Weedy activism: women, plants, and the genetic pollution of urban Japan

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Abstract

Along the ports of Japan, civilians have made a peculiar discovery: in a country where genetically modified (GM) crop cultivation is prohibited, wild canola weeds flourishing in the cracks of sidewalks are exhibiting the GM trait of herbicide resistance to Monsanto's infamous glyphosate. Able to enter the archipelagic country via unregulated channels and to cross-pollinate with locally grown crops, the weeds threaten to make inroads into the food system in ways unbeknownst to human actors. Among the most vocal of groups responding to this urban ecological threat are Japanese women and mothers involved in consumer co-operative systems. This article documents the emergence of their activism to demonstrate how situated and transformative political action is key to the political ecological study of human-plant encounters. It does so by interrogating the notion of *weedy activism* as a way to see plants not only as the object of political action, but also as a conceptual heuristic for understanding the kinds of political subjects that emerge in interaction with local environments.

Keywords: Weeds, urban political ecology, feminist political ecology, GMO, pollution, civil society, Japan

Résume

Autour des ports du Japon, les résidents ont fait une découverte particulière: dans un pays où la culture des plantes génétiquement modifiées (GM) est interdite, les mauvaises herbes sauvages de canola qui fleurissent dans les fissures des trottoirs présentent le caractère GM de la résistance aux herbicides au tristement célèbre glyphosate de Monsanto. Ils peuvent entrer dans le pays archipélagique par des voies non réglementées et effectuer une pollinisation croisée avec des cultures locales. Les mauvaises herbes menacent de faire des incursions dans le système alimentaire d'une manière à l'insu des acteurs humains. Les femmes et les mères japonaises impliquées dans les systèmes coopératifs de consommation sont parmi les groupes les plus bruyants qui répondent à cette menace écologique urbaine. Cet article documente l'émergence de leur activisme, pour démontrer à quel point l'action politique située et transformatrice est la clé de l'étude politico-écologique des rencontres homme-plante. L'article interroge la notion d'activisme des mauvaises herbes comme une manière de voir les plantes non seulement comme l'objet d'une action politique, mais aussi comme une heuristique conceptuelle pour comprendre les types de sujets politiques qui émergent en interaction avec les environnements locaux.

Mots clés: mauvaises herbes, écologie politique urbaine, écologie politique féministe, OGM, pollution, société civile, Japon

Resumen

Along the ports of Japan, civilians have made a peculiar discovery: in a country where genetically modified (GM) crop cultivation is prohibited, wild canola weeds flourishing in the cracks of sidewalks are exhibiting

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the GM trait of herbicide resistance to Monsanto's infamous glyphosate. Able to enter the archipelagic country via unregulated channels and to cross-pollinate with locally grown crops, the weeds threaten to make inroads into the food system in ways unbeknownst to human actors. Among the most vocal of groups responding to this urban ecological threat are Japanese women and mothers involved in consumer co-operative systems. This article documents the emergence of their activism to demonstrate how situated and transformative political action is key to the political ecological study of human-plant encounters. It does so by interrogating the notion of *weedy activism* as a way to see plants not only as the object of political action, but also as a conceptual heuristic for understanding the kinds of political subjects that emerge in interaction with local environments.
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1. Introduction

> If Yuri is no longer a human being, but a tree or a weed, I am the mother of a tree or a weed.
> -- Ishimure Michiko, writing as the mother of Minamata Disease Patient No. 41 (2003[1972]: 263)

For decades, weeds have captured the imagination of scholars for their proclivity to grow in between physical and conceptual spaces. Defying easy categorization or definition, these botanical undesirables are exemplars of "matter out of place" (Douglas 1966); they fall in the fissures of natureculture, at once a cultural designation for plants whose value, beauty or utility has yet to be discovered, and a natural category referring to an order of being entirely different from the cultivated plants against which they are often compared (Pollan 1989). As colonist species, biological trespassers, and nature's hitchhikers, they also occupy the spaces of slippage between nativeness, alienness, invasiveness, and wildness, calling attention to the nation as a shifting sociopolitical construct and to the role of humans in creating invadable landscapes through ecological degradation, disturbance, and simplification (Warren 2007; Richardson *et al.* 2008; Head and Muir 2004; Robbins 2004). It is thus unsurprising that weeds incite moral conundrums as they grow in the temporal and spatial boundaries of rapidly changing and increasingly sanitized urban cities (Falck, 2002), as well as in the interstices of micro- and macro-forms of environmental management evident even in the suburban lawn and home garden (Jenkins 1994; Mustafa *et al*. 2010; Lang 2018; Robbins 2007).

While there can be no doubt that weeds are "political"—indeed, they were central to Paul Robbins' formulation of political ecology (2007)—it is perhaps puzzling that recent turns in the research and writing on the proliferation of "weedy species" have been characterized by some as apolitical. In the past two decades, scholars investigating the human-plant encounter have adopted the language of "multispecies entanglements", "relational geographies", and "becoming-world." By and large, their aim has been to reveal the humanocentric ontologies at the core of modern eco-management, and to experiment with alternative means of engagement with the natural world (Ernwein 2020; Houston *et al.* 2018; Berrigan 2012). Weeds and other weedy species—from matsutake mushrooms to lodgepole pine and water hyacinth, African rice to Japanese knotweed and Brazilian pepper—have occupied a pivotal role in this literature, as mundane, seemingly innocuous more-than-human life forms that lay bare the cracks of industrial capitalism's self-devouring growth (Gan, 2017; Gan *et al.*, 2018; Hartigan Jr., 2017; Tsing, 2017; see also Tsing *et al.*, 2020). This work has set in motion renewed attention to miniscule, even insignificant, life forms (fungi on the forest floor), and to quotidian forms of human engagement with the natural world (noticing a mushroom) as sources of modest biocultural hope in the era of human-driven planetary destruction labeled the Anthropocene. In the spirit of this body of scholarship, to borrow the words of anthropologists Cymene Howe and Anand Pandian, "A few weedy tendrils unfurling from a sidewalk crack" can be "a muse for resistance in a time when life itself seems to have become a political act" (2020: 17). While this shift has gained scholarly momentum in recent years, it has also struck some critics as apolitical, as intellectual projects that detract from the transformative politics necessary in a moment of unrelenting ecological crisis. Bessire and Bond's characterization of ontological anthropology—phrased in botanical metaphors, no less—best encapsulates the critique: "To be radical, contra Marx, is not to grasp the thing by the root but to tend to a different plant altogether" (Bessire and Bond 2014: 441). Animal studies has received a similar critique, with detractors casting the incorporation of nonhuman actors into histories of

violence and labor as the "capitulation of present-day academia to trendy topics of little substance" (Zelinger 2019).

It is fair to argue, as others have, that Bessire and Bond's allegation evinces narrow understandings of "politics" tied to the standard Western categories of race, class, and gender that some are trying to think beyond (Jensen *et al.* 2017: 531; Kohn 2015). At the same time, however, it remains critical to the project of political ecology to establish how situated and transformative political praxis is key to the study of human-plant encounters. This requires more than simply suggesting that plants are the objects of "many of the most important environmental political issues of the century, including biofuels, carbon economies and food security", as scholars have already noted (Head *et al.* 2014). Recent anthropological analyses underscore the significance of this conceptual endeavor, as soy beans emerge as "excessive things with force of their own", capable of killing Paraguayan *campesinos* (Hetherington 2013); and oil palm trees materialize as militaristic plant-persons that eat Indigenous Marind communities in their dreams (Chao 2018). Both these accounts make valuable propositions worth pursuing: that particular plants—soy, over canola or corn, for example—occupy the center of particular political problems is not "incidental", even as popular allegories centering agrarian structures as the overarching cause of violence might suggest so (Hetherington 2013: 66; see also Beilin and Suryanarayanan 2017). Relatedly, that the multispecies turn envisions a politics of relational living/thinking does not preclude the reality that certain unloving plant-persons resist "reciprocal capture" (Chao 2018: 637). Pushing further the suggestion that "human–plant relations provides new insights into and framings of the political" (Head *et al.* 2014), and contra the presumed "ethical distance" that characterizes the human-plant versus human-animal relationship (Head and Atchison 2009: 236; Marder 2013), it is thus crucial to ask: how *do* plants trigger forms of collective action in ways that cut across racial, classed, and gendered divides? How might they serve as critical analytical tools for understanding the nature of local political praxis?

This article responds by interrogating the notion of *weedy activism*, a way to see weeds and plants both as the object of political praxis, and as a conceptual heuristic for understanding the kinds of gendered political subjects that emerge in interaction with local ecologies. "Weedy" is not a pejorative (see also Bubandt and Tsing 2018); rather, it points to forms of activism that, like weeds, are easy to miss though never hard to find as they fall in between institutional and conceptual disjunctures. Weeds, to borrow from philosopher Michael Marder, are "discarded as improper, superficial, inessential, and purely exterior" (Marder 2013: 90). While "devalued, unwanted in [a] carefully cultivated garden", their ability to grow "in-between the classical categories" allows them to "quietly [gain] the upper hand over that which is cherished, tamed, and 'useful'" (*ibid*). Weedy activism, then, can be understood as political contestation that is delegitimized, even as it springs forth with liveliness, systematicity, and sweeping reach.

A curious case of weeds[2] taking root in the cracks in the sidewalks of urban Japan brings the figure of the weedy activist to the foreground. Wild canola weeds (Brassica napus or *seiyō natane*, Brassica rapa or *zairai natane*, and Brassica juncea or *seiyō karashina,* here collectively referred to as "canola") are a common sight in city landscapes across the Japanese archipelago. In 2005, when civil organizations discovered that the weeds were exhibiting the genetically modified (GM) trait of herbicide tolerance to glyphosate, the controversial active ingredient in Monsanto's herbicide Roundup, and to glufosinate, the active ingredient in Bayer Crop Science's herbicide Liberty or Basta. The combination of canola's weedy character with the possible threats posed by transgenic genes raised alarm bells among citizen-consumers. Government regulations prohibit the commercial cultivation of GM crops within the nation-state boundaries of Japan, which would have been the only likely domestic source of the genetic diffusion. This implied that modified genetic material was making its way into the archipelagic country from external sources and through invisible and unregulated pathways. Able to cross-pollinate with locally grown and consumed crop relatives like broccoli, cabbage, *hakusai* (Chinese cabbage), *komatsuna* (Japanese mustard spinach) and *mizuna* (potherb mustard), GM weeds, so activists feared, could be reconfiguring Japan's urban ecologies with impunity and potentially making inroads into the food system in ways unbeknownst to human actors. Highlighting a sense of alarm, Japanese citizens have since labeled the spread of the wild canola weeds as a case of "GM pollution" (*GM*

[2] In the absence of any stable biological definition of the term, for the purposes of this paper "weeds" shall refer to any plant matter that became the object of the Genetically Modified Canola Weed Sampling Study (Figure 1).

osen), the inadvertent contamination of food and seed with unwanted genetically modified genes (Mulvaney 2008: 149). Genetic pollution is a pervasive and global issue with cases documented across the Americas and Europe, but Japan occupies a unique position in the mix as the "first published example of feral, transgenic populations occurring in a nation where the transgenic crop has not been cultivated commercially" (Saji 2005).

By and large, women, in particular mothers involved in consumer co-operatives, have risen to the stage as the most vocal and most organized of groups responding to the urban ecological development in Japan. Beginning in 2005 and occurring between two or three times a year, they have hosted local weed-picking and GMO-sampling studies across archipelago (Figure 1). These local activities have grown to encompass 37 out of Japan's 47 total prefectures in 2017 and collectively draw around 1,500 volunteers annually. In what follows, I describe the story of their activism, and explain how and why encounters with weedy plants triggered political action from mothers specifically. Just as weeds take root in the inhospitable cracks of the urban landscape, so too do mothers-turned-*weedy activists* find themselves operating between local environments and global political economies; between feminist citizen-science and patriarchal regulation; and between the state and the corporation, neither of which has taken action in response to the persistent problem of genetic pollution and its impending threats. I begin by discussing the roots of GM pollution in the interstices of transnational canola trade, noting how weedy proliferation and transgenic threat came together to produce a particularly daunting problem to perceived ecological integrity. I then describe how and why co-op moms emerged as the main political subjects collectively mobilizing in response to the issue, drawing connections to longer histories of mothers' entanglement in nodes of industrial pollution in urban environments. The fourth section situates weedy activism against the backdrop of patriarchal modes of eco-management. By citing cases from outside Japan where the weedy profusion of GM canola has compromised local community's legal claims to land, it emphasizes the kinds of threats that activists have sought to guard against through their simple act of weeding.

Figure 1: A local GM Canola weed sampling study, Fukuoka, Japan. (Photo by author)

This work is based on fieldwork encounters with the anti-GM pollution movement in Fukuoka City, Japan; and on longer periods of engaging with Japanese consumer co-operatives more broadly. Specifically, I attended three events that became the primary basis for this research in 2017: the GMO-Free Zone National Assembly in March, a local Genetically Modified Canola Weed Sampling Study in April, and the study's

subsequent debriefing session in June. These events fell within the 9-month period that I spent conducting immersive fieldwork with the Japanese consumer co-operative Green Coop through which the women featured below became engaged in environmental issues. Reviews of scientific and social scientific literature helped me place my reflections within broader perspective.

2. Ruderal spaces of the global economy of GM canola

I first became aware of the issue surrounding wild canola weeds while involved in Green Coop, a regional consumers co-operative headquartered in Fukuoka City in southwestern Japan. In the spring of 2017, I received an advertisement from the co-op for a local event it was co-hosting with the Fukuoka Civil Group for Food and Agriculture (*shoku to nō o kangaeru shimin no kai fukuoka*) called the "Genetically Modified Canola Weed Sampling Study" (*GMO natane nukitori chōsa*). Something of a cross between a street clean-up operation and a civic scientific experiment, the study was going to be carried out a short distance from where I was living in Hakata Ward, a dense urban landscape in the center of Fukuoka, while I had been conducting fieldwork on long-distance food chains. The study was in its eighth year, having begun in 2009 in response to reports of GM pollution from other citizens groups around the country.

On the day of the GM Canola Weed Sampling Study, I found myself at the factory of Torigoe Co., Ltd, a large-scale Japanese manufacturer and retailer of flours and, for that day, our activity's meeting place (see Figure 2). Torigoe was located nearby the Hakata Port, in an industrial area surrounded by other large manufacturing plants and storage facilities. At first glance, the landscape struck me as profoundly uninteresting, the kind of place your eyes glazed over as you rode past it on the freeway. A utilitarian space inhospitable to pedestrian traffic, it was almost entirely barren save for a few skinny trees sticking out of the leveled concrete. When I arrived there sometime in the early afternoon, the roads were empty, cleared from activity that had occurred in the early morning. With the help of a few chaperones, I made my way to a seminar room on the second floor of the building, and took a seat beside a number of other volunteers. There were about 50 other participants, a vast majority of whom were female co-op members, with a small handful accompanied by small children.

Figure 2: Torigoe Co., Ltd headquarters, Fukuoka City. (Photo by author)

The choice of a flour milling company as the site of the weed-picking study was not coincidental; it is one node in a vast network of grain processors and food manufacturers that have, knowingly or not, contributed

to the problem of genetic pollution. Annually, Japan imports over 2 million tons of canola seeds to be crushed into an estimated 1 million metric tons of canola oil. The oils are found ubiquitously in the commodities of everyday life: from food items like salad dressing, mayonnaise, margarines and other fat spreads, to non-food items like paint, printed ink, varnish, linoleum, transformer oil, cosmetics, and pharmaceutical products. Beyond the home setting, meals prepared in restaurants and ready-to-eat foods and snacks in grocery stores are also rich in vegetable oils like canola, and they are widely available to consumers with disposable incomes (Sasatani 2019).

Over 90% of the canola seed imports entering Japan come from the world's largest producer of the crop, Canada, where 80% of the country's canola fields are currently devoted to genetically modified, herbicide-tolerant varieties (Nishizawa *et al.* 2010: 152; see also Kawata, Murakami and Ishikawa 2009; Sasatani 2019). Japanese reliance on Canadian seed imports dates back to the 1960s, and it is an outcome of deliberate strategies by the Japanese state to phase out a once existing non-GM domestic cottage industry in canola that was deemed economically uncompetitive (Kneen 1992). High import tariffs on the oil, but not on the seed for domestic crushing, effectively staved off foreign competition in the lucrative market for edible oils (Kneen 1992: 76). This ensured that Japanese businesses could still make the lion's share of profits through the manufacture and retail of the oils, even as they relied on raw materials from abroad. The Japanese national government authorized the importation of GM foods in 1996, but, in response to the general public's skepticism about the safety of GM crops, has prohibited the commercial cultivation of GMO crops. The combination of GMO-friendly import regulation and dependence on non-domestic commodities thus catalyzed an ironic twist: Japan may not be growing GMO crops domestically, but that has not stopped it from becoming one of the largest consumers of imported GM foods in the world.

Public opposition to genetic modification in Japan largely echoes concerns raised in other parts of the world, and includes food safety, environmental threats, the monopolization of food provision systems and compromises to food sovereignty, and (commodification of life) intellectual property rights controlling living organisms and the growing number of lawsuits for patent violations (Nestle 2010; Snow *et al.* 2005; Kloppenburg 2004; Müller 2006; Mulvaney 2008). Among citizen-consumer organizations in particular, apprehensions tend to center on the emergence of new allergies and diseases, anti-biotic resistance, and higher levels of toxic chemical intake (MacLachlan 2006; Yamaguchi and Suda 2010). Pressure from such organizations compelled the Japanese government to introduce irregular labeling standards in 2001 and to agree to the Cartagena Protocol on Biodiversity in 2003 (MacLachlan 2006).[3] In a political economy historically biased towards the private interests of large-scale producers and manufacturers, this was a notable success for civil society, but one only imperfectly maintained through their sustained vigilance.

Against the backdrop of this uphill battle against GMOs, the dispersal of GM weeds beyond regulatable channels has raised new concerns. Civil society organizations, including Green Coop, hypothesized that transgene flow into urban environments was occurring because of spillage from trucks transporting the imported raw material into the country. Arriving on Japanese shores at 13 ports across the archipelago, the GM seeds spilled out of transport vessels while en route to crushing facilities, and landed on small patches of soil in cracks in curbstones, roadside pavements, gutters and drains where they grew and spread. These are spaces that Bettina Stoetzer has described as "ruderal ecologies", derived from the Latin word for rubble, to refer to "communities that emerge spontaneously in disturbed environments usually considered hostile to life" (Stoetzer 2018: 297; see also Grime 1977).

Those of us participating in the sampling study would test the hypothesis ourselves. Armed with gloves, collection bags, and banners, we set out to the streets in groups of ten to fifteen and followed an assigned route around the industrial landscape (Figure 3). While on the trek, the once barren landscape of an industrial port re-emerged as newly intriguing and shockingly populated. We found the weeds on the sides of the road, under

[3] Currently, laws that regulate GMO labeling in Japan only target eight major food items: soybeans, corn, sugar beets, canola, papaya, alfalfa, potatoes, and cotton, and 33 kinds of processed foods that use them as ingredients. Besides the fact that a plethora of GM items fall outside these lists (meat products from livestock fed with GM feeds, for example), a number of loopholes in the regulation have also become constant sources of ire for concerned consumers. In the case of processed foods, if the GMO is not among the top three ingredients in terms of volume, then the product is exempted. Even if the GM ingredient is among the top three, if the actual volume amounts to less than 5% of the total volume of the product, then the producer is not required to label as well.

trees, along median strips, and on the edges of fences. I had seen the weeds before, of course, but had never paid them much mind. They reminded me of Japan in the springtime, when the plant's tiny, bright yellow flowers spread across riverbeds and fallow fields. One by one we plucked out the weeds making sure not to leave from their ruderal habitats without checking we left none behind. Many of them came out of the ground with ease; others were so deeply rooted they required pruners. Combing through the ruderal interstices of Hakata Port, we each managed to fill one or two large garbage bags.

Figure 3: The view from one of the clean-up and sampling routes. (Photo by author)

Upon returning to the Torigoe headquarters, we were handed kits to perform a simple strip-test analysis on the several hundred samples we had collected, an activity emblematic of "citizen science", lay people's participation in scientific pursuits (Petryna 2013; Lave 2012; Kimura 2016; Sternsdorff-Cisterna 2019). The steps to follow were simple enough: in a small dropper filled with liquid solution, we were to crush a small sample of the canola leaves and place the strips in the mix. If the solution contained the proteins present in herbicide-tolerant GM crops, then two red lines would appear on the color-coded strip, indicating "GM positive." We broke into smaller groups, each member taking a turn selecting from the weeds a few leaves to test. The atmosphere was lively and chaotic with the sound of volunteers excitedly sorting through weed-filled bags, setting up the tubes, taking pictures, and shuffling between groups to see others' results. Within five minutes, we watched with trepidation as we saw the red lines emerge on a handful of the blue strips for glyphosate-resistance and the purple strips for glufosinate resistance (see Figure 4). Exclamations of surprise arose from the crowd, almost in unison. "I always thought it was suspicious to find a single canola flower blooming on a crack in the sidewalk", said one woman in my group. When we tested the sample she was carrying in her hand, it came out positive as well. The words of Mrs. Tabara Sachiko, former regional representative to Green Coop Fukuoka, capture the collective sentiment of the group,

> We carried out our study all the while hoping that we wouldn't find any GM canola weeds. Every time we got a negative result, we all heaved a sigh of relief together. Every time we discovered a spot that was positive, we felt uneasy that genetic pollution had indeed spread near us. All of us participants shared in our determination to protect against genetic pollution, even if only by a bit. We became affirmed in our heart of hearts to continue with the study. (Tabara 2010: 103-104)

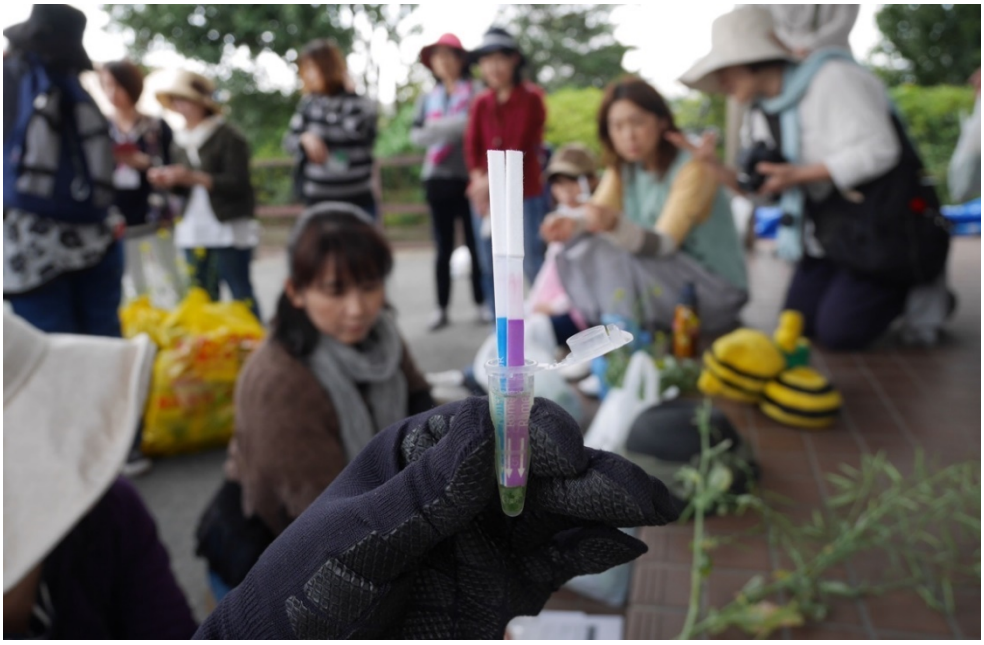

Figure 4: Results of a strip test indicate "negative" for both glyphosate- and glufosinate tolerance. (Photo by author)

Scholarship in political ecology and allied fields has found several important reasons to point to ruderal ecologies, liminal urban wilds, and other neglected margins of commercialized landscapes as spaces of political heterogeneity and promise (Tsing 2012; Gandy 2012; see also Houston *et al.* 2018). In an analysis of the Berlin tree house (*baumhaus*) or *gecekondu*, an urban garden once at the border of the Berlin Wall, Stoetzer (2018) explains that the ruderal become sites of state heterogeneity, home to "unexpected neighbors in the city", and, consequently, epicenters for thinking about urban social justice. In urban Taipei, members of Indigenous communities such as the Pangcah/Amis have built homes and "native hubs" in squatter areas and spaces on the side of the road, where they revitalize their native foodways, cultivate Indigenous sociality, and stake claims on settler colonized land (Sugimoto 2018, 2019). That the weeds growing in the cracks in Japan's sidewalks were in fact the castaways of global trade networks in transgenic crops, however, signaled something different: the incoming tide of biological trespassers that civil activists had struggled to halt at their shores, and the pervasive penetration of the commercial networks into the most minute crevices of the city. Vestiges of biotech-dominated and chemically-intensive industrial agriculture in the Western hemisphere had settled into the corners of urban environments halfway across the globe, revealing the shortcomings of biosafety protocols that operate at a country-by-country level.

The movement of crop genes into environments poses a unique challenge to modern managerial strategies. Elsewhere I have described how agricultural chemicals act as feral entities defying both the physical boundaries of the plantation and the scientific and legal paradigms of regulation (Paredes 2021). Plant geneticist Norman Ellstrand provides a striking contrast between feral chemicals and wandering genes: "A single molecule of DDT [1,1,1,-trichloro-2,2-bis(p-chlorophenyl)ethane] remains a single molecule or degrades, but a single crop allele has the opportunity to multiply itself repeatedly through reproduction, which can frustrate attempts at containment" (Ellstrand 2001: 1543). Environmental scientists claim that genetically engineered organisms released into wild populations can "behave like invasive species", causing biodiversity loss, genetic swamping, inbreeding depression, and, in rare cases, species extinction when hybridizing with compatible species (Mulvaney 2008: 151; Fowler and Mooney 1990; Ellstrand 2006). Weediness also begets weediness; scientists have long recognized that the profusion of transgenes into the wild stimulates the evolution of "superweeds" like palmer amaranth (Amaranthus palmer) and water hemp (Amaranthus Spp.), among

countless others (Ellstrand 2006; Gilbert 2013; Gillam 2017). This "superweed effect", to borrow historical geographer and historian Jason Moore's term, describes not only weeds, but other forms of "extrahuman nature" as well, which evolve to become "hostile to capital accumulation and whose hostility cannot be readily blunted by the usual strategies of the 'taming cycle'" (Moore 2015: 31).

Genetically modified, herbicide-tolerant wild canola weeds now grow in areas surrounding all thirteen Japanese ports where the seeds are imported (Kawata, Murakami, and Ishikawa 2009; Nishizawa *et al.* 2010, 2016). A six-year study of twelve importation facilities found GM traits for herbicide tolerance in about 40% of the B. napus weed populations[4] tested, with higher rates (>60%) in the ports of Chiba, Yokkaichi, and Hakata (Katsuta *et al.* 2015). Studies in Hokkaido have shown that rates of GM material crossover into agricultural fields may be reasonably low, but results nevertheless prove that "coexistence" between GM and non-GM crops is virtually impossible without contamination (Yamaguchi and Suda 2010; Hokkaido Prefecture 2007; Nihon Shubyo Kyōkai 2008).[5] Beyond the East Asian archipelago, unintended transgene escape via weeds has become a global phenomenon, and similar instances have also been reported around the world: along motorway tunnels in Germany, road verges of motorways in the United Kingdom, rural roads and railways in Canada, and adjacent farm fields and road verges in France (Nishizawa *et al.* 2010; Ryffel 2014). In North Dakota in the USA, a research team found that 80% of the wild canola plants they tested contained a transgene (Gilbert 2010). They located evidence of transgenic flow in roadsides, waste places, ball parks, grocery stores, gas stations and cemeteries, with highest concentrations near agricultural fields and major freeways. "But we were also finding plants in the middle of nowhere — and there's a lot of nowhere in North Dakota" (Black 2010). The story of genetic pollution continues to evolve, with each report unraveling the complexity of the issue. Most recently, scientists discovered GM canola weeds in Switzerland in the early 2010s, where neither cultivation nor imports of GM rapeseed were allowed until the end of 2017 (Schulze *et al.* 2014). In all these cases, weedy profusions have been enabled by the very industrial transportation infrastructures that were supposed to keep them contained (Tsing *et al.* 2020).

3. A new pollution: the emergence of the woman as weedy activist

From the beginning, mobilization against the trespass of GM weeds into the ruderal interstices of Japanese cities has been a fundamentally gendered affair, with women and mothers emerging at the center of nation-wide cleanup and monitoring initiatives. Women began coordinating local efforts to address weedy genetic pollution in response to a 2004 study sponsored by the Ministry of Agriculture, Forestry, and Fisheries (MAFF).[6] The study, based on two-years of research, confirmed the presence of the GM weeds around the Port of Kashima in Ibaraki Prefecture, about 100 km from Tokyo, but declared that the flow of transgenes into local environments posed no problem worth government action (NO! GMO Campaign 2010: 86). Characteristic of the Japanese state's laissez-faire approach to environmental protection, the MAFF has

[4] Population units defined as follows: "Even when there was only one plant, it was considered as an independent population. When a plant was >10m from another plant, the two were considered as members of different population. Assemblages in obviously different growing conditions, such as the presence of soil (i) in a planted zone, or (ii) in accumulations in cracked road surfaces, were considered to be different populations, regardless of the distance between them (Katsuta *et al.* 2015).

[5] In Hokkaido, a primarily agricultural prefecture, the prefectural government has agreed to double the distance mandated by the Ministry of Agriculture, Forestry, and Fisheries to isolate non-GM fields from GM equivalents in experimental (non-commercial) fields (Yamaguchi and Suda 2010: 397). Since 2006, it has maintained for rice a 300m distance, rather than the central government-mandated 26m; for soybean, 20m rather than 10m; for canola and corn, 1200m rather than 600m; and for sugar beets, 2000m despite the fact that the MAFF has yet to determine an appropriate isolation distance (*ibid*). Despite these measures, however, field trials on rice revealed that over 300 grains demonstrated GM gene transfer when isolated by 26m, and 12 grains even when distanced by 300m. Public and scientific communities were split over the results: while some considered it proof that genetic pollution rates were reasonably low, others saw it as evidence that coexistence between GM and non-GM crops was in fact impossible without contamination (Hokkaido Prefecture 2007; Nihon Shubyo Kyōkai 2008; see also Mulvaney 2014).

[6] Other central organizations include the No! GMO Campaign (*Idenshikumikae Shokuhin Iranai! Kyanpēn*), Citizens Concerned About GM Foods – Chūbu (*Idenshikumikae Shokuhin wo Kangaeru Chūbu no Kai*), Stop GM Polluting Seeds Net (*Stoppu Idenshikumikae Osen Shushi Netto*) in Chiba, and the Japan Family Farmers Food Analysis Center (*Nōminren Shokuhin Bunseki Sentā*).

continued to publish the results of its annual studies on the weeds, but has failed to implement any changes (NO! GMO Campaign 2010: 13). Critical of government inaction and concerned that concentrated state-sponsored studies failed to capture the true scale and scope of the pollution, women- and mother-centered consumer co-operative systems launched the Genetically Modified Canola Weed Sampling Study across the country first in 2005, and they have been the heart of mobilization since. Some of the most prominent of participating groups include the Seikatsu Club, Nanohana Seikyō, and Daichi wo Mamorukai from the Tokyo metropole and greater Kanto region, Seikyō Rengō Kirari and Coop Shizenha from Kansai, Ai Coop Miyagi and Niigata Sōgō Seikyō from Tohoku, and Green Coop from Kyushu. Anecdotal accounts, coupled with my own experience interacting with these organizations, make it clear that most of these women are housewives, some of whom work part-time. All of the women I would get to know through the Genetically Modified Canola Weed Sampling Study identified as part of Japan's middle-classes.

Why were women and mothers the ones to respond most systematically to the problem posed by proliferating weeds and the wandering genes they carried? I want to counter the over-simplistic assumption that weedy activism was motivated by ecological xenophobia. While state representatives' narratives have tended to emphasize the "occupation of Japanese stomachs" by the United States or other Western countries (MacLachlan 2006),[7] such geopolitical concerns never arose in the multiple conversations I had with women activists, and their frustration was more often directed at the patriarchal nation-state than any other institution, as I'll discuss further below. I also want to preempt the argument that women's engagement in the GM Canola Weed Sampling Study was primarily a classed affair—that is to say, that it can be understood chiefly as a preoccupation of the middle- to upper middle-class. To be sure, classed experiences have been historically consequential in the formation of women's environmental activism in Japan, as they have in the Western hemisphere (Rome 2006). During the prosperous bubble years between 1955 and 1990, corporate welfarism effectively subsidized married, middle-class women to be full-time homemakers, a development that provided many the time and space to participate in grassroots civil society. Engagements in issues surrounding food and the local environment became a means to tie domestic duties with broader community concerns (LeBlanc 1999; Avenell 2010, 2018). What class does not explain, however, is how these engagements have persisted despite radical changes to womens' lifestyles and socio-economic standing. In the decades after the 1990s, the unraveling of Japanese economic prosperity saw an increasing number of housewives turn to precarious, part-time employment (Kawano, Roberts and Long 2014) and contend with curtailed financial and social freedoms. Yet in the face of these changes, as the GM Canola Weed Sampling Study's fifteen-year career suggests, women's dedication to civic environmental participation has remained. This points to other factors that have prompted women's emergence as weedy activists. Here I want to emphasize how weeds in the ruderal interstices of the global economy became a Trojan horse for a new breed of urban ecological threat—in one activist's words "a new source of pollution" (*aratana osengen*). This threatened to affect mothers in particular, in biophysical and moral ways.

Long traditions of feminist political ecology, the field of study where feminist environmentalism intersects with structural analyses of power, have investigated how gender is an explanatory variable in the uneven forms of management, harm, and access in the creation of urban environments (Rocheleau *et al.* 1996; Elmhirst 2015). Central to the field's many contributions is the attunement to embodied encounters between women and the environment, not because of the essentializing assertion that women are intrinsically or spiritually connected to nature, but because women can become the victims of embodied environmental hazards in gender-specific ways (Seager 2003; see also Doshi 2017; Truelove 2019). These experiences, in turn, create gender-specific stakes in ending environmental degradation and appropriation, as well as gender-specific perspectives on alternative political pathways forward (Agarwal 1992). Historically, women's groups have thus become instigators of the paradigm shift that sees environmental degradation as a cause of human health decline, a linkage that, while seemingly obvious, remains fiercely contested (Seager 2003). Moving beyond "hyperevents" like Bhopal and Chernobyl, they have forged movements "around more mundane and modest health issues that disproportionately affected women and that women were the first to 'notice'" (Seager 2003:

[7] For a brief discussion on xenophobic roots of anti-GMO movement by Takeuchi Naokazu, former Ministry of Agriculture, Forestry, and Fisheries officer and founder of the Japan Consumers Union, see MacLachlan 2006.

958). In this work, it is well understood that women's motherhood, in particular, serves as a "resource for resistance" in environmental justice movements (Krauss 1993; see also Naples 1992; Bell and Braun 2010; Rome 2006).

Despite what some might consider as their relative affluence in the global economic hierarchy, women and mothers in urban Japan have long borne the burdens of industrial pollution. In the 1950s, environmental catastrophes such as the Chisso Corporation mercury poisoning scandal, which caused the infamous neurological affliction known as Minamata Disease, and photochemical smog pollution in city centers like Tokyo and Osaka, made urgent the need to bring politics into the everyday realms of the household (Avenell 2010, 2018). Minamata Disease in particular provides a striking case to observe mothers' environmentalism through a political ecological lens. Methyl mercury in the river effluents from Chisso Corporation, a manufacturer of fertilizers and industrial chemicals, was shown to cross the placenta, transferring the poison from unsuspecting pregnant mothers who had eaten polluted seafood to fetuses developing in the womb (Avenell 2018; see also George 2002; Smith and Smith 1975). Two women activists, Ishimure Michiko and Ariyoshi Sawako, Japan's own Rachel Carsons, became centerpieces of feminist environmentalism in the country when they published about these issues for the public. Among Ishimure's and Ariyoshi's works are the now classic 1969 book *Paradise in the sea of sorrow: our Minamata Disease* (*Kugai Jōdo: Waga Minamatabyō*) and the renowned 1974-1975 serial novel *Compounded Pollution* (*Fukugō Osen*), respectively.[8]

I want to draw attention to the sense of embodied moral hijack that characterized womens' experiences of urban ecological pollution in the postwar years. Recurrently, mothers' intentions and practices were transformed into inadvertent acts of harm, and their reproductive bodies were subsumed into networks of industrial hazard. Exemplary instances include the 1955 Morinaga milk scandal, when mothers discovered that the infant formula they were providing their children was laced with arsenic, and the 1968 Kanemi Food Company tragedy, when women who had consumed rice bran oil contaminated with PCBs (polychlorinated biphenyls) birthed children with dermal and ocular lesions and lower IQs. To add insult to injury, it took over a decade for corporate and government authorities to acknowledge the grave injustice that had been perpetrated. Disasters such as these underscore how urban ecological systems and the body are one inextricably, even tragically, entangled unit. As a unit, it is vulnerable to polluting forces that transform relationships of human-nonhuman symbiosis into chains of inescapable and hidden harm. Ishimure captured this poetically when she wrote, "Organic mercury never attacked from the front. It lurked densely in the mullets, the clear sea octopuses, and the nocticulae that were such an important part of people's daily lives. It infiltrated deep into the human body together with people's food, their sacred fish" (quoted in Thornber 2013: 211-212).

Renewed threat of embodied moral hijack loomed large with the issue of weedy genetic pollution. Consider, for instance, an official statement by Kumano Chiemi, regional director from Kumamoto province and elected director of the Green Coop Consumers Union (*Gurīn Coop kyōdōtai*):

> As a mother, to prepare food for one's child is to build for them the bodies that hold their lives together. It is an incredibly important thing. After [learning more about GMOs], I became aware of the reality that there were mothers who, even with all the best intentions, had no idea that the food they were feeding their kids was in fact harming their health. This should never be the case. We need to do our best to eradicate all GMOs. (Green Coop 2017)

Mrs. Kumano's statement appeared on campaign flier for the GM Canola Weed Sampling Study, which had circulated to all 400,000 members of the co-operative. When infiltrated into food systems, Mrs. Kumano suggests, feral GM weeds hijack the intentions of mothers, turning their hopes to build healthy bodies for their children into inadvertent acts of harm. They interrupt ideals that have come to define good motherhood, many of which are evident in Mrs. Kumano's statement: the responsibilities of the reproductive body extended

[8] Ariyoshi, in particular, pointed to the consumer co-operative system and direct food purchasing as a solution to the problem, a call that inspired many Japanese housewives (Kondoh 2015: 147).

postpartum, the perceived affinity of mothers to food preparation, and the moral charge over protecting children from objects deemed unsafe (Kimura 2011; see also Shaw 2016).

Many women like Mrs. Kumano took part in the weed sampling study hoping to understand just how much of an issue the "new source of pollution" had become. "We are constantly eating GM foods without knowing it", pronounced Mrs. Sakamoto, a representative from Green Coop's regional chapter in Kita Kyushu**.** I heard her speak at an organization-wide debriefing session in June 2017 to collate results from 13 of the organization's other regional chapters. Hosted two months after I had participated in the weed-picking and sampling study around Hakata Port, the assembly drew about a hundred people from all over the island of Kyushu, who filled a large function hall in an office building in Fukuoka's business district. Mrs. Utsunomiya, from the landlocked central province of Oita, expressed her shock at finding GM weeds, saying, "I was surprised because we don't even have routes that the canola should be passing between the port and manufacturing facilities." Mrs. Sakamoto, from Kita Kyushu, expressed of her sense of horror (*osoroshī*) upon discovering weeds testing positive for *both* Roundup- and Basta-tolerance—in other words, an unintended recombination of transgene traits (see also Nishizawa *et al*. 2016; Aono *et al.* 2011; Consumers Union of Japan 2010). This was a disturbing discovery as it made clear that weedy populations had been thriving in the landscape for long enough, possibly several generations, for the recombination to occur. Members of Green Coop Kita Kyushu found the recombined weeds in areas immediately adjacent to agricultural fields for locally consumed vegetables. Brassica species, commonly grown and consumed in Japan, are related to rapeseed and thus possible pollen recipients and victims of transgene flow (Nishizawa *et al.* 2010: 153). To Mrs. Sakamoto, this made matters particularly grave: "Even if we had understood the anxieties over GMOs in our heads, we had not realized just how close of an issue it was to us!"

4. In the cracks of patriarchal eco-management

Women's weedy activism challenges various assertions in recent scholarship on ecological engagements in the urban city. A central conversation in contemporary urban political ecologists is the notion of the city as a cyborg (Swyngedouw 1996; Gandy 2005; Loftus 2019). In conversation with Donna Haraway's "cyborg feminism" and allied theoretical commitments to cosmopolitan impurity, plural interdependence, and "contaminated worlds" (Haraway 1991a; 1991b; Comaroff 2017; Kim 2017; Ticktin 2017), the city-as-cyborg is a call to abandon the modernist virtualization of the contemporary cityspace. It is also a provocation to think and act with an understanding of the situated, underlying messiness of material realities and intertwined organic bodies that compose the city's very nature (Gandy 2005). Accompanying the "cyborg city" concept is the imperative to "make kin, not cities"—that is, to "nurture possibilities for multispecies flourishing" and embrace the "awkward creatures" that are co-constitutive of our very humanity in urban space (Houston *et al.* 2018; Ginn, Beisel and Barua 2014). In this context, Japanese mothers' weeding activities might be misunderstood as a disavowal of unruliness, as a case of "hyper-separation" that re-instantiates approaches to eco-management that see "nature" and the "city" as incongruous (Houston *et al.* 2018: 197; Braun 2005). I want to suggest, instead, that weedy activism underscores how cyborg assemblages, in the urban environment as elsewhere, are never completely innocent. It serves as a reminder that the ability to "take relational ecologies seriously as scholars or activists" cannot merely rely on resisting intervention, as Darren Patrick suggests in his queer urban ecology of New York's High Line and its former botanical inhabitant A. altissima (2014: 936–937).

Yet for all that weedy activism might illuminate for political ecological scholarship, it is unfortunately unsurprising how often its demands for new understandings of environmental risk have been dismissed in the face of dominant modes of scientific research. Women's stances on issues as highly politicized and as technocratically controlled as genetic pollution and genetic modification have often been characterized as self-righteous hysteria.[9] This is no less true in Japan, where women activists engaged in food- and environment-

[9] The level of technocratic control over the issue is demonstrated most clearly in the public controversy over the 2001 discovery that Mexican native corn had been contaminated with genetically engineered DNA. When David Quist and Ignacio Chapela, researchers at the University of California, Berkeley, documented the problem in 15 of 22 surveyed remote areas of Oaxaca and Ixtlán, they were met with a vicious discrediting campaign suspected to have been instigated at least

related movements of all sorts have had to confront, adjust to, and be disciplined by accusations that their forms of reasoning are overly emotional, irrational, and ill-equipped to deal with scientific reality. Various forms of citizen science have been instrumental to women's ability to stake claims over expertise in instances of contrasting perceptions of risk, and to develop alternative knowledge networks amidst state and corporate failures at risk communication (Sternsdorff-Cisterna 2019). However, this has not freed them from gendered prejudice, derision, marginalization and censorship by traditional knowledge brokers (Kimura 2016). In many ways, their positionality has been the very definition of weedy—to return to Marder's words, "discarded as improper, superficial, inessential, and purely exterior" and "devalued, unwanted in [a] carefully cultivated garden…" (Marder 2013: 90). They point to the fact that women confront patriarchal forms of eco-management that calculate environmental risks in very different ways, primarily based on utilitarian and production-driven concerns. In what follows, I situate weedy activism in the cracks of these existing patriarchal frameworks, explaining how those frameworks have not only failed to accomplish their stated goals, but have also actively exposed local communities to biotech's legal claims over land.

In 2003, Japan signed the Cartagena Protocol on Biosafety, an international treaty intended as a means to regulate, manage, and control the risks associated with the trans-border mobility of "living modified organisms", including seed. In order to fulfill the requirements of the Protocol, the Japanese Diet drastically redesigned its national guidelines and assigned Ministries as responsible for various aspects of its implementation by 2004. While Japanese law on the matter has been called "comprehensive and consistent", many stakeholders, including commercial traders and the scientific community, continue to confront confusions over operational details. By and large, the result has been a failure of the Japanese state to prevent the movement of transgenes and to hold corporate stakeholders accountable for the roles they have played in that development. To cite a reflection from Friends of the Earth, "Legal frameworks were supposed to be adequate to ensure that GMOs wouldn't endanger the environment or human health. Biotech companies were supposed to comply with those frameworks. Regulatory bodies were supposed to monitor and oversee GMO releases to ensure they were complying with the legal frameworks. But the reality shows a completely different picture" (quoted in Nestle 2010: 234).

Time and time again, Japanese activists against genetic pollution have cited the Cartagena Protocol in seeking the cooperation of the local and national government, but they have been met with inaction. At the 12th GMO Free Zone National Assembly, another large Green Coop-sponsored event I was able to attend, representatives from each prefecture shared their strategies and struggles while approaching their local political representatives on the issue of genetic pollution. The representative from Green Coop Kumamoto, Mrs. Kumano, reported that she and her peers had delivered a formal request to the regular mayoral meeting, a gathering of all city mayors in the province, as well as to the provincial government. From Fukuoka, a representative named Mrs. Mihara, explained that her group, too, had visited both the city and the prefectural government officers to alert them to the implications of the weed sampling study. She had explained that because the spread of GM pollution was particularly acute around Hakata Port, their group expected much more attention from the city government. "There was one time we were able to personally hand our petition papers to the mayor, voice our concerns as citizens directly, and draw out from the Port and Harbor Authority the 'Guidance in Cleaning Up of Hakata Port' …" she narrated cautiously, explaining that government representatives were prone to making empty promises. "The national government's decision is that the problem of genetic modification requires no special measures. Thus, the city government is not able to suggest any particular recommendations."

Generally, the lack of state interest in keeping genetic pollution under control is not because state representatives deny the reality of the issue, but because they rely on patriarchal, utilitarian, and production-driven notions of environmental risk, rather than on the precautionary concerns raised by feminist environmental movements and citizen science (see Seager 2003). On GM canola weeds specifically, while many public reports express a level of surprise at the idea of genetic material infiltrating uncultivated zones, the fact is that scientific authorities had anticipated as much when the technology was first developed and

in part by members of bioengineering industry (Quist and Chapela 2001; Metz and Fütterer 2002; Agapito-Tenfen and Wickson 2017).

authorized for commercial use. "Regulatory agencies in the US have acknowledged that volunteer populations of GM, herbicide-resistant canola are expected to occur, as well as populations of inter-specific hybrids", said Alison Snow, an expert on biotechnology and its environmental impacts at the Ohio State University (Black 2010). Further, authorities recognized that oilseed rape may have characteristics such as secondary dormancy and small seed size that enable it to persist and be redistributed in the landscape. However, scientists claimed that the presence of feral weeds would not in itself pose environmental or economic problems, and they argued that the concerns over transgene flow were therefore scientifically unjustified. Feral canola, these scientists argue, has not become "invasive" by scientific standards outside cultivated and ruderal habitats, and herbicide tolerance traits are not likely to result in increased invasiveness (Devos *et al.* 2012: 1). The accidental profusion of GM canola, authorities concluded, was no different from the profusion of conventional equivalents and thus necessitated no preventative measures.

Metaphors evoking accidents—to borrow from Marion Nestle, "Pandora's box and genies out of bottles"—become more sinister—the "Trojan horse"—when recalling the role that weedy profusions have played in biotech corporations' intellectual property claims over public and private landscapes (Nestle 2010: 234). Nowhere is this more cogent than in the story of Percy Schmeiser, the Saskatchewan canola farmer who in the 1990s and early 2000s was embroiled in legal battles in the Canadian Supreme Court with the biotech giant Monsanto. Schmeiser's story serves as a striking precautionary tale, and Green Coop event organizers often handed out a picture booklet called *A Story About Dangerous Food* to recount this to co-op families (Amagasa and Kaiya 2005; see Figure 5). The farmer had visited Japan in the summer of 2003, just as the issue of genetic pollution was being unraveled, at the invitation of Green Coop and a host of other civic groups. Giving talks in Osaka and Kumamoto, he had come primarily with a warning: "Once you put genetically modified organisms into the environment, there's no bringing it back" (Suutari 2003; NO! GMO Campaign 2010).

Figure 5: The text reads: "In Canada, a man named Uncle Schmeiser was lovingly growing his canola crops. But pollen from GM canola jumped [into his farm] and turned all of his crops into genetically modified canola. Monsanto Corporation accused him of stealing their GM crops. There are a number of farmers in America and Canada who are being accused by Monsanto [for the same reasons]" (Amagasa and Kaiya 2005: 26-27).

Sometime in 1997, Schmeiser discovered on his property canola, dandelion, and buckwheat weeds that seemed to withstand the application of herbicides, concluding at the time that they must have developed the resistance naturally. Representatives of the police and of the corporation reported in 1998 that the man had been growing the patented canola illegally with material that had been stolen from the corporation. This was despite the fact that there were clear reasons to believe that transgene flow via seeds or pollen had occurred voluntarily, spilling from grain trucks just as they would in Japan almost a decade later. Monsanto's intellectual property rights over the herbicide resistant gene entitled the company to royalty payments (in Schmeiser's case, about US$300,000) whenever it was "used." The corporation's lawyer, Roger Hughes, emphasized in court hearings how the genetic material was an inert material no different from "Lego building blocks for a toy castle", "patented steel in a car", or "baking ingredients in a cake", and that any person who had been or could be benefitting from its qualities was therefore a "user" (Müller 2006: 91–92).

In 2004, five of the nine Supreme Court Justices of Canada declared Percy Schmeiser guilty of infringement of Monsanto's intellectual property rights, regardless of the fact that GM canola cross-pollination and intermingling occurred in the absence of his or any human's intervention. While Schmeiser's was the singular case that reached trial, at the time Monsanto was reported to have raised over 500 similar technology infringement claims against farmers in the United States and Canada, most of which had been settled out of court (Broydo 2000). As Birgit Müller elaborates in her analysis of the court documents, "The customary view that a farmer owns the crops that grow in his field became superseded by the recognition of intellectual property rights over living organisms that are freely released into the environment" (2006: 83).

Perhaps most alarmingly, GM weeds have also proven to be fungible with respect to the laws that govern them, and ambiguous enough in their constitution that they were open to legal manipulation in the company's favor. An important counterpoint case concerning genetic pollution via the proliferation of GM canola weeds is *Hoffman v. Monsanto* (2005), where organic farmers in Saskatchewan motioned for certification to pursue a class action lawsuit against Monsanto Canada Inc. and Bayer Cropscience Inc., which they claimed had compromised their ability to achieve the degree of purity required for maintaining their organic certification. Terry Zakreski, lawyer to the plaintiffs, argued that, if by rule of law the biotech giants could claim the genetic material and its "use" as subject to their intellectual property rights, then it followed that the company ought to be held responsible for the issue of "genetic pollution that [had] infringed on the livelihoods of farmers or the general public" (Hoyle 1999: 747). GM drift, Zakreski argued, was tantamount to "trespassing": "They [the GM canola] do not simply trespass into the fields of the farmers and sit there. They take root, grow, propagate and spread" (Müller 2007: 95; see also McLeod-Kilmurray 2007). Monsanto and its lawyers responded by denying any evidence of alleged damage, as GM canola had been judged as "safe" by the commission that authorized its unconfined environmental release. It ought to be the responsibility of organic certification agencies, the defendants claimed, to review their standards against GM in organic foods. In an apparent reversal of the judgment in *Monsanto v. Schmeiser*, the corporation specified that the technology use agreement gave them control only over the saving of seed, and not over the GM crop itself (Müller 2007: 95). The Saskatchewan Court of Queen's Bench and the Saskatchewan Court of Appeals denied the organic farmers their organic certification, another loss to farmers facing off with big biotech (Olszynski 2005).

In Japan, local activists see their efforts to weed out GM canola from sidewalks as a bulwark against large biotech firms' property claims over landscapes and, as suggested in the *Dangerous Food* booklet, the word's food supply (see Figure 6). Thankfully, as of the time of this analysis, the country has yet to see a GM canola infringement case like the kinds that have come to characterize rural Canada. Schmeiser himself may have alerted women to the role they would play when he addressed the consumer co-op crowds in Osaka and Kumamoto back in 2003, saying, "We didn't have anyone tell us in 1996 what would happen, [and] I haven't come to tell people what to do. But at least [in Japan] you still have a choice" (Suutari 2003).

Figure 6: The text reads, "Multinational corporations developed genetically modified foods as they conspire to take control of the world's food supply." (Source: Amagasa and Kaiya 2005)

5. Conclusion

Celebrated feminist sociologist Ueno Chizuko once described anti-pollution women's groups in Japan saying, "If you have no contact with those grassroots networkers, they are simply invisible to you… Grassroots networkers often exercise political decision-making power, having become delegates of public bodies at the local level. Their political power can no longer be overlooked" (1996).

Ueno's reflections speak to the weediness of women's environmental activism in urban Japan. As a result of long histories of victimhood to industrial pollution, women in Japan have come to understand their food systems as a complex composed of both the intentional infrastructures enabling the singular flows of commodities (be they Chisso Corporation's chemical fertilizer or Monsanto's canola seed), as well as the hidden overflows allowing the leaky and unaccounted-for wanderings of feral entities (mercury or transgenes). When entering the food system, penetrating the body, or transferring from mother to child, these feral entities threaten to transform maternal intentions into nodes of pollution. In the contemporary case considered above, the weedy nature of wild canola plays a central role in the proliferation of potentially harmful feral transgenes, catalyzing an unusual commitment among women citizens to weeding the sidewalks of Japan's port cities. After fifteen years of bi- or triannual weed picking and GM monitoring activities, it is still difficult to quantify in scientifically recognizable terms the transformative work that weedy activists have accomplished.[10] To borrow from Ueno's words, the work of these weedy activists is still easily "invisible", but it can no longer be "overlooked." Researchers from dominant scientific communities profess an interest in measuring the extent of transgene flow in urban landscapes, and yet their own notions of environmental risk became cause for the dismissal mother's concerns as inactionable. Local and national governments relying on scientific modes of

[10] To my knowledge, in the growing academic scientific literature on canola weeds and genetic pollution in Japan, citizens groups are mentioned only once. The author references his discovery that hand-weeding along Route 23, a national highway connecting Aichi and Mie prefectures, had significantly affected the spread of GM canola weed populations on the roadside (Nishizawa *et al.* 2016).

understanding environmental risk have become quick to default to inaction as a result, despite regulatory obligations stated in the Cartagena Protocol. Japan's weedy activists fill the ruderal cracks that states, corporations, and scientific communities have left open to the threat of genetic pollution, demonstrating how transformative political action is constitutive of human-plant relationships. They advocate that hegemonic institutions see environmental risk in a new light. Until those institutions do so, weedy activists will remain easy for scientific authorities to miss, though in reality their activism is never hard to find.

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