Cultivating response: Peasant seed and plant–human collaboration in an agro-industrial heartland

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Abstract
Using Donna Haraway’s notion of “response-ability”, or the cultivation of the capacity for response, this paper seeks to understand seed saving and plant breeding as politically and ethically charged modes of interspecies communication. In Brittany, France, a region known for its industrial-scale fresh vegetable production, peasant farmers and organic plant breeders question the modernist plant breeding and agro-industrial paradigm, cross-pollinating ideas to produce new understandings of genotype-environment interaction, biodiversity and heredity. Plant liveliness is understood as politically transformative, constitutive of an agriculture that supports peasant farmer and crop plant creativity and self-determination. In contrast to F1 hybrids, open-pollinated semences paysannes (peasant seed) retain the ability to respond to environmental changes, adapt and evolve over (human and plant) generations. Farmers must in turn engage specific modes of attention, interpreting plant expressions and shaping future generations through rouging and crossing, selecting and saving, watching and learning from their crops. Mutual response is the foundation of interdependence, in which nonconspecific partners adjust to one another’s ways of being and doing in order to labor together. In remaining responsible, farmers reckon with the liveliness and agential capacities of plants, qualities that work against their subsumption into factory-like methods of cultivation. These communicative practices hint at the radical potential for interspecies resistance to monoculture within plant breeding and cultivation, practices that are so often molded by the interests of agro-industrial capital.

Keywords
Plant breeding, seed, plant–human relations, peasant agriculture, multispecies studies

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Uniformity is written across the agricultural landscape of northern Brittany, France: neatly gridded artichoke fields stretch for hectares, each plant a clone of the other; massive greenhouses enclose tens of thousands of identical hydroponic tomato plants, their roots suspended above the ground in the same tightly calibrated nutrient medium. When I looked on these parts of the landscapes, my eyes felt starved for difference, they swam and searched for something to anchor myself to, something that felt lively and unexpected. I spent the summer of 2019 in the region, living and working alongside organic farmers and plant breeders involved in the production of semences paysannes, or peasant seed, questioning them on their practices, politics and philosophy. I found refuge from the uniformity in the wild corners of the farms on which I worked, the hundreds of different tomato varieties with varying shapes, colors, tastes and stories, even in the tiny phenotypic differences between each open pollinated broccoli plant in the nursery field.

In Brittany, the region of my fieldwork, the policies that modernized agriculture and plant breeding in the first half of the 20th century sought to eliminate both “unproductive” peasant farmers and the diverse plant varieties upon which they relied (Bonneuil and Hochereau, 2008; Bonneuil et al., 2007; Demeulenaere and Bonneuil, 2010). Since the early 2000s, a movement has developed in France in reaction to the marginalization of peasant seed – which can be sold or exchanged only in very particular circumstances under French law – widespread ecological degradation due to industrial agriculture and the devalorization of the paysan.ne (peasant) identity and lifestyle. Semences paysannes are locally adapted landraces, open-pollinated, free of genetic modification, selected and reproduced by farmers, on farms.

Although peasant seed as a living entity has existed since early peoples began their domestication efforts, the term “peasant seed” is a more recent semantic innovation, directly linking political struggles over the control of seed to the promotion of peasant farming as an alternative to industrial agriculture (Demeulenaere, 2012). Alarmed by the rise of biotechnology and changes in intellectual property regimes, civil society groups organized in the late 1980s to combat the legal enclosures threatening seeds, culminating in the signing of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA or Seed Treaty) in 2001. Recognizing that the treaty did not go far enough, agrarian movements like La Via Campesina and many national and regional member groups worldwide built on these initial efforts, launching a campaign around seed as a global commons: not free to be privatized and appropriated, but tended to and protected by the global peasantry (La Via Campesina, 2011; Peschard and Randeria, 2020). It was around this time that the term “peasant seed” came into use, beginning in the France with the Reseau Semences Paysannes (Demeulenaere and Bonneuil, 2010). The late 2000s marked a shift toward seed sovereignty, which broadened the scope of the movement beyond the right to use and save seeds to the role of seeds in actualizing a wholly new form of peasant-oriented farming practice and socio-economic organization (Demeulenaere, 2018). Today, as part of the larger movement toward food sovereignty and self-determination for small holders and farmworkers worldwide, peasant farmer-led groups continue to organize around emerging biotechnologies and intellectual property rights, revising the Seed Treaty, implementing the right to seeds as enshrined in the UNDROP (UN Declaration on the Rights of the Peasant, 2018) and collaborative breeding with scientists, as well as continuing the critical everyday practice of seed saving and exchange (Amelie, 2020; BEDE, 2018; Ecoruralis, 2021; La Via Campesina, 2011, 2016). Scholarship in and with this movement has focused on the relationship between food sovereignty and seed (Bezner Kerr, 2013; Kloppenburg, 2010), different strategies farmer groups take to maintain seed sovereignty, including civil disobedience, subversion, and legal action (Demeulenaere, 2018; Hecquet, 2019; Peschard,
2017); ethnographic exploration of farmer seed systems and their interactions with global agrofood and intellectual property rights regimes (Aistara, 2011; Müller, 2020; Silva et al., 2020); the constitution of peasant identity through seed practice (Da Vià, 2012; Demeulenaere, 2012); and the potential for peasant seed practice and collaborative research to rethink conventional phytosanitary and seed certification laws (Bonneuil et al., 2007; Klaedtke et al., 2018).

Using ethnographic exploration of farmers saving seed and developing their own varieties in Northern Brittany, this paper links critical agrarian studies literature with the fields of STS and the environmental humanities, demonstrating how food and seed sovereignty necessarily implicate a concern with the other-than-human. Drawing on the work of Donna Haraway and Elizabeth Grosz, I will explore plant and farmer freedom as a relational achievement, grounded in the biological capacities and characteristics of open-pollinated semences paysannes.

“Response-ability” is the means by which this relational freedom is attained, the process by which crop plants and farmers “cultivate the mutual capacity to respond” across species lines (Haraway and Kenney, 2015). Farmers and crop plants come to adapt to and understand each other’s ways of working and communicating, becoming “subjects and objects to each other in ongoing intra-action”, unequally powerful but co-responsive partners (Haraway, 2008: 71). While Haraway focuses on the capacity of the animal to return the gaze of the scientist, animal ethologist, or lab worker, different frameworks must be applied in order to understand plant freedom or agency in the context of agriculture: plants cannot “look back” or “act” in the same way animals can. Plants are often considered passive because human (and other animal) timescales and ideas of mobility, communication and sensation are used as frames of reference: “if, however, plants are considered within their own lifetimes and scales, their responses become active (in sometimes quite sophisticated ways) rather than passive”(Head et al., 2015: 404). Understanding the complex and subtle forms of interaction and communication between plant and farmer through the process of seed saving sheds light on what forms these responses may take.

Following Elizabeth Grosz, I argue that “freedom” for crop plants is grounded in the proliferation of plant genetic diversity, which underlies the capacity of open-pollinated plants to adapt and evolve over generations. Through seed-saving, open-pollinated plants are given the chance to complete one or several life cycles in the field, allow the action of insects, soil, climate and farmer selection practices to (over time) affect their trajectory as a variety. F1 hybrids, which only live one generation in the field and are harvested before seed is allowed to set, are denied this opportunity. This elaboration of difference through the interplay between matter and life is in turn the basic source of freedom and potential for living things, a sort of freedom that cuts across boundaries of species and kingdom (Grosz, 2011). Farmer and plant freedom is distinct but united by the capacity to interact with the agroecosystems: with autonomy from agribusiness (for farmers) and with the capacity to continue as a lineage of multiples generations and diverge into more diverse forms (for plants). Working with these concepts, this paper builds on existing conceptualizations of food and seed sovereignty as a multi-species collaboration, rather than humans maintaining control over seed as an inert resource, as in Guntra A. Aistara’s explorations of “networked diversity” in the organic farming landscapes of Costa Rica and Latvia (Aistara, 2018). Locating the potential for interspecies collaboration in the context of a highly developed agro-industrial region helps expand our sense of where these types of relationships can occur, pointing to the possibility of locating “refugia” (Tsing, 2015) in unlikely places. When faced with widespread agro-environmental crisis rooted in colonial aspirations to
shape diverse ecologies in the image of the plantation, finding these spaces of potential, of recuperation and biosocial diversity becomes all the more critical (Haraway, 2015).

In the first section, I briefly discuss the rise of pure-line and F1 hybrid plant breeding and their connection to the quest for uniformity and standardization in French plant breeding science. Then, I connect these practices to the industrialization of farming in Brittany, contextualizing the current Breton peasant seed movement. In the following section, I explain how the plant breeders and peasant farmers with whom I worked are pushing back on the hegemony of agroindustry in the region by centering diversity and adaptiveness, rather than uniformity, in their practice. Finally, I discuss how the practice of cultivating plants for seed and developing and maintaining open-pollinated varieties creates the conditions for relationships of “response-ability” and freedom for both plants and farmers. By grounding conceptual discussions in an understanding of regional history and current peasant farmer struggles over seed, I point out how relations of response-ability and relational freedom between crop plants and farmers constitute a form of “interspecies resistance” with the potential to transform our understandings of agrarian worlds (Galvin, 2018) and interspecies relationships.

**The seeds of agro-industry**

In France, the industrialization of agriculture began with the seed. From the pure-line and pedigree breeding experiments pioneered by Vilmorin in the mid-1800s to the discovery of F1-hybridization by George Shull following the rise of Mendelian genetics, changing understandings of heredity, evolution and the gene-environment relationship in the 19th and 20th centuries, drove a fixation on purifying the character and habit of crop plants (Berlan, 2001; Bonneuil, 2008; Bonneuil and Thomas, 2010). Before these changes took hold, farmer selection occurred at the population level, allowing plants to retain a degree of natural variability from which farmers selected the “morphotype” best suited to their needs (Aistara, 2011). Now, plants were no longer understood as populations (groups of individuals), constituted by a shifting environment and acted on by a variety of forces: they were seen as individuals, divorced from the “sum total of ancestral influences” with the locus of heredity delimited to the gametes (Bonneuil, 2008: 86).

F1 hybridization ensures that all offspring in the F1 generations are genetically identical (Acquaah, 2012). Genetically identical plants enable standardized production techniques, larger plantings with uniform maturity and mechanized harvests. High levels of nitrogen fertilizer speed up the maturation process and thus time to market. The result is a monoculture with fast, luxuriant growth, attracting insect pests and disease and necessitating the use of pesticides (Delmond, 2006; Scott, 1998). Machines, synthetic fertilizers and pest protection introduced new vectors of capital accumulation on the farm, increasing farmer dependence on inputs manufactured by agribusiness firms. F1 hybridization eliminated the reproducibility of seed, a “biological barrier to its commodification” (Kloppenburg, 2004: 11). The high yield of F1 hybrids plummet in the F2 generation, as heterozygosity is reduced. Genetic predictability breaks down, as the exact mix of alleles in parent lines is scrambled, producing many defective or “off-type” plants. This loss of predictability and yield meant that farmers, who traditionally set aside a portion of the harvest to use for next season’s seed or selected a small group of individual plants to serve as seed bearers to the next generation, could no longer do so: instead, they had to return to the seed company each year to buy new stock. By removing the production of seed from the space of the farm, where ecological interactions and farmer selection processes create a non-uniform input, seed companies instead produced a standard seed for all farms and farmers.
At the same time, the plant “variety” – as a category was imported from the science of botany to agriculture and its definition – was intimately shaped by the rise of pure line and hybrid varieties (Bonneuil and Hochereau, 2008). In France, the variety came to be defined by three key characteristics: uniformity within a given generation, distinctness from other extant varieties and stability, or lack of evolution or change over time. The Catalogue officiel des espèces et variétés (Official Catalogue of Species and Varieties, created in 1932) enshrined these criteria in law: any variety that did not conform to them could not be registered. Allowing plant breeders and seed companies to designate their pure lines as taxonomically distinct from one another was a form of legal commodification that dovetailed the biological commodification of pure line and hybrid breeding. The official definition of professional breeder-created varieties made them distinct from “impure”, genetically heterogenous farmer varieties, which were denied entry into the catalogue and could therefore not be exchanged legally.

In the post-Second World War period, the French state focused on rebuilding the nation’s productive power, beginning with attaining national self-sufficiency in agricultural production (Gevers et al., 2019). The creation of a legal definition for variety and its institutionalization in the Catalogue went along with a process of professionalization and compartmentalization of the seed industry. Breeding firms like Vilmorin developed varieties based on novel combinations of genes, following formal mathematical principles; State entities like GEVES (the French Variety and Seed Study and Control Group) certified the quality of new varieties based on the three criteria of distinct, uniform and stable, and seed multiplication farms generated supply. In this new arrangement, farmers were consumers of industrial inputs (seed and agrochemicals) and producers of raw material, growing massive quantities of uniform grains and vegetables to feed a growing urban working class and export market (Bonneuil and Thomas, 2009; Desclaux et al., 2008). Using the official catalogue of species and varieties, the French state institutionalized a regime of plant legibility by enforcing a legal-botanical definition of a variety: each crop species had an ideal type against which all specimens could be judged, a definition to which state-employed plant breeders conformed (Bonneuil and Thomas, 2009).

The Breton context

Long considered France’s most ‘backward’ region, Brittany was dominated by subsistence-based peasant farming well into the 1960s (Canévet, 1980; Gambino, 2014; Renard, 2005). In the early 1960s, fierce protests by young farmers in Finistère (the region in which I conducted my fieldwork) galvanized the application of the lois d’orientation agricole, a series of laws that brought the post-war productivist paradigm and its machinery, agrochemicals, infrastructure and technocratic perspective to the region (Renard, 2005). These young farmers organized the Société d’intérêt collectif Agricole in St-Pol-de-Leon (now called the Sica de St-Pol), a decentralized cooperative which allowed them to organize the regional market and collectively determine prices. The creation of the Sica St-Pol set in motion the region’s rapid ascent from France’s backwater to one of the country’s top agricultural regions. Recognizing that their bargaining power rested on controlling the entire production of the region, the Sica succeeded in petitioning the state to intervene: in 1967, remaining independent producers were compelled to join the collective market (Laurentin, 2012). In the years following Sica’s ascent to the region’s largest cooperative, they elaborated into different bodies including the Organisation Brettone de Selection (OBS) in 1970, which conducts varietal development, testing and seed multiplication for cooperative members. Later, stations for varietal testing and laboratory-based work for plant
breeding like molecular marking were created. These latter organisations were instrumental in introducing and popularizing hybrid varieties in the area. Industrialized agriculture now had fertile ground in which to take root.

Northern Brittany is thus a fascinating and deeply contradictory region to study human–plant relations and peasantry. Steeped in the farmer-led agricultural reform of the Sica, it is also an example of how those very reforms can later marginalize farmers seeking change in their insular rural communities, now dominated by the influence of the Sica. Over the course of two months, I conducted ethnographic fieldwork in the Finisterre and Morbihan regions, living and working with farmers for periods of 2 to 10 days. I conducted semi-structured interviews and informal conversations with farmers, observed farming and seed selection/saving practices, participated in meetings with wholesalers and tours of the regional organic wholesaler’s warehouse and organic farming research station. The coordinator of the regional peasant seed group, Kaol Kozh, put me in touch with farmers and gave me access to the association’s archival materials. I also visited the BAGAP (Biodiversité, AGroécologie et Aménagement du Paysage) lab at INRA (Institut National de la Recherche Agronomique, now called INRAE, l’institut national de recherche pour l’agriculture, l’alimentation et l’environnement) to interview plant breeders who had worked with Kaol Kozh farmers, as well as the OBS, where I interviewed the director of plant breeding. All the farmers with whom I worked were part of BioBreizh, an organic farmers’ cooperative. Most of these farmers were also members of Kaol Kozh, the regional subgroup of the Réseau Semences Paysannes (RSP), France’s national peasant seed advocacy organization. At the time of my field work, some members of Kaol Kozh had recently come under fire from the RSP for entering a contract with Carrefour, a multinational supermarket chain, to market their produce from peasant seed at higher prices, with an exclusive label that reads “Graines de Paysans” (peasant seed). A controversial ad campaign called “marchés interdits” (forbidden markets), calling attention to how French law prohibits the exchange of peasant seed, accompanied the agreement. The RSP lambasted Kaol Kozh for making this deal, stating that Kaol Kozh undermined collective efforts to protect peasant seed through an RSP-led label, and that the commodification of a political practice and selling to a multinational supermarket were both antithetical to peasant farming.

The case of BioBreizh and Kaol Kozh farmers complicates the typical picture of “peasantry” – they produce for larger wholesale markets and supermarket chains but position themselves against both conventional and “organic-for-the-money” farmers (Sica farmers who had recently transitioned to organic farming, sensing a lucrative market). They exist within a highly capitalized and mechanized region but find ways to carve out spaces for response-able plant–human relations. In turn, they have felt pushed to capitalize on that seed practice in order to compete with the high volumes of their (nominally) organic and conventional neighbors. Their relationship with seed and seed production plays a critical role in this awkward position: neither peasant nor industrial farmer; modern nor traditional, and ostracized by both sides of the divide. My interlocutors were all white, most second- or third-generation farmers and native Bretons, and male. They occupy and leverage positions of racial and geographic privilege with respect to other peasants globally. However, because the EU has exported said system so widely through free trade agreements, their work to raise publicity around peasant seed and advocate for opening up the strict European seed certification and standardization schemes could benefit peasant seed systems worldwide (Wattnem, 2016). Looking at the case of Kaol Kozh farmers builds on the idea that plant–human relationships never exist in a vacuum but are encircled and informed by complex webs of history, capital, local and national politics, identity and science. Plant–human response-ability is not a timeless, pre-modern ideal to which we must revert or return, but a
shifting set of relations that respond to the context in which they are rooted, to ecological and socio-economic change faced by both farmers and crop plants.

**Shaping communicative plants and farmers**

During my summer in Brittany, I visited organic plant breeders who make up the BAGAP (Biodiversité, agroécologie et aménagement du paysage) lab at INRA (Institut Nationale de la Recherche Agronomique), who collaborate with farmers in Kaol Kozh other region seed groups to develop new and revive old vegetable and grain varieties. This is the process of participatory plant breeding, in which varietal development and selection occurs collaboratively, in farmer’s fields, under their cropping conditions and selection criteria. This section focuses on this practice, turning to ethnographic material from my summer in northern Brittany. Challenging the compartmentalization and professionalization of seed production activities, the plant breeders and farmers with whom I worked collaborate to rethink distinctness, uniformity and stability as the defining criteria of a plant variety. Instead, they understand that plants are formed through interaction and defined by their diversity. By refusing the methods and ideologies of industrial plant breeding first laid out in the late 19th and early 20th centuries, these farmers and breeders lay the material foundations for relations of response-ability and freedom between plants and farmers.

**Diversity**

Within peasant seed practice and organic plant breeding, diversity occurs at multiple scales: Although “monocultures usually mean one crop species growing over a large space... monocultures can exist at multiple levels, from the species to the variety to the gene” (Dawson and Goldringer, 2011: 79). Peasant seed varieties are population varieties: populations are simply a group of a plants of a single variety, maintained under the same cropping conditions. In open pollinated varieties, the breeding process is uncontrolled: wind and insects do the work of dispersing pollen, producing plants of mixed parentage with a range of genetic and phenotypic expressions even within a variety.

This “hidden” diversity struck me during the hours spent planting cauliflower on R and M’s farm: hundreds of young plants passed through my hands as we transplanted, most with relatively similar leaf shape and color, growth habit and comportment. Still, I knew each one contained a slightly different mix of genetic and hereditary information – each plant at once an individual and a member of a population, “deep time technologies” (Fulilove, 2016) containing the imprint of the population from which they arose as well as its environmental change over time. This intravarietal heterogeneity is the material basis of farm resilience: in a dry year, some plants will produce better while other will succumb to thirst; under pest pressure, some plants will suffer while others will resist better. Farmer selection also acts on this diversity: farmers usually choose several specimens as porte-graines, let them go to seed, and save that mix of seed for the next generation. Retaining and propagating intravarietal diversity over plant generations reduces farmer’s reliance on seed companies and the inputs necessary to protect genetically homogenous varieties, which are more vulnerable to devastation by pest and disease.

Because of this capacity to support farmer autonomy from agroindustry, intravarietal genetic heterogeneity is deeply politicized in peasant seed practice: it is the locus around which peasant seed producers and plant breeders collaborate and agitate. For the farmers I worked with, the maintenance of agrobiodiversity becomes political through its links to peasant identity and autonomy – the freedom of peasant farmers to select from and manage...
plant diversity, as opposed to the top-down creation and destruction of plant varieties. These farmers said they engaged in seed production in order to distance themselves from large seed companies. They connected the transition from population to hybrid varieties with the shift from *paysan* to *exploitant agricole* – and the way that this shift in vocabulary reflected a shift in relationship between farmer and plant as well as a devaluation of the farmer’s *métis* – emplaced skill and knowledge (Scott, 1998).

Diversity exists at another level: the number of crop varieties under cultivation. The criteria of distinct, uniform and stable that determine entry into the Official catalogue of species and varieties excludes many open-pollinated varieties, which are by nature heterogeneous and evolving. Many plant breeders and scholars blame these standards for the dramatic drop in crop agrobiodiversity and the gradual disappearance of peasant varieties, displaced by uniform hybrids (Bonneuil et al., 2007; Corporate Observatory Europe, 2013; Mammana, 2014; Rossmanith, 2015). Importantly, conformity to DUS standards and registration in the official catalogue also gives plant variety rights to the breeder under UPOV, a form of intellectual property rights that confer exclusive rights to produce, package, market, import and export the variety to the breeder for 25–30 years (GEVES, 2019). Intellectual property regimes, a legal definition for plant variety based on uniformity and an agricultural economy that values yield over anything else are mutually reinforcing, placing the existence of both small-scale farmers and open-pollinated crop plants in a precarious position. This corporate breeding paradigm is represented in Brittany by the *Organisation Brettonne de Sélection*, an arm of the Sica cooperative. During an interview at their research and seed production farm, a representative of the OBS explained their perspective on the plant variety:

> A variety can have a career that is twenty years, or five, six years, because it hasn’t found its market. The variety is correct but nothing more. It’s a factor of competition … if we can’t commercialize it at a sufficient scale. Because even if the variety is created, you have to follow certain regulations for quality: germination, testing for stability. So at the minimum you have to cover your costs. At the moment you can’t cover your costs, it means the producers have found a different, more interesting variety, and the other one is taken off the market.

Rather than seeking to proliferate and nurture as many varieties as possible, allowing them to evolve and change, the life and death of a plant lineage is reduced to a factor of supply and demand. F1 hybrids are created through a combination of desired genes under ideal, laboratory conditions, defined by and maintained in genetic stasis, and readily exterminated when their (economic) value is no longer demonstrable.

Representatives of the seed industry often claim that the system of seed registration has *increased* agrobiodiversity, citing the over 3200 vegetables already registered, with 150 additional varieties added each year (GNIS, 2019; Masbou, 2017). However, the narrow focus on numbers elides the fact that most varieties are protected by plant variety rights, with breeding material overwhelmingly maintained by a few large seed companies. A proliferation of varieties does not mean they are accessible to or reproducible by farmers. Further, varieties whose registration is not renewed each year (with a large fee) are allowed to lapse from the catalogue, and if no one maintains them, they may fall out of use and go extinct. Many of the farmers with whom I worked stress that the definition of plant life is that it is in flux, constituted through its response to the changing environment: varieties must be in continuous cultivation in order to retain this capacity to respond. Based on a different understanding of what defines a crop plant, they reject the obsession with fixing and stabilizing a plant’s identity and the Catalogue system on which it is based.
For peasant farmers, the cultivation of biodiversity is never an individual act: maintaining resilient population varieties requires incorporation of new genetic material from other varieties, produced under different agroecological conditions on other farms. Producing *semences paysannes* thus compels farmers to interact and collaborate, sharing seeds, ideas and practices, building a form of peasant autonomy that is collective rather than individualistic. From the level of the root microbiome to political organization, diversity constitutes these encounters and connects each level in such a way that a singular logic cannot be propagated from the smallest scale to the highest. Relying on place- and farmer-specific adaptation emphasizes the power of encounters in challenging industrial agriculture – interaction between plants, weather, soil microbiota, beneficial insects and pests, climatic shifts. In the case of peasant seed, the human is a central actor in the encounter: plant evolution is channelled and directed in a complex dance among environment, gene, rhizosphere, epigenetic factors, and farmers’ acts of selection on these expressions of gene-environment interaction, based on their ideas of plant health, beauty or economic function.

**Encounter**

Over the roar of the seed-threshing machine, into which we fed cauliflower *porte-graines*, a farmer renowned for his work with *Brassica* varieties explained his view: he said the gene-focused method of plant breeding, which looks to link a desired trait to a gene and introduce only that gene to a new variety, creates a *plante déséquilibrée* – a plant in disequilibrium, which will manifest new weaknesses and susceptibilities to disease because it is treated as isolated parts rather than a whole being. A plant breeder in the BAGAP lab echoed this idea:

> From our research we realize that hereditary information is not genetic information. Genetic information is part of the hereditary patrimony. But there are microorganisms, epigenetic information… New developments in microbiology have demonstrated that there are also microorganisms on the seed, inside of the seed, and they are transmitted to the other generation.

Confounding the logic of gene-focused breeding developed in the early 20th century, the fundamental unit of manipulation in organic breeding is the entire plant, in interaction with its environment – the individual gene makes no sense outside of its interaction with surrounding processes and organisms. It is these interactions that create the more-than-genetic (epigenetic) hereditary information embodied in and on the seed. Plants are formed through their “encounters” (Barua, 2015; Haraway, 2008; Tsing, 2015) with soil microbiota, weather and climate, pollinators and pests, and the farmer themselves. Varieties are not fixed or predetermined, but emerge through relationship, troubling attempts to fix them with a static definition.

Nurturing plant–environment encounter is encoded in the ethics of organic plant breeding. Central to the practice is the integrity of the crop plant at multiple levels: as a living being, as a plant with a typical nature (plant-typic), as a species with its own genetic variation and potential to express characteristics specific to the species (genotypic) and as phenotype, with an appearance in balance with its environment (phenotypic) (Lammerts van Bueren and Struik, 2005). Any intervention into the life of the plant in the form of breeding or propagation must respect these levels of integrity, enhancing rather than limiting the ability of the plant to interact with the environment and adapt. In practice, this means that breeding techniques that violate the cell boundary or manipulate genes of the crop, such as tissue culture, protoplast fusion and genetic modification are prohibited, under
the guidelines set out by European organic plant breeders at the Research Institute for Organic Agriculture (FiBL) in Switzerland. Plants grown for seed are grown in soil, without the use of chemical inputs, and are allowed to complete the natural cycle of reproduction. For organic plant breeders and peasant seed producers, abiding by these “self-imposed, deliberately chosen limits to the freedom of manipulating, overruling, or violating nature and its resources” (Lammerts van Bueren and Struik, 2005: 481) is an ethical obligation that has material consequences for plants themselves. Allowing plants to complete their cycle of germination, growth, maturity and death in soil gives affords them the opportunity to communicate with their environment that conventional plant breeding techniques producing F1 hybrids intentionally subvert in order to create uniform, placeless plants.

Farmers are deeply aware of this exchange between plant and agroecosystem. One farmer explained to me that he saves seed because plants “learn” and “remember” the agroecosystems in which they are grown, adapting over generations to specific soil and climate regimes. When we spoke about a particular carrot variety he had been selecting over many seasons, he said that he looked to wild carrots, which grow prolifically in hedgerows and uncultivated spaces in the region, as models: they adapt in place over many generations, integrating and reflecting changes in climate, pests and land use. With his help as selective agent along with the environment, his cultivated carrots would do the same. In contrast, conventional plant breeding works from the principle of wide adaptation, in which plants are bred, selected and grown for seed under “ideal” conditions on research stations and seed multiplication farms, with high levels of irrigation, fertilizer, and pest protection. Farming environments must then replicate these conditions in order to achieve similar yields (Dawson and Goldringer, 2011). Hybrid seed or seed produced off-farm has no genetic memory of place – it is remade anew each generation, and gene-environment interaction is intentionally minimized (or eliminated, if cell fusion under laboratory conditions is used). In contrast, breeding for low input conditions stresses place-specific adaptation, the interaction of the plant’s genotype with its environment (Ceccarelli, 1989, 2009). Rather than transforming the farm to match the high input, mechanized conditions of the research station, organic plant breeding works from the principle that each farm is ecologically unique, and plants should be able to adapt to these conditions.

When I asked another farmer why she saves and works with her own seed instead of buying from a seed company, she replied:

For me, good seeds are not something tampered with, with genes inserted in their DNA, manipulated artificially, sectioned, I don’t know what. We think that it is a plant that grows from these seeds, but for me it’s like a robot; it’s programmed for such and such thing but it’s completely useless, the roots can’t associate with mycelium. These plants are not adaptive, they are poor.

For this farmer, hybrid and genetically modified seeds are defined by their inability to communicate with their environment and adapt, their mute and robotic nature that precludes any meaningful form of interaction. Adaptation is a form of non-human semiosis, a process of meaning-making produced by dialogue between the environment and a plant’s physical form (Kohn, 2007). Increased drought resistance, for example, is a response to specific climatic and soil conditions – an “embodied sign vehicle” (Kohn, 2007: 6) that serves to capture relevant features of the agroecosystem, which are then passed on and “interpreted” by subsequent plant generations. These embodied signs, plantly interpretations of the environment, can only be passed on if plants are allowed to adapt in place, if some plants are left aside as seed-carriers, retaining genetic impressions of past environments for subsequent generations. Open pollination and on-farm adaptation therefore
afford plants not only the capacity to respond to and elicit response from their farmers, but to engage in call-and-response with the rest of the material world. By and performing selection on farms and refusing breeding techniques that circumvent the natural reproductive cycle of the plant, organic breeders and farmers help create the conditions in which these communicative processes can occur.

This is the material process of shaping communicative plants and farmers: instead of abiding by the criteria of uniformity and purity to make plants interchangeable; interaction is the guiding principle of any breeding activity, making plants irretrievably of a place and a product of relationships. The process of selection in the field is the medium through which interspecies response-ability unfolds.

**Response-ability and freedom**

In defining response-ability, Haraway’s central concern is how shared labor in laboratory settings can be freer and less deadly for both human and non-human animals (Haraway, 2008: 77). Humans must learn to see a lab animal as an individual rather than an allegory or stand-in for all others of their kind, understanding their actions as “responses” instead of pre-programmed “reactions”. Invitations to engage can be given in the form of movement, vocalization, or bodily function on the part of the lab animal. Learning to respond to these invitations is to “to hold in regard . . . to look back reciprocally, to notice, to pay attention” (Haraway, 2008: 19) with an open-ended sense of curiosity. But what entails a response from a cultivated crop plant? In conventional, anthropocentric narratives, domesticated plants are embodiments of human control and domination: bred and selected over millennia for specific traits, they often bear little resemblance to their wild relatives and could not survive without the interference of human cultivators, in the form of tilling fields, controlling weeds and pests with chemicals, hand pollinating or isolating varieties to keep them pure for subsequent generations of seed. However, alternative perspectives frame domestication as a result of symbioses between plant and human (Rindos et al., 1980), a complex negotiation of our (human) and their (plant) desires, locating a space and practice in which they overlap and coalesce (Pollan, 2002), or the result of the co-construction of niches amenable to both humans and their plant allies (Zeder, 2015). Understanding the relationship between open pollination, plant integrity in breeding practice, response-ability and freedom deepens this nuanced definition of domestication and plant cultivation.

Farmers cultivating semences paysannes encounter and come to understand plant response by learning the habits of particular varieties for which they have an affinity. When I asked R to explain why he works with Brassicas (a notoriously difficult and unruly plant family to breed and save seed from) and how one learns to shape and select varieties, he could not articulate his reasons or process. This incredibly intelligent and erudite person was at a loss for words, simply explaining that one develops “the eye” for the plant; an instinctive feeling for its way of being, growing and changing, a responsive affinity for the plant, borne out of many years of interspecies communication. This affinity reaches beyond cultivated varieties: I spoke to R about his work in developing Brassica varieties without the use of cytoplasmic male sterility⁶ (CMS) and the reasons for his opposition to the practice. He mentioned how CMS genes can readily transfer to the wild cabbages, progenitors of all of our cultivated *Brassicaceae* that grow along every roadside in Brittany. He explained how the transmission of this gene for sterility could compromise the ability of wild relatives to grow and reproduce, and what a sadness it would be to control and dominate the reproduction of a plant that we do not even need to cultivate. Through developing response-able relations with his cultivated Brassicas, this farmer developed a
caring eye for their wild and weedy relatives, a recognition of the landscape in which farms are embedded. This reflects the larger understanding within organic and participatory plant breeding that cultivating resilient and adaptable varieties involves the entire agroecosystem – soil and the microbiota within it, insect pollinators and pests, plant diseases, weather and climate. The cultivation of the capacity to respond is multi-directional, involving farmer and crop plant but also the ecological specificities of each farm and its surroundings.

Linking Darwin, Bergson and Deleuze, Elizabeth Grosz posits a more expansive understanding of the humanities, which draws other-than-humans into the fold of agential, creative and communicative beings. Grosz highlights that, for Bergson, it is the potential for difference and evolutionary change that defines life itself: life is the bringing of “new conditions to the material world”, the “elaboration and expansion of matter” which enables matter to “remember” previous conditions by carrying within it previous evolutionary histories and the imprint of the material conditions that made them possible (Grosz, 2011: 31). Freedom, then, is not a “quality or property of the human subject” but a process which characterizes certain acts (Grosz, 2011: 67). Freedom is the “capacity to act . . . structured by the ability to harness and utilize matter for one’s own purposes and interests” (Grosz, 2011: 66). Importantly, free acts are undertaken not as individual beings, but are “immanent in the relations that the living has with the material world, including other forms of life” (Grosz, 2011: 68). Freedom is thus a relational achievement; for plants and their peasants, one that is attained through response-able relationships.

Through interaction and communication with their human cultivators, open-pollinated crop varieties are indeed afforded a plantly type of freedom – the capacity to adapt and change, to utilize the material world for their ongoing evolution. By adapting over many plant and human generations, in the fields where they are cultivated rather than on isolated research stations or multiplication fields.

Often these inventive practices take the form of surprising or unexpected variations in crop phenotype in the field. One evening, I was inside, working on notes, when the farmer with whom I was staying burst in grinning, telling me he had made “une belle découverte” (a beautiful discovery) while harvesting. He presented a perfectly bicolored tomato, one half deep purple-red, the other bright yellow-green – the entire thing soft and ripe. The fruit had come from a variety represented by a single plant, whose name the farmer had lost. In the next few days, he showed everyone who came by the farm the magic tomato, promising to save seed and watch the plant to see if later fruits showed the same curious beauty.
earth, reaching up for the next, over and over. Suddenly, the tractor lurched to a halt and the farmer driving jumped out, half-running toward the squash field next to the one we were planting. I looked up as he beckoned me over, pointing to a round yellow squash which stood out from the field full of dark green ones. He immediately began pulling off male flowers, explaining that he did not want this rogue yellow plant to cross-pollinate the green ones. I joined him in emasculating the yellow squash, and we buried the male flowers in the dirt. He handed me his pocketknife and had me carve my name into a sizable yellow fruit, telling me he would send me seeds if it turned out that they bred true (the offspring turned out yellow as well).

I was startled by the decisiveness of the action, abruptly ending this plant’s ability to pollinate and propagate itself. I thought that the farmer did it to keep the purity of his green squash, but I realized that by emasculating this _individual_ squash plant, ensuring it did not cross pollinate, he was ensuring its potential to propagate later generations of yellow squash: he was caring for a potential variety by recognizing that its uniqueness was compromised by its sibling (green-fruited) plants. In this careful maintenance of the reproductive boundaries between individual plants, this farmer was maintaining and generating greater plant diversity, nurturing his plants’ creative acts. This push and pull between care and violence for plant life highlights the “ambivalent moral valence of interspecies co-becomings” like the domestication/cultivation relationship (Chao, 2018: 425). Still, through noticing what their plants did, their acts of creativity and liveliness, these farmers were “respond[ing] to an invitation or recogniz[ing] one when it is offered” (Haraway, 2008: 22), involving themselves in the evolution and reproduction of their crop plants (Hustak and Myers, 2013) in a way that does not avoid or deny the instrumentality of their relationship. Farmer-crop variety relationships like these show that “to be in a relation of use to each other is not the definition of unfreedom and violation” but can provide new ways of working (together) for both plants and farmers (Haraway, 2008: 74).

These surprising and novel individual plants are relatively rare instances of “entanglement and generative interruption” (Haraway, 2008: 20) which push the farmer to remain curious, observant and responsive to their plants. The cultivation of diverse populations also entails a more subtle form of response-ability and maintenance. Where Haraway emphasizes seeing lab animals as individuals, organic plant breeding and peasant seed practice stress the importance of the _population_ as a lively, generative entity; a group of plants viewed in aggregate and in a constant state of adaptive change, in response to farmer selective practices and environmental changes. Rejecting the static and strict definition of the “distinct, uniform and stable” variety encoded in French law, the farmers and plant breeders with whom I worked maintain that the very definition of life is that it is in flux and interaction – an idea which Grosz and Bergson echo.

Tending to population varieties involves maintaining a level of diversity which affords the plant the capacity to evolve, but also stays within limits. I spoke with one farmer who works with different crop plants in the _Brassicaceae_ family: cauliflower, broccoli and cabbage. Allogamous Brassica crops will freely cross-pollinate with one another within a distance of up to 3 km. This farmer stated that outcrossing, from the perspective of the plant, is a beneficial adaptation: it ensures greater heterozygosity and genetic mixture in each generation. For the farmer and seed saver, however, this is a formidable obstacle: a domesticated broccoli and wild and weedy cabbage growing on a roadside may cross-pollinate, producing an offspring that resembles neither. When I questioned him on the difficulties of working with such unruly (from an agricultural perspective) plants, this farmer stated that maintaining a consistent and relatively stable variety of, say, purple broccoli, requires constant vigilance and season after season of highly discriminating selection. Growing out seed for
this variety involved isolating selected plants under insect netting, releasing flies for pollination, watching these *porte-graines* through their senescence to monitor for disease, hanging and drying the seed-bearing plants, then finally sending the *porte-graines* through a *battage* (seed processing) machine in order to separate the miniscule seed from other plant material – all for a handful of seed.

Another farmer who worked with old, regional varieties of Brassica told me a story that perfectly encompassed the unruliness of this plant family. Unbeknownst to him, his neighbor was growing forage cabbage for meat rabbits just next door to his cabbage seed crop, hidden by a tall hedge. Both crops came into flower at the same time and cross-pollinated, ruining the seed crop of this farmer’s head cabbage. Laughing, he told me this taught him to always have a backup of seed stock, but I was fascinated by this small expression of freedom from a domesticated plant, searching for non-anthropomorphizing vocabulary that captured this plantly form of subversion. Open-pollinated plants in interaction with their environments exist and grow within a “fringe of freedom, a zone of interdetermination” (Grosz, 2011: 69), which is highly circumscribed by human involvement, but significant nonetheless. Haraway calls this a “mundane” form of freedom for lab animals, which encompasses the ability not to cooperate with experiments (Haraway, 2008: 71).

In this case, the plant’s “freedom”, their inherent tendency to mix and cross, is delimited by the farmer so that he may shape a variety that is uniform enough to sell and maintain his livelihood. This vigilance on the part of farmers could be viewed as a form of human dominance over plants, evidence of their passive, domesticated nature. However, in working with this farmer, I saw that his relationship with *Brassicaceae* encompassed a distinct form of care born of deep and intimate knowledge of the plant family, cultivated over decades of laboring with these plants. The effort devoted to keeping plants domesticated and uniform enough blurs the border between typical conceptions of care and control.

While all farming is necessarily a risky undertaking, part of the point of breeding highly uniform and stable plants was to eliminate the uncertainty of letting natural processes unfold on their own terms (Kloppenburg, 2004; Mann and Dickinson, 1978). Decreasing uncertainty and increasing control meant delimiting farmer and plant work to one thing only: producing higher volumes to increase profits for wholesalers and supermarkets while pushing down costs for the consumer. Cultivating *semences paysannes*, which are by nature less uniform and less predictable, involves accepting a degree of this uncertainty and risk in farming practices, making hyper-efficiency and streamlining less attainable. The inconveniences and uncertainties introduced by the integration of seed production onto the farm seem minor, but as they began to accumulate in my conversations with farmers, I began to see how the intentional cultivation of these “small biological determinisms” (Fleming, 2017: 26) has the potential to alter farming practice. It pushes farmers to reckon with the liveliness and vitality (Bennett, 2010) of plants, qualities that work against their subsumption into factory-like methods of cultivation. These uncertainties are a type of plant creativity that is nurtured rather than suppressed (within limits) in the creation and use of peasant seed. These farmers challenge the view of plants as mute, passive and malleable, reducible to their genes, something to be grown in the most standard method in order to increase turnover and profit. Plants grow in a measured, healthy manner adapt to changing environments through encounters with other elements of the farm ecosystems, giving space for self-expression based on genetic heterogeneity, the hallmark of a population variety.

In these relationships farmers and plants cultivate response-ability, building an autonomy from agro-capital that is not synonymous with individualism, but is rooted in dependence on both their plants and their fellow peasant seed producers. This kind of autonomy is economically risky, laborious and complex, but farmers take on these added response-
abilities through an active choice and a sense of political urgency, rather than a compulsion
to engage in productivist practices.

**Interspecies resistance**

In their work in the agricultural landscapes of Argentina, Beilin and Suryanarayanan draw
attention to the “interspecies resistance” formed between RoundUp-tolerant amaranth and
communities opposing toxic RoundUp Ready soy monoculture (Beilin and Suryanarayanan,
2017). Plants are “active contributors to practices of domination and resistance . . . teaming up
with humans in networks of support but also in antagonistic confrontations” (Beilin and
Suryanarayanan, 2017: 208). In a vastly different socio-ecological context, peasant seed in
Brittany is another instance of interspecies political alliance. More than just a symbol of
farmer resistance to industrial monoculture, corporate control, and the devaluation of the
*paysan.ne* lifestyle; peasant seed and the plants grown from it are biologically subversive of
factory farming, through their heterogeneity and diversity. By engaging in iterative response
over many growing seasons, peasant seed and farmers become resistant to productivist para-
digms through their relationship with each other. As hybrid seed built the foundation for
factory farming, so can peasant seed act as the material foundation for small-scale, agroeco-
logical peasant farming and food system.

Plants are worthy allies in resistance in more ways than one. They force us to rethink
some of the fundamental tools we use to understand political subjectivity: power, agency,
action, the individual, even the time scales over which change can occur. “Agrarian worlds”
are “formative meeting places” (Galvin, 2018) where categories like nature and culture,
domesticated and wild, are unraveled and remade by human and non-human alike through
the everyday work of cultivation, of caring for and killing, of reproducing and decomposing
again. In questioning the criteria of distinct, uniform and stable, and therefore the notion of
“variety” itself, these farmers and plant breeders implicitly critique the “speciated reason”
(Barua, 2015) of Western taxonomies, which order and rank plants and animals as well as
different human bodies in a hierarchy of worth and value (Ritvo, 1997).

Peasant farmers in Brittany do not exist outside this hierarchized system. Worldwide,
most seed-saving and subsistence-based, peasant agriculture is performed by women (AFSA
and GRAIN, 2018; Doss et al., 2011; Verschuur, 2017). Feminist perspectives on care work
highlight how the unremunerated reproductive labor (like seed production) of women sus-
tains the production of value in capitalist economies (Benéria, 1979; Federici, 2016; Vogel,
1983). In the developing world, most seed is still sourced through “informal” networks, but
the very same system of strict seed certification and intellectual property rights over seed
enforced in Europe and the USA is increasingly threatening local seed economies, partic-
ularly through trade deals which mandate agreement to UPOV 91 (the Convention of the
International Union for the Protection of New Plant Varieties, which codifies a system of
IPR called plant breeder’s rights) (La Via Campesina and GRAIN, 2015; Wattnem, 2016).
The peasant farmers with whom I worked, who have succeeded in capturing recognition and
economic returns for their work in caring for seed, are almost all male, white, from the
global North and not engaged in subsistence-level production. This dynamic points to
the persistence of the gendered and racialized division of power and labor, even within
the global movement for peasant seed and agriculture, and the role of seed and supermarket
capital in sustaining those divisions.

It matters how the story of cultivation and agriculture is told. Domestication of plants is
often framed as the first step in a linear trajectory toward “civilization” in which humans
attain mastery and control over the natural world. This progress narrative is a cornerstone
of the Western origin story: domestication and settled agriculture produce surpluses, which enable the division of labor along lines of gender and race; social stratification, wealth accumulation and private property result, and the modern state as protector of property comes into being (Swanson et al., 2018). The dark unraveling of this progress narrative has become all too omnipresent. As what we call “nature” becomes ever more unpredictable and frightening – pandemics, droughts and heat waves, superweeds, gene drives and CRISPR Cas9 – it is essential to find ways of living well on this damaged planet. With domesticated plant companions, there is no pure, untouched nature to return to: we have always been living and dying together; we brought each other into being.

Seen through the prism of *semences paysannes*, domestication is instead an ongoing interspecific negotiation, a call-and-response that encompasses soils, fungi, bacteria, climate, bees and flies, wind and pollen, stretched out over seasons and generations of both plant and human life. *Semences paysannes* presents an alternative story, one about how to live with plants and cultivate one another in ways that destabilize human control, ways that give both plants and farmers margins of freedom in relationship to each other. This is a freedom that recognizes mutual dependences and non-innocent relations of instrumentality while pushing us to acknowledge the quiet force and power that plants possess.

**Highlights**

This paper examines:

- The historical co-constitution of plant breeding, industrial capitalism and agricultural modernization in 19th and 20th century France.
- A group of farmers and plant breeders in northern Brittany collaborating to rethink industrial plant breeding’s focus on varietal purity and uniformity.
- The cultivation of open-pollinated seed crops as a practice of plant–human communication and care.
- The potential of this practice as a mode of interspecies resistance to industrial monoculture and agribusiness seed monopolies.

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Notes

1. For a concise overview of the shifting legal status of *seemens paysannes*, see the *Kit Reglementaire 2020* published by the Reseau Semences Paysannes (https://www.semencespaysannes.org/images/documents/semons-nos-droits/KIT-COMPLET-SEMECES-PAYSANNES_WEB_2020.pdf)

2. BioBreizh is an organic cooperative with about 60 members, created in the early 2000s, following a lawsuit in which the farmers who went on to found BioBreizh contested the obligation to pay dues to the Sica even though they were not members, citing differences in farming philosophy and market. They won the lawsuit and the right to create their own cooperative.

3. Participatory plant breeding aims to combat the profit-driven and centralized organization of corporate-led plant breeding, citing that involving farmers has greater potential to conserve agrobiodiversity and create varieties of use to growers in marginal or resource-stressed environments (Chiffoleau and Desclaux, 2011; Dawson et al., 2008; Pimbert, 2011; Vernoy et al., 2009). Numerous scholars in the development studies have criticized the notion of “participation”, pointing to the persistence of power dynamics between participants and administering organizations and the lack of evidence supporting empowerment or democratic decision-making (Cleaver, 1999). In the case of plant breeding, participation generally refers to the stage of the breeding cycle in which farmers become involved: initiating the project, setting breeding or selection goals, hosting trials in their fields, making crosses or assessing variation in a population, performing selection, characterizing varieties, and interacting with systems of distribution/marketing/registration, as well as what roles farmers play in all of these stages (Sperling et al., 2001). While PPB has been shown to have greater success than top-down approaches in developing cultivars that perform well in low-input conditions (Atlin et al., 2001); the degree of “empowerment” or changes in the entrenched decision-making structure of corporate-led breeding projects is more difficult to assess (Sperling et al., 2001), suggesting that participation is just as fraught a concept in plant breeding as in other areas.

4. *Porte-graine*: (literally, seed-carry) a plant that is not harvested for its fruit or leaf and is instead left to flower at the end of the season (or the fruit is left to get large and produce mature seed), producing seed for the next year. *Porte graine* are treated differently depending on autogamy vs. allogamy (isolation or not), if intentional crosses are made or if plant is left to open pollinate. I use the French term for ease and clarity because there is no single word in English.

5. Cytoplasmic male sterility is a form of pollination control used to develop F1 hybrids for most cultivated *Brassicaceae* in which the function of the male sex organs (stamen) is genetically altered, resulting in sterile or absent pollen. This makes removal of pollen or stamens unnecessary in the production of inbred parent lines in hybrid seed production, thus greatly reducing cost. Cytosterility is determined by the interaction between male sterile genes and factors in the cytoplasm of the female sex cells, and the inheritance of sterility is determined by the female parent. The production of F1 hybrid seed is the result of interplanting a sterile version of one variety with a fertile version – the former will be pollinated by the latter, and the resulting seeds are the F1 hybrid, which will be planted as a commercial crop. Because the introduction of cytoplasmic male sterility often involves protoplast fusion and/or an interspecies cross (between the Ogura radish and the desired Brassica variety), the technique was banned from organic plant breeding based on its violation of species integrity and the cell boundary (Billmann et al., 2008; FiBL, 2015; Nuijten et al., 2017).

6. Although CMS by definition means that pollen from male sterile cannot fertilize other plants, R’s sentiment and concern for wild Brassica relatives remains telling and important, as well as reflective of many farmers’ (logical) concerns of genetic drift from GMO crops into both domesticated and wild plants.
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