11

Monstrous materialities: ash dieback and plant biosecurity in Britain

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The aim of the edited volume *Science and the politics of openness* is to raise awareness of the double-sided controversial nature of initiatives aimed at improving relations between science, policymaking, politics and publics. Efforts have been made to strengthen public trust in expert knowledge. These include dialogues organised between scientists and concerned publics on contentious, ethically complex issues, inviting specific publics to help decide the trajectories of controversial scientific and technological innovations and opening up the questions of the role of science in politics and vice versa to closer scrutiny. All this has been much debated in the UK and elsewhere since around the turn of the millennium (House of Lords, 2000; Stilgoe et al., 2006; Wilsdon and Doubleday, 2013). These 'monstrous' sides of relations between science, policymaking, politics and publics – aspects that are unexpected, uncertain, unknown, uncomfortable, preferably ignored and often downplayed– also entail material ones, and these can exert a strong influence over how these relations evolve (Latour, 2004, 2013; Raman and Tutton, 2010; Tsouvalis, 2016; Tsouvalis and Waterton, 2015). This chapter begins with a discussion of the monstrous materiality of Chalara ash dieback (Chalara), a deadly fungal tree disease that has decimated the ash population across Europe since the early 1990s.

On 7 March 2012, Chalara was officially declared present in England, following the routine inspection of a nursery in Buckinghamshire. The ash saplings infected with the disease were found in a consignment of plants imported from the Netherlands. Plant disease outbreaks are on the increase worldwide and many are linked to international trade.

Countless pathogens, insects and animals circulate through the global trade network as travel companions in plants, soil, logs, packaging materials, nursery stock, fruit and seeds (Brasier, 2008: 793–794, 796–797). They pay no heed to political or geographical boundaries, and with changing climate conditions their border crossings are increasingly common and successful. Unfortunately for native, locally adapted plant communities, this is bad news. Generally suffering few ill effects from the life forms they have co-evolved with, they often succumb to encounters with new ones. Chalara first broke out in Poland and Latvia in the early 1990s, having arrived there on infected ash saplings imported from East Asia (Drenkhan et al., 2014; Han et al., 2014; Zhao et al., 2012). The disease reached Germany in 2002, Denmark in 2003, Belgium in 2010 and northern France in 2012.

Given this rapid geographical spread west, it is surprising that the British Government did nothing to try to prevent its arrival in Britain. Part of the reason for this was that scientific knowledge about the cause of the disease was scant and that an error had occurred in its taxonomy. The latter played a brief but important role in allowing Chalara slip through the net of legislation then in place to prevent the trade-related spread of infectious diseases in the EU. It allowed the pathogen to spread freely through mainland Europe and eventually take a foothold in Britain (Freer-Smith et al., 2013: 23). This is the monstrous side of Chalara, a disease that remained *terra incognita* in science for many years, and this is its story.

More than a decade after arriving in Eastern Europe, in 2006 *Chalara fraxinea* was named as the pathogen responsible for the disease (Kowalski, 2006). Three years later, however, new research suggested that Chalara was only a stage – the asexual form, or anamorph – in the life cycle of a fungus called *Hymenoscyphus albidus*, known to science since 1851 and indigenous across Europe and the UK. Historically considered a harmless saprophytic ascomycete, *H. albidus*, which thrives on ash leaves and plays an important role in the nutrient cycle, suddenly assumed the sinister role of the ash-tree killer.

In 2010 molecular studies overturned this verdict, showing that the disease was actually caused during the asexual phase of a newly identified fungus, *Hymenoscyphus pseudoalbidus*. Identical to *H. albidus* in appearance, it is distinguishable from it only by molecular analysis (Queloz et al., 2010). This case of mistaken identity had serious

consequences for Britain, as it prevented the British Government from acting on the advice the Forestry Commission (FC) had received from the Horticultural Trade Association in 2009: to impose an import ban on all ash and ash-related products. When asked why during a House of Lords' debate on Chalara in 2012, the Government's reply was that it had 'no reason to believe that this [the discovery of Chalara in the Buckinghamshire nursery] was anything other than an isolated incident' (quoted in Downing, 2012: 10). Probing deeper, however, we find that the FC assumed it was 'dealing with a pathogen already present in the UK and this precluded the UK from initiating an emergency response under the EU Plant Health Directive and World Trade Organization phytosanitary rules and using import restrictions as a means of control' (Downing, 2012: 10).

The head of Plant Health at the FC thus responded to the Horticultural Association's letter that 'our hands are tied' (Downing, 2012: 10). The Forest Research branch of the FC could only issue a pest risk alert to the forestry and horticultural sectors to make them aware of the symptoms of ash dieback. It could not, however, request a full pest risk analysis (PRA). A PRA is a protective measure that all EU member states can apply for under Council Directive 2000/29/EC. Its aim is to prevent the introduction into the EU of organisms harmful to plants or plant products and to stop them spreading in the EU. Chalara's monstrous side – a side only molecular analysis could uncover – illustrates the complex linkages that exist between materiality, policy, legal instruments, human knowledge and understanding, and countless other factors in the emergence of relations between science, politics and publics. After it was declared that *H. albidus* was not the cause of Chalara, an import ban of ash and ash-related products came into effect in Britain on 29 October 2012. By that time, of course, the horse had bolted.

Opening up the science of ash dieback

Knowledge about Chalara was scarce and the public response to the disease in England was exceptionally strong and emotional. As a result, the year 2012 saw an unprecedented opening up of the science of Chalara to scientists internationally and concerned publics locally. This response also needs to be situated in the context of years of

funding cuts in the area of plant pathology in the UK, which had led to a steep decline in expertise in this field. In a report published in 2009, the Royal Society had urged universities and funding bodies to collaborate in order to revive the teaching of subjects like agronomy, plant physiology, pathology, general botany, soil science, environmental microbiology, weed science and entomology. This was no mean feat, as an audit of plant pathology undergraduate teaching and training commissioned three years later by the British Society for Plant Pathology (2012) revealed. It found that many plant pathology research institutes and industrial research and development departments had been closed; plant pathologists were ageing; retiring higher education institute plant pathologists were rarely replaced; fewer than half the 103 higher education institutes that offered biology, agriculture, horticulture or forestry courses at BSc level still taught plant pathology, and only half of these offered practical classes. The British Society for Plant Pathology wondered whether higher education institutes would be able to retain their capacity to teach plant pathology in five to ten years' time, given that 'new departmental appointments and RAE/REF assessments are driven in part by the Impact Factor (IF) of scientific publications. The highly specialised nature of much plant pathology research means that many publications are of low IF' (British Society for Plant Pathology, 2012: 2). A key recommendation of the Tree Health and Plant Biosecurity Expert Taskforce (THPBET) set up in November 2012 following the ash dieback outbreak was that 'key skills shortages' in this field needed to be urgently addressed. To combat Chalara, desperate measures were therefore in order. For example, in December 2012, the open-source platform OpenAshDieBack (oadb.tsl.ac.uk) was launched. It had been designed by scientists from the John Innes Centre in Norwich, and invited scientists from around the world to share scientific data on Chalara. This unconventional step of rapidly generating and releasing genomic sequence data was premised on the understanding that 'to foster open science and make it possible for experts around the world to access the data and analyse it immediately [would] speed up the process of discovery' (MacLean, 2016).

Another effort to open up and speed up the science of Chalara was the Facebook-based crowdsourcing game *Fraxinus*, developed by the Sainsbury Laboratory in Cambridge. *Fraxinus* presents players with real reference DNA sequences from the ash tree genome and asks

them to match up multiple DNA sequence reads from other samples with the aim of identifying regions of the genome that display characteristics such as resistance. These could then be used to breed new, disease-resistant ash tree varieties. *Fraxinus* and OpenAshDieBack both require mass participation, and between August and December 2013, 51,057 people played the *Fraxinus* game.

Opening up in the context of biosecurity, the conceptual framework within which plant health risks are currently approached, is closely connected to activities like surveillance, monitoring and control, and here citizen science came to play a particularly significant role. The Living Ash Project, funded by the Department for Environment, Food and Rural Affairs (Defra), is one example of an initiative where the public can get involved in monitoring Chalara. Another is the smartphone app AshTag, developed by the Adapt Low Carbon Group at the University of East Anglia and launched in October 2012. Initially, AshTag enabled concerned members of the public to record infected trees and submit photos of them to experts for assessment. These data were then used to map the spread of the disease across the UK. Since 2016 AshTag has been collecting data on healthy trees in the hope of identifying disease-resistant ones. Citizen scientists also help monitor tree diseases through the Open Air Laboratories network. All three initiatives are focused on monitoring, surveillance and, ultimately, disease control. Did these novel and exciting ways of opening up the monstrous materiality of Chalara in science correspond to an equal opening up of the Pandora's box of free trade and its role in the perpetuation of plant disease epidemics to broader political scrutiny and public debate? Did it correspond to an opening up of policymaking in this field?

'Biosecurity': turning a complex socio-political problem into a techno-scientific challenge

This section attempts to answer these questions. It draws on findings from an in-depth qualitative study (Denzin and Lincoln, 2005; Silverman, 2005) conducted in 2014 of the Government's response to ash dieback. The study was funded by the Leverhulme Trust under its Making Science Public programme. Sixteen in-depth, semi-structured interviews were carried out, nine with members of the THPBET and

seven with civil servants and experts otherwise involved in supporting and advising the Government on plant biosecurity. The interview schedule covered a broad range of topics, including questions about the interface between science, politics, policymaking and the public, and about how the THPBET worked, made its recommendations, and addressed and resolved conflicting views. Data on these and related issues were also collected from secondary data sources, including newspapers, government documents, non-governmental organisation (NGO) reports, legal documents, social media, TV documentaries and academic literature.

As indicated earlier, when ash dieback was first discovered the British Government had no contingency plan in place to deal with plant disease epidemics. Scientists knew very little about the disease and plant diseases rarely made it into the headlines of the national press. Although the Government had been reminded by the Foresight Project on Infectious Disease in 2006 that 'diseases in plants and animals act as barriers to economic development and also threaten ecosystems' (Foresight, 2006: iv), and urged by the Independent Panel on Forestry in 2012 to 'speed up delivery of the Tree Health and Plant Biosecurity Action Plan by additional investment in research on tree and woodland diseases, resilience and biosecurity controls' (Independent Panel on Forestry, 2012: 34), little had as yet been done to enact these recommendations. At the European level, in response to the steep rise in tree and plant diseases in the EU, the European Commission (EC) had commissioned an evaluation of the EU's plant health regime in 2009.

The key instrument of this quarantine legislative system dating from 1977 is Council Directive 2000/29/EC. It is meant to guard against all pests and diseases, but in practice only targets the most dangerous ones, of which 250 are listed in its annexes. The plant health regime encompasses measures like plant inspections at production sites, during the growing season and post-harvest; producer registration; and issuing plant passports. It forms part of international regulatory frameworks, including the International Plant Protection Convention of the Food and Agricultural Organization of the United Nations, and the World Trade Organization Sanitary and Phytosanitary (Plant Health) Agreement. Their prime objective is to foster free trade: in 'essence, *Biosecurity* balances enthusiasm for international trade

with the need to protect against risks' (Manzella and Vapnek 2007: vii; emphasis in the original).

The EC considers the EU plant health regime as 'indispensable for protecting the health, economy and competitiveness of the EU plant production sector as well as for maintaining the Union's open trade policy' (EC, 2013). It describes it as 'unique in that it is an open regime: movements of plants and plant products into and within the Union are allowed' (EC, 2013:1). The 2009–2010 review, however, found this unique regime was thoroughly inadequate in preventing plant disease epidemics and advised that it be modernised through more focus on prevention, better risk targeting (prioritisation) and more solidarity (EC, 2010). In 2013 the EC warned that 'the existing regulatory framework is … unable to stop the increased influx of dangerous new pests caused by the globalization of trade', and predicted that 'high volumes of imports from other continents … imply a high probability of future outbreaks of foreign pests' (EC, 2013: 1). Only a modernised regime, it concluded, could 'effectively address the plant health impacts of globalisation [and] mitigate the plant health impacts of climate change'. Proposals for improving the EU plant health regulations have since been made and are currently under discussion by the European Parliament and Council. It is doubtful, however, that they will bring about greater plant biosecurity as long as the plant health regime remains tied to the objective of fostering free trade, which is considered by some as the greatest threat to plant health (Brasier, 2005, 2008). On the contrary, plant disease epidemics are likely to increase in number.

At this point, we need to take a closer look at the framing of tree and plant pests and diseases as a 'biosecurity' risk. In Britain, the term 'biosecurity' first entered politics in a House of Commons debate on the foot and mouth disease outbreak in 2001. It is thought that because concerns over affairs of state and national security loom large at this level, biosecurity discourse became littered with references to 'border controls' and 'surveillance' (Donaldson, 2008: 1552), and as a result the protection of the 'native' from the 'non-native', 'alien', and 'invasive' (Nerlich et al., 2009). Studies of the effects of the discourse of biosecurity have found it to be highly restrictive, preventing alternative definitions and understandings of disease epidemics from emerging (Hinchliffe and Ward, 2014; Vogel, 2008). They have also found that tensions between biosecurity governance and neo-liberal international

trade priorities remain ill understood (Meyerson and Reaser, 2012), that the dominant biosecurity metaphor of security and the fears that underpin it direct resource allocation towards the fortification of boundaries (Nerlich et al., 2009), and that in some countries biosecurity politics are in the process of engineering a new kind of social identity: 'biosecure citizenship' (Barker, 2010).

From a theoretical standpoint, biosecurity discourse can be understood as forming part of the broader trend in Western societies of being risk-averse and overanxious about health, safety and security. Beck's (1992) *Risk Society* thesis, Foucault's (2004, 2007) biopolitics and Latour's (2003) version of Beck's thesis using actor-network theory have all served here as explanatory sources. The conclusion drawn by Defra from the final report of the THPBET exemplifies some of these arguments. In prose littered with military metaphors, Defra urges the UK to be 'better prepared in understanding the risks of what pests and diseases are likely to arrive, when, where and how they might invade, how severe the impact is likely to be and what options are available for interception, eradication, mitigation or adaptation' (Defra, 2013: 2).

Framing plant diseases in this way has far-reaching consequences for policy and democracy. As Duckett et al. (2015) have shown, risk-based policy is based on a positivist epistemology that favours objective, scientific and technical risk assessment rather than an opening up of complex issues to public and political scrutiny and debate. This can lead to a form of post-politics which is exacerbated by consensual policymaking 'in which the stakeholders … are known in advance and where disruption or dissent is reduced to debates over the institutional modalities of governing, the accountancy calculus of risk, and the technologies of expert administration or management' (Swyngedouw, 2011: 268). While risk-based approaches can constitute a valuable source of knowledge alongside other knowledges and approaches, they cannot, on their own, solve the monstrous aspects of the increasingly tricky and complex problems we face (Chilvers and Kearnes, 2016; Grove-White et al., 2006). This was the conclusion drawn by members of the THPBET on the process in which they were involved in addressing Chalara.

Public concern over Chalara was great. Apocalyptic imaginaries of a landscape devoid of ash trees and bleak economic forecasts of the

consequences of the disease flooded the pages of national newspapers and social media sites. This response took Defra by surprise, and it duly commissioned a study of the THPBET by a social scientist to better understand it (Pidgeon and Barnett, 2013). The study concluded that Defra was dealing with a case of the 'social amplification of risk', where numerous, often lingering, anxieties culminate to find expression in response to a particular event. The Government reacted to to this response by convening a national emergency (Cabinet Office Briefing Rooms – COBR) meeting in London in November 2012, with the aim of showing people 'how seriously the Government is taking the threat of this disease' (Defra, 2012a). It also commissioned the FC to carry out a rapid, large-scale survey to establish the extent and spread of the disease, as the National Forest Inventory of 2009–2012 had recorded 103 diseased ash trees among the 15,000 inspected, none of which were infected with Chalara (House of Lords, 2012: 10). Finally, it set up the THPBET.

This taskforce was entirely composed of 'Chief Scientific Advisors and eminent Government and academic experts' (Beddington, quoted in House of Commons Library, 2012: 1). Its remit was to comment and advise on Defra's scientific evidence and approach to Chalara and 'the current threats from pests and pathogens'. It was also tasked with making 'recommendations about how those threats to trees could be addressed' (Defra, 2012a: 7). The names of the taskforce participants are listed in its Final Report (Defra, 2013: 49). Of its fourteen members, eleven held professorships at the time and all fourteen were educated to PhD level. Ten were natural scientists, four were social scientists, and of these, two were economists. The taskforce was supported by a public sector officials advisory group, whose members were drawn from Defra and the Defra network organisations. External referees were invited to comment on the reports, as were a broad range of stakeholders. The terms of reference for the taskforce were determined before it first convened. The language in which they are formulated is indicative of the risk-based approach adopted, containing references to 'best available evidence', an 'assessment of risk status', 'appropriate risk assessment tools', a 'rapid evidence assessment', a 'risk mitigation framework', 'contingency planning', and 'emergency response arrangements'. Stakeholders and the public played no role in framing the problem of ash dieback at this stage, nor did they have a say in who

ought to address a challenge of such magnitude. Many stakeholders were concerned about this, as the empirical study conducted by the author and described at the beginning of this section found:

> Conservation organisations in particular were quite critical that it [the taskforce] was set up without any sort of conversation with them about membership. … They would have liked to have had an opportunity to have suggested how the Terms of Reference [were] framed. … They were … invited [to] sit on the Stakeholder Advisory Panel … after the Terms of Reference and membership had been made. (Respondent 11)

The deadlines for the publication of the two reports to be produced were determined from the outset. The interim report was due by the end of November 2012 (two weeks after the first meeting of the taskforce) and a final report by the spring of 2013 (Defra, 2012b). These tight deadlines – indicative of the perceived emergency of Chalara – greatly impacted on the speed with which the taskforce had to work. The taskforce itself was set up within days of the COBR meeting and was purposely kept small. The names of most of its members were proposed by Defra. Those able to participate at such short notice had to be available for meetings immediately and be committed to working to tight deadlines. Apart from several two-day meetings, telephone conferences and email exchanges took place and participants were assigned to expert groups that tackled specific issues. They had to review and comment on vast numbers of documents. Senior plant health officials were actively involved in meetings and the chief scientific advisor, the chairman of the taskforce, the Secretary of State and Minister Lord De Mauley met on a regular basis to discuss any progress made.

This tight timeframe and the predefined terms of reference of the THPBET, together with the fact that the taskforce was primarily composed of experts with existing links to the government department they now advised, are characteristic of the technocratic post-political approach to risk-based problem solving and policymaking described by Duckett et al. (2015) and Swyngedouw (2011) above. Their combined effects were explored during interviews. The findings suggest that they impacted negatively both on the degree of stakeholder and public involvement and on the degree to which disagreement and conflict could emerge and be addressed during the THPBET meetings.

Concerning stakeholder and public participation, one interviewee observed that the taskforce was not a public forum in the sense that there were no public meetings and no public dialogue took place. Although 'additional people [from local authorities, trade associations, environmental interest groups and others] who were not members of the taskforce … were brought into meetings and provided written evidence' (respondent 5), they were invited only to comment on materials already produced by the taskforce:

> There were several meetings convened, each one had a very specific agenda that was marginally directed towards arriving at a useful set of recommendations that could be justified on the basis of the scientific background. … There was also a later phase where … there was an attempt – prior to submission of these recommendations – to basically get input from various UK Stakeholder groups. (Respondent 8)

Following the first two-day meeting of the taskforce in November 2012, an interim report containing eight recommendations was published (Defra, 2012). Reviewers for the report were chosen on the basis of their ability 'to constructively contribute to the objectives of the taskforce', and a broad range of stakeholders were invited to comment on it (respondent 6). Significantly, this respondent points out that the 'Interim Report came out first and then they [the taskforce] used that to refine what they thought their recommendations should be and they talked to stakeholders'. The stakeholders could therefore only refine conclusions already drawn by the experts and formulated as recommendations in their first report. Even then, there was little room to accommodate their views:

> We were trying to make our recommendations based on science. So we weren't really trying to make them fit with the views of stakeholders at all. … There was much less stakeholder input into the expert report because it was not meant to be an exercise which drew its information from stakeholders. It was meant to be an exercise that drew its information from … the best understandings of … both natural science and social science. (Respondent 9)

Time, bureaucratic procedures, scientific knowledge, and the Government's framing of tree and plant health as a problem of biosecurity all impacted on the issues the taskforce could address and the recommendations it finally made. Taskforce meetings generally lasted

under an hour. This made 'a deeper engagement and the development of conversations' impossible (respondent 15). However, it proved a powerful strategy for keeping conflict at bay: 'there is a risk … that if views were polarised they could be very polarised by the end of three hours' (respondent 15).

Unsurprisingly, most interviewees reiterated the view that there had been little disagreement and conflict between taskforce members during meetings. Some respondents, however, were unhappy about this and thought that 'there had been things that had not been included in the reports' and that 'other recommendations could have been made' (respondent 11). This respondent felt that general agreement was at least in 'part to do with the way the discussions were framed' and 'there was certainly the impression that controversial issues were avoided'.

The taskforce's recommendations reflect this. They include the development of a prioritised UK plant health risk register; the appointment of a chief plant health officer responsible for the UK plant health risk register and for providing strategic and tactical leadership for managing risks; the development and implementation of procedures for preparedness and contingency planning to predict, monitor and control the spread of pests and pathogens; and the revision, simplification and strengthening of governance and legislation. They also include the recommendation that epidemiological intelligence from the EU and other regions needs to be better used, and EU regulations for tree health and plant biosecurity improved. Biosecurity at the border and in the UK needs to be strengthened, capabilities and communications improved through the development of a modern, user-friendly system providing quick and intelligent access to information about tree health and plant biosecurity and key skills shortages addressed (Defra, 2013: 5).

Many taskforce members described these risk-orientated recommendations as limiting. They were, one observed, 'quite technical and cathedral and as a result less controversial'. It had been easy, the respondent explained, to reach agreement on the need for the appointment of a new chief plant health officer and the creation of a risk register (respondent 11). Another saw them as 'rather sort of bureaucratic-type recommendations' (respondent 2). Some taskforce members had expressed concern during meetings about the

'risk-orientated approach' to biosecurity, saying they would have preferred a 'pathways approach'.

However, they knew that such a paradigm change would have proved controversial with the nursery trade, as it would have opened up room for a critical appraisal of the role of trade and the single market in the spread of plant disease, the checking of plants for disease prior to them being moved, consumer behaviour, and the biosecurity implications of the work of professionals such as landscape architects. Unfortunately, debating such issues was beyond the remit of the THPBET. It could therefore not address key drivers of plant disease epidemics, including the effects of trade, even though taskforce members 'were all of the view that it would be much better if the UK could impose trade restrictions for plant health reasons' (respondent 4). Indeed, the respondent went on, 'We [the taskforce] ought to say, if you really want to tackle this you need to ban import on plants, which would be politically not useful at all. … we found it more difficult to see impossibilities in the human world than in the natural world. … and where you see impossibilities affects how you make recommendations.' Echoing this view, another respondent lamented that 'you can make as many recommendations as you like, but the science can't sort those issues out' (respondent 14).

Conclusion: the many monsters of plant biosecurity

The risk-based approach to ash dieback adopted by the Government in 2012 in response to Chalara transformed a highly contentious socio-economic, political and material problem of monstrous and messy proportions into a neatly defined techno-scientific challenge. As a result, trade-related plant disease outbreaks continue to be an issue where 'debate is not only seriously lacking but may also be suppressed through non-recognition or even avoidance of the issues' (Brasier, 2005: 54, 2008; Daszak et al., 2000). Such issues, as observed by the THPBET member interviewed above, cannot be sorted out by science.

Although ash dieback catapulted plant health to the top of the Government's agenda in 2012, many of its monsters remain lurking in the dark. The science of plant pathology was opened up in novel and exciting ways both to scientists and to the public after the strong

public reaction to Chalara, which led to the long-overdue allocation of resources in this area. However, interpreting these efforts as a democratisation of science or as 'making science public' would be a mistake. Rather, they formed part of the dominant risk-based approach to plant biosecurity endorsed by the Government and were primarily directed at surveillance, monitoring and plant disease control and at the changing of the very nature (the genetic makeup) of the life forms affected by Chalara, ash trees. The risk-based approach adopted also meant that the THPBET was structured and designed in ways that make it a perfect example of consensual post-political policymaking.

A deeper engagement with the complex economic, socio-cultural, material and political drivers behind tree and plant disease epidemics was impossible. This raises serious questions about the role scientists, social scientists and humanities scholars are often made to play in policymaking, especially in the case of emergencies. Concerning plant health, for example, there are plenty of studies that document the detrimental effects of trade and certain horticultural practices, such as the overuse of herbicides and pesticides in nurseries, the importation of live trees, or the practice of exporting seeds and importing saplings to save labour costs, on plant health. If their findings were more powerfully articulated and taken seriously by government institutions, this would inevitably put the spotlight on politically more delicate and challenging issues, and it is these issues that urgently need addressing in this field. To simply exploit scientific 'evidence' for the purpose of upholding neo-liberal trade arrangements or finding ever more life-transforming technologies to counteract their costs is not only irresponsible, it is also deeply unethical.

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