intellectual Property to Build Food Security" at the University of Queensland. Jocelyn Bosse's research explores the role of intellectual property law in shaping the circulation of native Australian plants. Xan Chacko's current research compares different approaches to seed banking by studying the everyday tasks of collecting, sorting, and saving seeds, as well as, the organisation of physical, digital, and intellectual property of the banked seeds. Susannah Chapman studies the relationship between law, science, and society, with a particular focus on human-plant relations, intellectual property, and histories of state seed regulation.

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Abstract

The stories we tell about the world, through worlding practices such as films, open the possibilities of certain futures, while foreclosing other imaginable ones. Attuned to recent work on political ontology that takes contests over 'how the world is' as a starting point for navigating the degradation and uncertainty of life in the Anthropocene, we trace how two films released in 2016, *Seed: The Untold Story* and *Food Evolution*, weave different—though sometimes similar—accounts of the past in order to present precarious futures that are best served through particular interventions. To the extent that both films render accounts of precarious futures saved by science or conservation, we argue that they provide compelling spaces to, following Isabelle Stengers's Cosmopolitical Proposal, to slow down: to pause and consider the types of worlds that are brought into being—and those that are foreclosed—in their portrayal of amid the crises of climate and food. We follow this worlding practice through four threads developed in each film: the momentum of apocalypse, the boundaries of the natural, the politics of law, and the cures for precarity. Focusing on the politics of representation mobilized in each film, we enact a feminist praxis of slowing down.

> 'Americans beware, be warned that when you say no to GM technology, you are suppressing Africa.' Motlatsi Musi, *Food Evolution*
>
> 'This time's famine will be based on a seed famine.' Vandana Shiva, *Seed: The Untold Story*

Introduction

In *Staying with the Trouble*, Donna Haraway posits that, 'It matters which worlds world worlds' (2016, 165). The stories we tell about the world, through worlding practices such as films, open the possibilities of certain futures, while foreclosing other imaginable ones. The skein we weave into the special issue on 'Precarious Futures' is spun from the articulations and imaginaries of food in/security in a moment of climate crisis. Two films released in 2016, each presenting visions of the past, present, and future relations of food, agriculture, and crop diversity provide the 'speculative fabulation' upon which our analysis rests (Haraway 2016, 8). The first, *Seed: The Untold Story* (hereafter *Seed*), focuses on the loss of plant varieties, positioning seed saving and

seed banking as practices that will secure the future of agricultural production in the face of increasing corporate control and environmental destruction. The second, *Food Evolution*, aims to recuperate genetic engineering from its opponents, presenting the development of genetically-modified seeds and organisms as the best—and in some cases the only—option for securing the future of food amid growing human population, heightened drought, and rising incidence of agricultural pestilence. In this sense, the fundamental valence of each film is vastly different, even as both films turn to the palliative potentiality of the seed—whether in the form of conservation or innovation—as a cure for future crises.

Given these partial connections, we are interested in how each film engages in practices of *worlding*—that is, how each describes, conveys, and presents what is and what could be possible in the realm of food, agriculture, and human-plant relations. To this task, we bring our combined experience in plant science and law (Bosse), environmental and legal anthropology (Chapman), and feminist science studies (Chacko). Attuned to recent work on political ontology that takes contests over 'how the world is' as a starting point for navigating the degradation and uncertainty of life in the Anthropocene (Blaser and de la Cadena 2018), we trace how the films weave different but similar accounts of the past in order to present precarious futures. For both films, these futures are best served through specific interventions: where *Seed* foregrounds the environmental, economic, and cultural politics of our contemporary food system and an urgent need to care for and conserve dwindling seed diversity, *Food Evolution* is largely an exercise in technoscientific authority and anti-politics (Ferguson 1990). To the extent that both films render accounts of precarious futures saved by (certain types of) seed, we argue that they provide compelling space to pause and consider the types of worlds that get brought into being—and those that get foreclosed—in calls to action amid environmental crisis. In this essay we slow down the worlding practices of the films through four threads: the momentum of apocalypse, the boundaries of the natural, the politics of law, and the cures for precarity. In doing so, we seek to hold a 'space of hesitation' to reflect on the slippages required to tell the particular stories in these films (Stengers 2005: 995).

In 'The Cosmopolitical Proposal,' Isabelle Stengers reflects on the opportunities presented by embodying 'Deleuze's idiot,' a conceptual character who, 'is the one who always slows the others down, who resists the consensual way in which the situation is presented and in which *emergencies mobilize thought or action*' (994, emphasis added). To be clear, we do not slow down because we deny the urgency or wish to detract attention from the crises, but rather we engage the films as an expression of our commitment to the praxis of radical feminist contextualization, as a way of 'staying with the trouble' (Haraway 2016). With care, we disentangle assumptions and simplifications that scaffold the films and, in doing so, we stay attuned to the worlds that the films create, and recognize the ones they foreclose.[1]

[1] For examples of works that embody Stengers's call to slowing down but stay present with crises and ruin see Puig de la Bellacasa 2017; Tsing 2015; Stoler 2008; Haraway 2011.

Imagining Apocalypse

The themes of uncertainty, ill-health, and corporate greed are well-represented in English-language documentary films that focus on the production, supply, consumption, waste, and future of food. These films offer personal narratives of change for the better (or worse) by controlling what you eat and how much (*Fat, Sick and Nearly Dead* (2014); *Super Size Me* (2004)), insights into the imbrication of agriculture, technology, and corporations (*OMG GMO* (2013); *Farmageddon* (2011)), and with less frequency, challenges and warning about the future of food production (*Seeds of Time* (2013); *Vanishing of the Bees* (2009)). The proliferation of these films in the last two decades reveals not only a growing concern about the source and values imbedded in our food systems, but also a lurking terror in the suggestion that the way of life to which 'we' have become accustomed will not continue because it has never properly reckoned with the harm it was causing all along, the unsustainability of the enduring profit motive, and the finitude of earth's resources.[2] As calls to action amid looming agricultural precarity, both *Food Evolution* and *Seed* fall firmly within this genre, even as they propose different remedies for how to navigate crises in food production.

Food Evolution and *Seed* both tell stories that draw the audience into the future. In doing so, they also rely on a common point of departure. Each begins with a montage of visually stunning images of seeds: resplendent shots of geometric and colourful vessels sprouting, falling, moving across the screen—a cinematic celebration of the outcome of more than 10,000 years of crop varietal selection and diversification. It is immediately following these shots that the audience is introduced to the arc of each story. These arcs begin in somewhat similar places (the deep history of domestication) and they entail similar future precarities (agricultural disease, drought, crop failure, famine). What sets them apart is their momentum.

In *Food Evolution*, viewers are presented with the problem of how to feed a rapidly growing population amid the uncertainties wrought by environmental degradation and a rapidly warming planet. Over a brief video montage, the film's narrator, Neil deGrasse Tyson, explains, 'The survival of our species has always depended on advances in food and agriculture.' Meant to provide the viewer with a brief history of agriculture, the images that accompany this introduction relay much more: they begin with a recent video of an African man using a hoe to turn the soil, followed by old black-and-white film of a combine harvester, then a clip of a present-day combine harvester, and finally a shot of a white man watering plants inside a greenhouse. The cultural

[2] For more documentary films on food, agriculture, and nutrition see: *Dominion* (2018); *Rotten* (2018); *The Magic Pill* (2017); *What the Health* (2017); *Cooked* (2016); *Eating You Alive* (2016); *Food Choices* (2016); *Sustainable* (2016); *The Kids Menu* (2016); *Cowspiracy* (2014); *Bite Size* (2014); *Fed Up* (2014); *Food Chains* (2014); *That Sugar Film* (2014); *Just Eat It* (2014); *A Place at the Table* (2012); *Genetic Roulette* (2012); *Hungry for Change* (2012); *In Organic We Trust* (2012); *More Than Honey* (2012); *Forks Over Knives* (2011); *Vegucated* (2011); *Fat Head* (2009); *Fresh* (2009); *Ingredients* (2009); *Peaceable Kingdom* (2009); *Food Fight* (2008); *Food Inc.* (2008); *Killer at Large* (2008); *The World According to Monsanto* (2008); *King Corn* (2007); *Black Gold* (2006); *We Feed the World* (2005); *The Future of Food* (2004).

evolutionism relayed in this brief clip then shifts seamlessly into the pending future crisis. Over a quick succession of video clips, viewers hear audio from news programmes telling of a growing population and the challenges that climate change poses for feeding the world. The images that convey the urgency of this statement begin with video of young African children filling water from an outdoor tap, followed by clips of crowded city streets, packed urban markets, barren land, mountains of refuse, desiccated crops, farmers spraying chemicals, and piles of diseased produce. Then, the film cuts to footage of protesters marching against the use of genetically-modified organisms (GMOs) in food and agriculture, overlaid with a recording of a woman's voice raising alarm about corporate consolidation in the food system. In the conclusion of this sequence the two-part crisis that drives the film comes full circle: first, beset with problems of rapidly growing population, climate change, drought, and disease, humanity may fail to avert a looming neo-Malthusian crisis. Second, such a failure stems not from a deficiency of technoscience, but rather from opposition to the very 'advances in food and agriculture' upon which 'our species has always depended.'

In the beginning of *Seed*, the audience is presented with a crisis of a different sort. Just after the opening seed montage, the film introduces the seed saver Will Bonsall, a wizened bearded white man who runs the Scatterseed Project from his farm in Industry, Maine. Bonsall explains that he has 'always just been dazzled by diversity,' but that this diversity is waning. The film cuts to an old photograph of Bonsall's great-grandparents, who were farmers. In the photo they are surrounded by piles of fresh garden produce, of which approximately 90 percent, Bonsall explains, are 'now extinct.' Bonsall ponders what God might ask upon witnessing the state of the world's biodiversity today: 'I created this [plant], where did it go? How come it is not here?' Bonsall explains that he fashions himself after the biblical character Noah, keeping the collection alive until the 'flood' of loss has passed. What is this loss? This is the loss of crop diversity; a loss that already has caused catastrophe. The audience is reminded of this catastrophe through reference to past crises: in Bonsall's quest to maintain his vast collection, he has even kept a variety of lumper potato—*the* potato of the Irish potato famine. Genetically homogenous, we learn that its susceptibility to fungal blight led to widespread crop failure, prompting massive food shortages and emigration from mid-nineteenth century Ireland. The film argues that in the face of mounting diversity loss, similar devastation is foreseeable. 'Genetic diversity,' Bonsall explains, 'is the hedge between us and global famine.' From Bonsall's farm, a montage of images of seeds and plants, overlaid with onscreen text explains the magnitude of crop diversity loss: 'We have lost 94% of our vegetable seed varieties in the twentieth century… The last study to count U.S. seed diversity was conducted in 1983.'[3] In the conclusion of this sequence, as in *Food Evolution*, the crisis that undergirds the film comes full circle: beset with problems of crop diversity erosion, humanity may fail to avert future disease, worsening drought, crop failure and, ultimately, famine.

[3] This is a small error in the film. The most recent study to track loss for U.S. seed diversity was published in 2012 (Heald and Chapman 2012) and the figure of 94% loss comes from the 2012 study. The 1983 study presented in the film documented 97% loss, as reported in the book *Shattering* (Fowler & Mooney 1990).

If the apocalypse presented in *Food Evolution* signals a future of potential crop failure and widespread hunger, it is a crisis nonetheless premised on a narrative of advancement, wherein innovations in technoscience have propelled agricultural and social change over millennia (Harvey 1996). For *Seed*, on the other hand, a future of potential disease, crop failure, and hunger emerges almost out of an Edenic, pastoral fall (Williams 1973): the bounty of diversity that once existed and that once provided a buffer against catastrophe has been—and continues to be—lost. For both the progressivist narrative of *Food Evolution* and the declensionist narrative of *Seed*, transformations in seed and crop diversity during the twentieth century emerge as a key site of contestation. For *Food Evolution*, the twentieth century represents a time of rapid advancement in seed technologies, which hold the promise of averting the looming crisis. For *Seed*, the twentieth century is a period of massive, disconcerting diversity loss that threatens the foundations of the global food system. These different approaches to imagining apocalypse—coupled with their shared focus on the seed as the vital site of intervention—shape the way each film engages with questions of what is natural and what is not, what constitutes science and what does not, and what role law and politics might play in both creating and averting crisis. Where *Food Evolution* embraces technoscientific seed as natural and extols the promise of a Western science free of politics, *Seed* attempts to foreground diverse ways of knowing to interrogate the politics and relations of technoscientific seed. But where *Food Evolution* cannot escape the politics it eschews, neither can *Seed* fully step outside the cosmological frame of the declensionist metaphor it has co-opted.

(Un)bounding the 'Natural' and (Re)affirming 'Science'

While each film attempts to stake a claim on the concept of the 'natural,' both ultimately use contradictory rhetorical and aesthetic strategies to shape the concept to suit their particular needs. The malleability of what it means to be natural affirms how inseparable the social or cultural is from the purportedly singular biological construction of nature (Foucault 2005). Not only does it matter what particular natureculture (Haraway 2003) configuration is taken up, but following how the natural is evoked in the film reveals what is at stake, for whom, and for what purpose. In both films, claims about the 'natural' seed infuse both representations of looming crisis and recommendations about how to avert it. Nowhere is this more clearly evidenced than in the treatment of the technoscience of genetic modification.

Early in *Food Evolution*, we encounter the question: what is a genetically-modified organism (GMO)? Two interviewees proffer contrasting explanations, which at first glance seems to suggest that the film has no particular position or vested interest. First, Alison Van Eenennaam, a geneticist from the University of California, Davis, argues that it is an 'undefined term' and equates GMOs with a Chihuahua or a Great Dane, since the dogs having been 'genetically modified' from their wolf ancestors by human breeding. Second, Charles Benbrook, an agricultural economist from Washington State University, states that a GMO is 'an organism that has had its genetic makeup altered by the insertion of DNA that's from outside of its normal genetic makeup.' Benbrook's

unease with the technology hinges on the foreignness of the inserted genetic material that creates an abnormality in the organism. The film is quick to seize on this unease and quells it using a dual aesthetic and rhetorical approach. First, Tyson calls genetic engineering a 'modern form of breeding, which farmers have done for thousands of years.' Then, using animated graphics that move across the screen, depicting the transition from an ancient progenitor of corn (teosinte) to a cob of 'modern' corn, Tyson assuages any remaining doubts, declaring, 'in fact, it's hard to call any of our food natural.' This strategic destabilisation of the demarcation between the natural and the artificial is a response to Benbrook's concerns about the artificiality of the inserted genetic material in GMOs, as well as an extension of Van Eenennaam's position that equates the technology of genetic engineering with the long history of breeding and agriculture.

While making GMOs natural in *Food Evolution* is accomplished in a matter of minutes, *Seed* takes great care to convey the artificiality, even monstrosity, of genetic engineering. The film showcases Clayton Brascoupe, a Mohawk/Anishnabe farmer and director of the Traditional Native American Farmers Association. In an extended cut at Brascoupe's farm, he describes how maize is not only a crop, it is also a manifestation of his ancestors. Brascoupe explains that GM technology, once incorporated into the genes of a plant, is a contamination that cannot be removed through breeding. 'I wouldn't feed it to animals, I wouldn't compost it because it is in the DNA. It is an abuse to seeds and to us as Indigenous people.' Incineration is his only recourse. Another environmentalist and seed carer, Winona LaDuke of the Ojibwe White Earth Band, who fought against the genetic contamination of her tribe's wild rice seeds, calls the technology offensive and hurtful, and emphasizes that, '*wild* should mean something.'

Then, not to be seen as only representing the view of seed savers and Indigenous farmers, *Seed* reiterates the artificiality of GMOs using the voices of scientists and activists. For instance, in one clip Jane Goodall, renowned primatologist and conservationist, calls GM technology 'something that isn't natural in the plant world.' Goodall narrates a most simplistic version of the science of genetic modification over a seemingly hand-drawn animation. As a disembodied blue-veined, hairy, beige hand (ostensibly of an older white male fisherman) picks up a perturbed looking, blue-green fish. A magnifying glass takes us into the flapping fish eye, where a blue DNA strand is isolated. Then, a different white-sleeved hand (now of a male scientist) triggers what we are to believe is a gene-gun (but looks more like a hand-held drill), sending the blue material into a juicy red strawberry still on the plant. The strawberry withers as Goodall explains that the plant fights against the introduction of the fish DNA, represented in the animation, at the microscopic level again, as a blue DNA strangling a red DNA strand. The animation finishes and we are brought back to Goodall's beloved face. She then says, 'the plant is not happy to receive an alien species.' More animations depicting the wrongness of GMOs follow, including a pig being enticed to mate with a tomato. To demonstrate the human hubris in imagining our ability to control the barriers of species, the film presents a rendering of the iconic Michelangelo painting from the ceiling of the Sistine Chapel, *The Creation of Adam*, but instead of reaching towards his creation, God has a gene gun in his outstretched hand.

Whereas *Seed* begins its foray into problems with GMOs via Indigenous more-than-human cosmologies of relations made with plants, it finalizes its argument with a Christian motif of divine control over purportedly natural divisions between species. While this dovetails with *Seed*'s broader narrative of Edenic decline, this rearticulation of boundary crossing weakens the film's implicit call to value diverse cosmologies concerning the seed because it fails to take seriously both the science of taxonomy, which is contested (Bowker 1999; Haraway 2008; Helmreich 2008), and the complexity of Indigenous ontologies (Ens et al. 2015; Kimmerer 2013), which also do not conform to strict—Western scientifically speaking—species demarcation (Viveiros de Castro 2007; de la Cadena 2015). The epistemic blinders used by the film creates a world that endows Indigenous voices with enough power to challenge the science of GM technology but not enough to create a future outside the purview of modern scientific notions of 'the natural', such as the boundary between species.[4] Instead, in the film, what begins with Brascoupe and LaDuke's concerns over GMOs within the context of multi-species respect and care, ends with disquiet over maintaining natural boundaries between species. In this turn, what comes to matter for the film is the policing of the boundary between species rather than the care of the species as articulated by LaDuke and Brascoupe.

The pursuit of scientific legitimacy haunts both films. *Seed* expends considerable screentime on the critique of the unnaturalness of GMOs but also dedicates a considerable portion of the film to showing how scientific research and its applications are entangled with military and corporate interests. *Seed* accomplishes this by showing the intricate means by which the world that makes GMO technology possible came to be. Care is taken to problematize every step of the supply chain of GMOs starting with their production, following their lure, and subsequent proliferation. By clarifying the nefarious pathways by which GMO crops are expedited through systems of safety screening, often by former employees of agribusiness companies turned public officials, and by locating the nexus of control in agriculture not solely in the production of seed, but also in the chemical industries that support and profit from the GM crop system, the film complicates its initially simplistic narrative of artificiality. Set in Jharkhand, India, a segment of *Seed* repositions the dangers of GMOs from that of unnaturalness, to the reality of the debt and chemical violence that haunts the introduction and spread of the technology (Mohanty 2005: 257). Against the backdrop of the 300,000 farmer suicides that have taken place in the aftermath of the introduction of genetically-modified Bt Cotton, the film rallies against the technology by showcasing the choice of a young woman farmer, Suman Khulko. Contrary to her family's wishes, Suman chooses to reject GM seeds and chemical inputs because she has learned a devastating lesson from death of her uncle, who committed suicide by drinking pesticide.

By contrast, in *Food Evolution*, when pushed to answer to the farmer suicides, Alison Van Eenennaam dodges blame stating, 'When you actually look at the data around that the rate of suicide before the introduction of GM crops and after, it hasn't changed. It's a matter of debt and

[4] On the politics of self-help that allows for choices as long as they are the right ones see Nally and Taylor 2015.

it's not actually associated with the use of GM technology.' What Van Eenennaam cannot reconcile, or rather refuses to, is that while the GM seeds are not the direct cause of the farmers' debt, they are an essential part of the world that makes the debt possible: an agricultural system based on monocultures of commercial seed, high chemical inputs, mechanization, dwindling state support for farmers, and low, volatile, commodity prices (Shiva 1993). GM seeds are the pinnacle of the long history of farmer dependence on companies for seeds, whether those seeds are hybrids that do not retain their desirable traits from one generation to the next or whether they are prohibited from being saved under intellectual property law. In either instance, farmers are forced to go back to the seed companies every season. In addition, the herbicide tolerance traits inserted by genetic engineering inextricably link modified plant varieties with the herbicides marketed by chemical companies, thereby maximizing the companies' profits. *Food Evolution* treats the results of GMO introduction and chemical proliferation by focusing on the benefits that the twinned technologies have brought to both the rural poor (through increased yields), as well as the urban rich (by reducing the use of harmful pesticides).[5] The profits of the agribusiness companies are then presented as the necessary incentives to innovating creative solutions for the benefit of humanity. In its pursuit of a seed science free of politics, *Food Evolution* thus deploys ideas about the 'natural' in two ways: first, by insisting that GM seeds are 'natural' extensions of the innovation that enabled crop domestication and second, by insisting that forms of profit and proprietary interest which have been built into the contemporary seed systems are a 'natural' component of that very 'innovation.'

Making and Contesting Worlds with Law

Each film's representation of the 'natural' (whether the 'natural seed' or human/social 'nature') bleeds into its engagement with seed politics and associated questions of ownership, ethics, and commodification. As work in feminist and post-colonial science studies has shown, the delineation of that which is 'natural' from that which is 'cultural' has always been embroiled with claims about the capacity to labour or the extent to which something has been laboured upon (Vats 2020; Besky and Blanchette 2019; Weeks 2011; Ahmed 2019). Because labour (or claims about it) brings the 'natural' into the realm of the social, technological, and artefactual, it is also central to questions of property, regulation, and politics (Herzig and Subramaniam 2017; Foster 2016). This interplay between nature-labour-politics is perhaps the most evident in how each of the films engage with intellectual property law.

In general, intellectual property law (as patents or plant variety protection) is both an instrument for generating profit and a mechanism for defining what counts as 'nature' (Strathern 2001). Under the law, patents cannot be granted for mere discoveries. Rather, for something to constitute a protectable invention, it must be seen to be laboured upon in some way. In this sense, claims about

[5] For critiques of these narratives of success, see Patel 2009; Cullather 2004, 2010; *Pilliod v. Monsanto Co.*, 2019 Cal. Super. LEXIS 843.

what constitutes nature and what constitutes 'culture' or 'technology' are central to determining whether something is eligible for intellectual property protection (Pottage and Sherman 2007; van Dooren 2009; Mgbeoji 2006). Yet the claims made in both films about the 'naturalness' or 'artificiality' of genetically modified and technoscientific seed peddle less in debates over whether something is eligible for intellectual property protection than they do in staking claims about the 'natural' or the 'proper state of the world.' In fact, in rendering genetically modified organisms as alternatively natural and artificial, each film makes a case for the seed-as-(non)invention that is at odds with its own position on the desirability and appropriateness of the law. Rather, what is at stake in both films' discussion of intellectual property is the struggle to bring certain types of worlds into being.

For example, in *Seed*, just before Jane Goodall turns to the artificiality of GMOs, she recounts her first exposure to seed patents. 'When I first heard the idea of patenting a seed,' she says, 'or any kind of plant, I was absolutely horrified, and I thought, surely that will never be allowed, you can't own nature.' Goodall's horror and bewilderment is given additional force by the brief history of intellectual property law that follows. Amid shots of bees pollinating flowers, the filmmakers recount this history in text: 'Thomas Jefferson drafted the first patent statute in 1793. Living organisms were considered to be the 'common heritage' of mankind. They were not considered to be patentable.' The citation of the 'common heritage of humankind' doctrine repeats a pervasive misconception about the historical status of plants within both colonial scientific circuits and under international law, wherein plants were often subjected to national jurisdiction (Mgbeoji 2003: 821), but it also makes a powerful claim about the world by narrating the plant commons that has been and the plant commons that should be.

Seed takes care to underscore the radical transformations ushered in under intellectual property law in the next scene, wherein Andrew Kimbrell, public interest attorney and the founder and executive director of the Center for Food Safety, cites 35 U.S. Code § 101 in his explanation of patentable subject matter. He explains that 'Monsanto takes one gene out of tens of thousands of genes, changes that, and says 'Now we own the whole plant'... They don't just own the seeds, they own all of the offspring of those seeds, and patent them forever.' While this is a mischaracterization of the duration of patent rights, which are limited in the United States to a term of 20 years (35 U.S. Code § 154), this narrative sequence is significant for the story *Seed* relays about transformations in twentieth century agriculture.[6] If the past was marked by a vast bounty of crop diversity that once belonged to all humanity, the late twentieth century, characterized by new and unnatural mixings of living things, has seen not only a massive contraction but also a dramatic consolidation of that diversity. The film builds on this in its account of the US Supreme Court decision, *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc*., 534 U.S. 124 (2001), which is presented as a recent, radical transformation by excluding from the historical narrative

[6] It should be noted that although utility patents are limited to a period of 20 years in most jurisdictions, it is increasingly common for patent owners to effectively extend this period via the enforcement of related trademarks and patents of subsequent modifications to the original invention. Nonetheless, patents do not last forever.

the creation of the US *Plant Patent Act of 1930*, and the subsequent expansion of proprietary rights in plants thereafter.[7]

Food Evolution, on the other hand, works in the opposite direction to establish intellectual property law as something integral to all agricultural innovation. In this regard, the film repeats a common argument advanced by the seed industry and other staunch proponents of patent protection, who assert that intellectual property claims provide a necessary incentive for innovation and a mechanism for companies to recoup the money invested in research and development. In this way, the film positions the activities of Monsanto as sound business practice in line with industry standards, presenting the decision to pursue genetic engineering and patenting of high-value commodity crops like corn, soy, and cotton as rational. But the narrative goes further than this, naturalizing corporate investment and patent rights as prerequisites to the technoscientific intervention that will get humanity out of catastrophe. Neil deGrasse Tyson's narration affirms that: 'While [Monsanto] did invent the technology, they didn't invent patents. Almost every agricultural advance in both conventional and organic farming has a patent behind it.' The suggestion that genetic modification is a natural extension of plant domestication and that patents and intellectual property are a natural underlying driver and metric of innovation, ignores a longstanding body of literature that challenges the simplicity of this assumption.[8] The world built by this slippage only values labour that is legible through the vantage point of capital accumulation and ownership.

In its discussion of intellectual property rights, *Food Evolution* hand-waves concerns about the distribution of seed and the negative economic impacts of multinational control on farmers, framing patent law as a neutral-to-positive tool for the plant biotechnology industry that is unassociated with indebtedness, dispossession, or economic consolidation of the seed industry. Yet the film does recognize the coercive and potentially devastating impacts of a change in the legal environment when it suits them. During *Food Evolution*, viewers spend a great deal of time with a municipal council in Hawai'i, watching protestors wave signs on the side of the road, hearing interviews with local councillors, and observing the hearings and debates over a bill to prohibit GMOs on the island. After footage of people speaking about their concerns about the links between GMOs and multinational control, pesticide use, and human health, Tyson asks the audience, 'What

[7] For example, in the interview with Claire Hope Cummings, she emphasizes how the *J.E.M. Ag Supply* majority opinion was written by Justice Clarence Thomas, who was a former lawyer for Monsanto. While Monsanto was not a party to the litigation (a point which is not clear from the film), the implication is that Justice Thomas and the five other judges who agreed with him, were acting in the corporate interests of his former employer. The key finding in the Supreme Court decision in *J.E.M. Ag Supply* was that newly developed varieties of sexually reproducing plants were patentable subject matter, and therefore, J.E.M. could be liable for patent infringement for re-selling Pioneer's patented hybrid corn varieties. While the case is an important development in intellectual property jurisprudence, the film does not acknowledge the precedent for allowing patents on genetically-modified organisms in *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), the patentability of plants in *Ex parte Hibberd*, 227 U.S.P.Q. 443 (1985), and it ignores the history of the US *Plant Patent Act of 1930* (35 U.S. Code § 161 *et seq*.) and the Plant Variety Protection Act of 1970 (7 U.S.C. § 2321 *et seq*.).

[8] See Heald and Chapman 2012; Jaffe and Lerner 2006; Schiff 1971; Machlup 1958; Machlup and Penrose 1950.

if in trying to do the right thing, the council got it wrong?' The rest of the film emphasizes how such legal changes, from labelling requirements to total prohibitions on GMOs, are not neutral measures. In contrast to its denial that patent law has been developed under the influence of corporate interests like Monsanto, *Food Evolution* demonstrates how lawmaking represents a confluence of state power and capital when it highlights the economic influence of the organic industry on legislative debates and court proceedings. This point is brought home at the end of the film when the audience is shown footage of Charles Benbrook whispering with a corporate executive about an upcoming court case in which he will be testifying as an expert witness, while the executive mentions that his company in the organic industry made a contribution to the defence fund. In this context, regulations that prohibit or impose conditions on the circulation of genetically-modified crops—from the municipal bill in Hawai'i, to a national ban in Uganda, to a directive of the European Union—are shown to have radical consequences. Not only are such regulations portrayed as ruinous to the financial position of farmers and the potential application of technological developments around the world, the film often presents these bans as a determining factor in the ongoing spread of plant disease and famines.

Thus, in both films, the law is a fickle ally. While *Seed* highlights how the petitions from the Ojibwe tribal government gave rise to regulation of genetically-engineered wild rice on tribal lands and in the State of Minnesota, the dominant narrative is that the law has been a key mechanism for the derogation of farmers' rights, food sovereignty, and the free distribution of seed, thereby serving the economic interests of multinational corporations, as epitomized in the case, *Bowman v. Monsanto Co.*, 569 U.S. 278 (2013). By contrast, *Food Evolution* points to intellectual property law as an important driver of the technoscientific activities that will save humanity from disaster, yet portrays the law as vulnerable to being co-opted by a handful of activists on the side of the road, who thereby represent a potent threat to the global food industry while multinational, billion-dollar corporations are helpless to stop their influence on legislation. These articulations of the politics of the law shape the interventions that each film portrays as possible cures for precarity.

Emergent Cures for Precarious Futures

In their representation of nature, society, law, and technoscience, both *Food Evolution* and *Seed* stake claims about the future of food production and prescribe interventions that they consider most capable of averting environmental catastrophe. In this sense, both films theorize the future through a kind of co-production (Jasanoff 2004) that entails telescoping *certain types of* agrarian pasts and presents into a 'call to action' for how to live with seeds in the future (Jasanoff 2020: 32). For both films, this is a future marked by uncertainty, crisis, and, at worst, famine and environmental collapse. Nonetheless, each film offers a different type of remedy for how to navigate these precarious futures. In paying attention to these cures we follow the charge laid by Stengers to 'protect us from an "entrepreneurial" version of politics, giving voice only to the clearly-defined interests' of the films' stakeholders (2005: 1000). We hesitate in accepting each prescribed panacea long enough to reveal the unintended side effects of simplistic solutions.

For *Food Evolution*, this 'call to action' takes the form of a call for 'good science.' Specifically, 'good' science is shown to be conducted independently of political, economic, or social interests, while any research that is portrayed as being bound up with such concerns is presented as 'bad' science or pseudoscience. Yet the filmmakers seem incapable of critically examining the inventive credits, ensuing profits, and social consequences attached to the technologies they celebrate. For example, the film's second scene presents the success story of the Rainbow papaya in Hawai'i. The camera pans along rows of papaya trees (*Carica papaya*) while a voiceover from a news segment explains that, twenty years ago, the 'thriving' papaya industry was devastated by the Papaya ringspot virus, which spread to 'nearly every papaya tree on the island', and the industry was 'literally wiped out.' We are shown a papaya fruit with mottled skin from the viral infection, rotting fruit on the ground, and uprooted papaya trees in razed fields. Faced with this catastrophe, phytopathologist Dennis Gonsalves narrates his idea to 'vaccinate' papaya plants using genetic engineering. The results, he explains, were 'dramatic', visualized on screen through the drone footage of a large field with lush, genetically-engineered trees at the centre, compared with pale, withering non-genetically engineered trees at the outskirts. This scientific solution, viewers learn, allowed the Hawaiian papaya industry to 'come back from the dead', resulting in the plump, glistening fruits that roll down a conveyor belt and are packed into boxes for export around the world.

Dennis Gonsalves is presented as independently pursuing an answer to a pressing question; the fact that he was named as an inventor on many patents relating to resistance to papaya ringspot virus is given only passing mention (e.g. US Patent No. 6,750,382). While Gonsalves is portrayed as objective, irrespective of his personal, professional, and economic interest in the success of this GM technology, the film repeatedly interrogates the vested interests of the critics of GMOs; for example, agricultural economist Charles Benbrook's acceptance of funding from the organic industry is said to be corrupt and 'the antithesis of what a scientist is prepared to do.' By setting up a dichotomy between independent science and corrupt research, *Food Evolution* fails to explain how contemporary instruments of scientific credit, including patents, spin-off companies, and monetary awards, can be rationalized in the practice of pure 'good science' (Shapin 2010). Furthermore, by being unable to engage with science as entangled practice, the *Food Evolution* film mischaracterizes many opponents of GMOs as having a problem with the scientific process or the technology itself, rather than taking seriously the way in which scholars and activists like Vandana Shiva articulate their concerns with GMOs as embedded with corporate ownership, exclusionary legal rights, and the operation of debt finance (Shiva 1999).

Food Evolution uses the same didactic formula to make a series of claims; that GMOs like those altered to express a microbial protein coat from the Papaya ringspot virus are safe because the virus is 'naturally occurring'; that the glyphosate-based herbicide RoundUp, used in concert with the RoundUp Ready (genetically engineered to be resistant to the herbicide) crops are harmless to humans and the environment; and that organic food can never provide the sheer quantity of food

needed to feed humanity unless every last bit of forest on Earth is converted to agricultural land.[9] Every time a proposition is put forward in the film, it is carefully curated through a volley of visual and textual argumentation, while paying lip service to the oppositional perspective. The authority of Tyson and the infographics that conclude each section seek to drive home the overarching message that through rational, scientific deliberation, the only possible conclusion is that GM technology is a boon. Naysayers are at best naïve and at worst nefarious fearmongers with commercial interests in alternatives to GM technology.

Food Evolution crafts its advertisement for the potential cures of 'good science' through the juxtaposition of the successes of GM crops like the Rainbow papaya in the United States opposite poor African farmers, who, the viewers come to learn, are being deprived of GM technology.[10] This narrative strategy is suggested by the opening scene, wherein a contemporary African farmer acts as a placeholder for 'primitive' agriculture on the precipice of 'modernization.' This motif reoccurs as the filmmakers move from farmers of disease-stricken bananas in Uganda deprived of GM solutions, to GM corn and soy farmers in South Africa who have been able to make marginal gains, to lawmakers in Kenya who have voted to lift longstanding bans on GM technologies on a crop-by-crop basis. In every case, GM technology introduced from elsewhere, however painstakingly, has the potential to radically alleviate systemic social and economic hardship. This is captured in one of the concluding scenes, when a Ugandan veterinarian and farmer says during a speech: 'If you don't have food, then you are going to steal, you are going to kill someone… Or, [you can] incorporate science. So we ask you to tell your relatives… your brothers and sisters in parliament, let's grow food to feed Africa and feed the world.' Repeating the trope that the only choice available to African farmers is between salvation through GM technology (Paarlberg 2008) or hunger and violence (Kaplan 1994) reflects the film's inability to take seriously the critiques of GM crops from activists and scientists from Africa (Rock 2019) and elsewhere. The film thus reiterates that for activists or consumers in the Western world to critique or impede the flow of GM technology is to actively withhold life-saving cures from those most vulnerable in Africa.

While the cure for the future presented by *Seed* is less prescriptive, it nonetheless asks for a fundamental reorientation in how people relate with and value seeds for food and agriculture. Combining accounts of Indigenous seed carers, non-profit seed banking organizations, backyard seed savers, and eccentric plant collectors, the film seeks to open up diverse ways of being and working with seed in its call for saving crop diversity. *Seed* suggests that the salvation of the world rests on the valorization of seeds based on a speculative imagining of their capacity to bring the past into the future. As conveyors of this past, seeds, the knowledge associated with them, and the

[9] Patel 2013 shows that this argument, called the Borlaug hypothesis, that the only way to feed the world with organic food would entail having to fell all the world's forests, is fallacious because it assumes that the replacement for conventional monocultures will be organic monocultures. He claims that results from agroecological multicropping are disproving the mythology of increased yields and have the benefit of providing enduring improvements to soil health.

[10] Among proponents of GM technology, this is a common line of argument. See also Paarlberg (2008).

diversity they embody, might solve known and unknowable problems of the future. While the world created in *Seed* requires a disavowal of a science that has become entwined with agribusiness—held in tension with a contradictory faith in the science of seeds to save the future—it succeeds in bringing viewers into a set of embodied human-seed relations through the portals of kinship and sensorial affects. Yet in rushing to call an emergency of loss, the film produces at least four iatrogenic effects. First, the film's presentation of the 'natural' contra the 'artificial' creates a false boundary between Indigenous knowledge and Western science. To the extent that *Seed* builds its argument around the movement from the natural (Edenic past) to the artificial (present), it also peddles in the exoticization of traditional ways of knowing and cleaves Indigenous knowledge-practices from the practices of Western science (Grove 1996). In this regard *Seed*, like *Food Evolution*, relays its own account of 'moderns' and 'non-moderns,' save that in *Seed*'s account it is not GM technology that will save the future, but the knowledge and seeds of the peoples who are presented as exemplars of a past-still-present.

Second, the film's engagement with the relationship between law, power, and property uncritically recapitulates to modes of colonial extraction. One of the ways that *Seed* proposes to counter loss is in and through plant collecting, and the film features a pair of brothers who travel to the Peruvian Amazon and the deserts of Namibia in search of rare plants of potential commercial and scientific importance. Guided by local experts, these brothers not only learn about where rare plants thrive, but also how to process and prepare them from their local guide. Yet, throughout, *Seed* fails to reference the long and violent history of colonial botanical collecting (Casid 2005; Schiebinger and Swan 2005) or contemporary debates about the politics of ethnobotanical research (Foster 2017; Osseo-Asare 2014; Hayden 2003). While the local guides in the film are presented as 'original botanists,' they are never named. As viewers, we know them only through the filter of the white explorer. Coupled with the film's representation of a past state of 'common human heritage' transfigured and corrupted by intellectual property, *Seed* perpetuates a romantic image of a commons before and beyond the reach of the law. As presented, this is a commons largely devoid of local norms regulating use, access, and signification; a commons that is open for collection and, potentially, misappropriation (Chander and Sunder 2004).

Third, in their representation of crop diversity loss as a fall from a once-bountiful, Edenic world, *Seed* is quick to accept technoscientific cures, such as cryogenic seed banking, without considering who the endeavour ultimately serves. Loss presented in this way lends credibility to the idea that seed banking is a simple, failsafe intervention, but this ignores the uncertainty and unsettledness of the practices and theories of seed conservation (Chacko 2019b).[11] The framing of loss in terms of historic bounty transformed into present scarcity ignores the processes—always at play—by which new diversity emerges. There has been a massive loss of historic seed diversity in the twentieth century United States, but there has also been impressive 'replacement' of that

[11] Donna Haraway pointed toward the irony that while the calls to emergency lead to the collection of biodiversity in banks, the 'nature that feeds the storehouses disappears' (1995, 65).

diversity—not with hybrids or GMOs, but with open-pollinated seed saved, selected, and innovated by seed carers, savers, gardeners, and exchangers. To ignore this new diversity not only obscures the careful and innovative labour of many of the peoples *Seed* seeks to celebrate, but it may implicitly support arguments that position legal and technoscientific interventions as the best means to innovate new diversity amid a future marked by seed scarcity (Chapman and Heald 2020). Finally, the film's elementary focus on the seed prioritizes the substance of the seed, rather than its relations, and effaces the conditions of possibility—microbes, soil, insects, and water to name just a few—that are necessary to support life. After all, 'Nothing comes without its world.'[12]

To Conclude by Slowing Down

In holding these films in discursive tension, we learn to identify that the world used to construct a problem matters. Such a world governs the kinds of questions we are able to ask and the kinds of solutions we are able to articulate. Both films imagine precarious agricultural futures marked by the ravages of climate change, crop failure, and possibly famine. However, these two films are not equivalent. While the apocalypse features prominently in both, the momentum of each film's crisis seems to move in opposite directions, shaping, in turn, how each engages with ideas of the natural, the promise of technoscience, and the place of the law. To the extent that these filmic exercises in worlding are askew, they provide good examples of the power of narration and the limits of imagination in navigating precarious futures. To varying degrees, each film is so tethered to its own world that it is unable to imagine otherwise—to open up and slow down the politics of crisis.

Yet what if we were to step away, however momentarily, from the emergency of each film? What might come into focus if we—as viewers, farmers, eaters, and worldmakers—step out of the path of the crisis pendulum that swings between pending human and environmental decline and progressivist assuredness in the power of technoscience to meet any future challenge? What else might we notice if we attune our senses otherwise?

To step away, holding space here on these pages for reflection, is not to turn away from the magnitude and severity of anthropogenic climate change. Rather, it is to take Isabelle Stengers's suggestion to 'slow down' seriously (2005). In Stengers's Cosmopolitical Proposal, slowing down provides a 'space for hesitation' before saying that any particular worlding practice is unambiguously 'good' (995). To question the promise and cures of agricultural technoscience, provides the opportunity to trace the social, economic, and political relations that sustain it and which it sustains. To question the crises and cures of diversity loss, allows us to acknowledge processes of proliferation and the importance of saving, not just seeds, but the worlds that make

[12] This quote from Donna Haraway (1997, 137) is used by Maria Puig de la Bellacasa in the title of an essay about the ethical obligation and practical labour in care practice (2012). For the pitfalls of taking seed elementarity for granted, see Chacko 2019a.

seeds possible. ‘When so many others are preoccupied with emergency,’ slowing down may provide space for ‘attending to emergence’ (Johnson 2017, 5).

Slowing down also allows us to recognize all the ways that the apocalypse has already accompanied, for so many, the conditions of modernity, colonialism, and settlement. By following Stengers’s suggestion, ‘to arouse a slightly different awareness of the problems and situations mobilizing us,’ reveals that the call to action and attention engendered by the ‘apocalypse’ allows us to *walk away* from the condition of everyday violence that continues to be a part of corporate agriculture (2005: 994).[13] The tenor of crisis collapses disparate experiences of relating to the ongoing violences of coloniality and settlement into a unitary movement that commands singular focus. By taking a stance of hesitation, this article sought to slow down, complicate, and situate the narratives and conclusions proffered by these two contrasting documentary films. We selected four interconnected themes that the films used to tell their particular stories. We showed how both *Seed: The Untold Story* and *Food Evolution* mobilize anxieties about an apocalypse, police the boundary of the natural, evoke the law and political consciousness, and prescribe cures for precarity. We offered our critiques of the rhetorical methods of the films not to tear them down but to provide constructive nuance to the narratives they promote. Staying with the trouble in each film, slowing down the pace of the leap from problem to solution, we bring our interdisciplinary perspectives to reveal what is glossed over. The Cosmopolitical Proposal asks us to delay action, not to besmirch the veracity of the emergency, but to consider that there may be other possibilities waiting to be explored, if only we dared to imagine them.

[13] On walking away from discomforting realities see Le Guin 1973.

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