



The War between Amaranth and Soy

Interspecies Resistance to Transgenic Soy Agriculture in Argentina

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Abstract Based on multidisciplinary archives as well as fieldwork and interviews, this article focuses on the intertwined nature of movements of resistance by humans and plants struggling against genetically engineered soy monocultures in Argentina, which we provocatively conceptualize as interspecies resistance. Roundup Ready (RR) soy is genetically engineered to be resistant to the herbicide Roundup, which is intended to eliminate all unwanted plants except for the main crop. In response to the repeated applications of Roundup, however, weeds, of which the most aggressive have been varieties of amaranth, mutated and evolved resistance to the herbicide. We explore how, due to this “biological” resistance of so-called super weeds, human anti-RR-soy activism has picked up, and how both kinds of resistance are interconnected. In exploring human entanglements with RR-soy and super weeds (in particular, amaranth that also has edible varieties), we follow Anna Tsing in asking how different plants mediate particular social arrangements. Moved by on-the-ground realities and inspired by Donna Haraway’s provocation that “knowledge is always better from below,” we contrast the discourses of agribusiness, mediated by satellite technology from above, with views from below, where other senses join sight, focusing on the struggle for survival of fumigated humans and weeds. In our story, while RR-soy has become a “bright object” of Argentinean agriculture, drawing to its orbit multiple human and nonhuman entities in aggressive pursuit of profits, close to the ground, weeds and the poisoned people rise up as “rogue objects” subverting “the gravitational force” of soy.

Keywords Interspecies resistance, Roundup Ready soy, agriculture in Argentina, glyphosate, bioeconomy, super weeds

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The old question about the “meaning of life” should as a result give way to questions about the meanings of lives (both human and non-human) that arise, practically and concretely, from the heterogeneous vivacious activities of every single creature, including a plant.

—Michael Marder, *Plant-Thinking: A Philosophy of Vegetal Life*

While the publicity of genetically engineered (GE) organisms contains a promise of human emancipation, a solution to world hunger, and a guarantee of sustainable environmental management, and while various governments have embraced these hopeful imaginaries, resistance to the appropriation of lands and bodies by GE plants has been steadily growing. Argentina is the world’s third largest producer and exporter of GE soy after the United States and Brazil, but it has grown GE Roundup Ready (RR)-soy the longest in South America. RR-soy has mediated the transformation of Argentina’s landscapes and its cultures, restructured its economy, and divided Argentinean people, prompting two new subcultures—the culture of soy and the culture of resistance to soy. It has also prompted genetic and epigenetic mutations in insects, fungi, and weeds, transforming them into so-called super insects, super fungi, and super weeds.¹ In many ways, these nonhuman mutants that were previously nonprevalent or nonexistent, have become allies of humans resisting the RR-soy bioeconomy.²

The collective resistance of people and the biological resistance of plants to GE crops in Latin America have been discussed in separate realms by scholars in science and technology studies (STS) and in the social and biological sciences.³ However, no study focuses on the intertwined nature of these movements of resistance that we conceptualize as *interspecies resistance*. RR-soy is genetically engineered to be resistant to the herbicide Roundup (active ingredient: glyphosate) to eliminate all unwanted plants except for the main crop. In response to the repeated applications of Roundup, however, weeds, of which one of the most aggressive has been Palmer amaranth (*Amaranthus palmeri*), mutated and evolved resistance to the herbicide, undermining RR-soy plantations

1. Genetic mutations are changes to the sequences of DNA found within the cells of organisms. Epigenetic mutations are modifications to the molecular apparatus that packages DNA within cells, affecting the capacity of DNA to respond to environmental and developmental cues in its milieu (Jablonka and Lamb, *Evolution in Four Dimensions*).

2. The bioeconomy is a relatively new economic and political space that has emerged on the heels of neoliberalization at a global scale. It signifies a broad shift from an economy based on the efficient exploitation of natural and biological resources to one in which the generation of markets is much more tightly integrated with the biotechnological capacity to manipulate the vital properties of living processes (Rose, *Politics of Life Itself*; Moore et al., “Science and Neoliberal Globalization”; Goven and Pavone, “Bioeconomy as Political Project”).

3. Hetherington, “Beans before the Law”; Kinchy, *Seeds, Science, and Struggle*; Lapegna, “Global Ethnography and Genetically Modified Crops in Argentina”; Domínguez and Sabbatino, “Muerte que viene en el viento”; Otero, *Food for the Few*; Heineke, *Vida en venta*; Palau, “Centralidad de la lucha por la tierra”; Tiesca, Papa, and Morichetti, “*Amaranthus palmeri*, una maleza arribada a nuestro país desde el Hemisferio Norte”; Fitting, *Struggle for Maize*.

in the process.⁴ Super weeds have learned how to use technologies for their own purposes as they spread through plantations by attaching their seeds to agricultural equipment and machinery.⁵ Subsequently, however, it has been in part due to the “biological” resistance of weeds that human anti-RR-soy activism picked up.

When resistant super weeds emerged as major obstacles to the expansion of transgenic soy, growers responded by intensifying fumigations with glyphosate-based herbicides and brought back some of the strongest and most toxic herbicides, such as Paraquat and 2,4-dichlorophenoxyacetic acid (2,4-D), not to abandon besieged transgenic plantations.⁶ This in turn exacerbated health problems in proximate human communities, for example, bringing cancer rates and birth malformations to unheard-of levels in the affected areas, which prompted the development of citizens’ movements of resistance to agribiotechnology.⁷ Resisting people and resistant weeds acquired similarity as obstacles to the development of an RR-soy economy, for example, when they were fumigated together from above by planes, and the RR-soy economy was redefined by this double resistance. When Syngenta publicized of RR-soy where areas of Argentina, Uruguay, Paraguay, Bolivia, and Brazil were marked as a “United Republic of Soy,” openly displaying the neocolonial discourses of the multinationals, activists reacted by choosing amaranth as a symbolic hero and an ally in their decolonizing campaign, voicing a “revenge of the Amaranth,”⁸ but also urging people to throw mud balls filled with amaranth seeds into RR-soy plantations.

As we explore human entanglements with both RR-soy and the resistant super weeds, focusing in particular on amaranth, we invert the habitual way of looking at the social dynamics of techno-scientific change. Instead of asking how people manage plants, following Anna Tsing, we explore how different plants mediate particular technologies and social arrangements.⁹ We discover that the struggles surrounding GE crops can be seen as an exemplar of synergies between culture, politics, live tissues, and science, where *mutagenesis* affects cells, bodies, ecologies, and social structures. We build on the conviction that the separation between realms of science and politics, culture and nature, are artificial because these categories are deeply interrelated. Although, as Bruno Latour has shown, this separation has led to the spectacular power of our “modern” civilization, it has also been harmful because it has contributed to the

4. Another super weed taking over RR-soy plantations is *Sorghum halepense*; Pengue, Monterosso, and Binimelis, *Bioinvasiones y Bioeconomía*. See also Gaines et al., “Gene Amplification Confers Glyphosate Resistance in *Amaranthus palmeri*.”

5. We are using “learning” in the sense of findings in epigenetics that acquired behavior can be passed to new generations (Jablonka and Lamb, *Evolution in Four Dimensions*).

6. Meyer and Cederberg, *Pesticide Use and Glyphosate Resistant Weeds*.

7. Ávila Vázquez, “Agricultura tóxica y pueblos fumigados en Argentina”; Ávila Vázquez, *Evaluación de la salud colectiva socio-ambiental de Monte Maíz*; Chaco Government Report, *Comisión provincial de investigación de contaminantes del agua*.

8. Serruya, *Venganza del amaranto*.

9. Tsing, *Mushroom at the End of the World*.

exploitations that are bringing about the current crisis of life on Earth.¹⁰ This twofold influence of the separation between human and nonhuman actors becomes striking as we consider how the view from above—a satellite-technology-mediated design of RR-soy plantation—substitutes for and makes invisible what can be seen, heard, tasted, touched, and smelled close to the ground, where suffering and destruction accumulate. We move away from the vision of objectivity as a middle ground and adopt Donna Haraway’s provocative idea that “knowledge is always better from below.”¹¹

For our work, searching for “knowledge from below” meant touching down and getting physically close to the RR-soy crops, the mutant amaranth, and sitting face-to-face with those who live surrounded by this bioeconomy where “plant factories”¹² meet resistant “third nature,” that is, all that manages to live despite the killing effects of human industries.¹³ While listening to the stories of affected communities in San Jorge and María Juana and while walking through the surrounding fields, we learned how to recognize the smell of glyphosate. In the Malvinas Argentinas blockade camp of Monsanto’s GE seed factory outside of the city of Córdoba, we appreciated an acidic earthly smell of human bodies resisting for more than two years the world’s largest multinational agribusiness firm. The young people that we met there lived without electricity, running water, and a reliable roof over their heads. Outside of their tents they wore Zapatista facial coverings, yet inside we did see their faces, which got stuck into our field notes and undermined our conceptual maps. They were tired and dirty, and some coughed badly. The exchange of looks with them pricked us. Even though they would never allow us to take their pictures, they were happy we had come to talk with them. Their gazes, with the aura of the protagonists of Ken Loach’s *Land and Freedom* (1995), filled us with an anxiety with which we now write.

In Catán, a visibly poor satellite town of Buenos Aires, the Socio-environmental Meeting of Buenos Aires (ESABA) introduced us to the tenuous balance between trust and suspicion with which various activists observed us. We were asked who invited us and who knew who we really are. As we talked, though, we slowly gained their trust. We learned that their movement has been infiltrated at various times. We also understood that some activists doubt the value of the academic work that, as they claim, can do more harm than good if the research revealing activists’ stories and strategies of resistance are published. These exchanges alerted us to write so that our texts cannot be turned into manuals on how to overcome resistance. We only mention well-known facts and name people who regularly appear in the media, where they take on the performative roles of environmental activists. Our goal is to provoke new patterns of seeing

10. Latour, *We Have Never Been Modern*.

11. Haraway, *Simians, Cyborgs, and Women*, 161.

12. Grobocopatel, “Futuro y tecnología del campo.”

13. Tsing, *Mushroom at the End of the World*.

rather than to carry out a detailed study of resistance strategies.¹⁴ Starting from the premise that academics could contribute to a better world if they did not talk only to themselves in closed circles, we address this article to an interdisciplinary community that is willing to consider the urgency of “the knowledge from below” as well as to all those nonacademics who want to know. With this mixed audience in mind, we provocatively mix knowledges, low and high, academic and popular, scientific and indigenious, and we apply them in search of understanding.

As a result of the real-worldliness of what we research and of the transdisciplinary character of our project, our respective disciplinary frameworks transform. In creating a transdisciplinary comparative archive that connects anthropology, Hispanism, environmental studies, STS, and our ethnographic work, we want to bring humanities scholarship literally to the ground level of soil. In our project, humanities’ view of culture as a human phenomenon opens up to include plants as active contributors to practices of domination and resistance, and as teaming up with humans in networks of support but also in antagonistic confrontations. In order to understand “how things work,” along with the analysis of things as human objects and signifiers, we devote more attention to the dynamics of things themselves, in our case, live things that produce oxygen and food but that are also able to develop and subvert economies and take over disputed lands as if fighting a war.

In environmental humanities research, as well as in various local conceptions of nature, humans and nonhumans form alliances and build or defend their worlds together.¹⁵ According to Michael Marder, plants do not remember things as they appear in light as humans do, but rather they encode on a cellular and molecular level the patterns of light itself as it changes through time.¹⁶ Marder’s description of plant life as a nonorganismal and nonconscious intentionality that fuses with the milieu, invites us to imagine human-plant cultural hybrids as driven by multiple, intertwined agencies; vegetal nonconscious quasi agency that guarantees the reproduction of remembered planetary patterns and human, mostly conscious agency that is self-centered and adaptive. We employ Levi Bryant’s concept of “gravitation” to appreciate differing roles of objects in the networks constituted by human and nonhuman agents.¹⁷ We focus in particular on what Bryant calls “bright objects” and “rogue objects.”¹⁸ Bright objects are equipped with a particularly strong gravitational force, so they make other objects circle around them as RR-soy does in our story. Rogue objects have surprising trajectories as they appear and disappear in unforeseeable ways, but they are able to subvert the gravitational field of bright objects at times as mutant weeds and peoples’ collectives subvert RR-soy monocultures.

14. For a detailed study of resistance strategies, Lapegna, “Global Ethnography and Genetically Modified Crops in Argentina.”

15. Tsing, “Unruly Edges”; De la Cadena, “Indigenous Cosmopolitics in the Andes”; Marder, “Resist Like a Plant!”

16. Marder, *Plant-Thinking*.

17. Bryant, “Onticology.”

18. Bryant, “Rogue Objects.”

Soy as a *Bright Object*: From Above

By subtitled his book *The Soy Children*, Eduardo Molinari metaphorically conceptualizes RR-soy as a (step)mother of today's transgenic culture not only because RR-soy poisons all exposed bodies—glyphosate has been detected in the blood of rural and city dwellers¹⁹—but also because it is controlling and manipulative.²⁰ The writer seems to grant RR-soy the gravitational force of Bryant's *bright object*, one that heavily impacts all other proximate objects, which turn into its satellites. Even if RR-soy was initially equipped with the gravity that it has today by particular human communities that planted it on Argentinean fields, it has then become “hegemonizing,”²¹ as it pulls other objects—agricultural machines, agrochemicals, bulldozers, biofuel markets, animal-meat production facilities (mainly in China), banks, universities, governments, corporations, and environmental and civil society groups—into its orbit.

We are watching an Argentinean TED Talk, featuring Gustavo Grobocopatel, called “the king of soy,” who talks with excitement about the times when it has become possible “to design plants as we design cars” and to make these plants produce inside of their bodies what used to be done in factories, with solar energy transforming carbon dioxide into oxygen instead of contaminating the environment with it.²² The RR-soy plants that are now covering close to 50 percent of all cultivable land in Argentina are a perfect example. In Grobocopatel's view, with the bioeconomic revolution that is occurring in the fields (after people and other nonhuman obstacles are removed), Argentina is now becoming the England of the eighteenth century. The video accompanying Grobocopatel's talk shows the blue planet from cosmic outer space and then quickly zooms in to focus on an RR-soy field, where an agronomist leans over an iPad mapping the area. The image moves in again and the iPad view, framed and signed “Grobo Integration Technology,” merges with that of the real field. As the technology-mediated view repeatedly substitutes for reality, it produces purposeful confusion between the two, while Grobocopatel resorts to militaristic metaphors announcing that the “management of photosynthesis” is the “greatest weapon of the twenty-first century.” The confusion is instrumental in focusing the viewers' attention away from the real-life scenario (the point of view of a person living by the fumigated fields is missing) in the

19. “Hallan glifosato en muestras de sangre y agua en pergamino.”

20. Molinari, *Walking Archives*.

21. Bryant, “Onticology.”

22. Grobocopatel, “Futuro y tecnología del campo.” Gustavo Grobocopatel is a success story of Argentinean RR-soy farming. A landowner whose farms once extended through 120,000 hectares in Argentina, Uruguay, and Brazil, introduced no-till farming in 1994 and embraced GE seeds a few years later. He founded an agro-industrial business venture, Grobo Group that has introduced GroboSoft, a software that lets farmers input their GPS coordinates and recommends what seeds and chemicals they should use. Los Grobo established a collaboration with a satellite company whose technology provides a bird's-eye view to help achieve more precision (Hazlehurst, “Profile: Gustavo Grobocopatel, the Philosopher Farmer”). In 2015 Los Grobo had a turnover of \$700 million per year, employed nine hundred people, and had plans to grow a lot more (“Gustavo Grobocopatel: El periodismo militante es peor que el terrorismo del estado”).

hypnotizing movements of multiple screens. The view oscillates between two Kantian infinities: showing Earth from the satellite's point of view and details of the RR-soy resistant tissue under the microscope, toughened by genetic engineering into a "soldier" plant.

Originally, soy was tolerant and not an aggressive plant. It adapted well to hardened conditions but was easily overpowered by weeds. For that reason, soy was equipped with resistance to the herbicide Roundup that kills all plant life around RR-soy and that has become its inseparable companion, indeed its bodyguard, transforming soy's nature into a deadly one. To make the partnership between soy and glyphosate possible, three multinational companies agreed on a collaboration. Monsanto oversaw the research; Asgrow (later purchased by Monsanto) supplied the "gene gun" for delivering the herbicide resistant gene into targeted cells of the soy germplasm; and Pioneer (later acquired by DuPont), which in the 1990s controlled the soybean market, paid for the right to use Monsanto's resistant gene forever.²³ Not in vain, the main tool for gene insertion has been called "a gun" since it could be said that soy has been gunned down into RR-soy hybrid, having had bombarded into it, together with the gene from the bacteria *Agrobacterium tumefaciens*, human greed, acceleration, and the desire for conquest. Soy has been thus mutated to serve the economic visions of powerful human entities with whom it dominates other nonhuman and "not sufficiently human" lives.²⁴

The bird's-eye view from Grobocopatel's TED Talk video, where Earth is sucked into an iPad screen in a Grobo technology app, visualizes the dream of the precision and control-based bioeconomy: to transform the whole planet in the same way that the soy plant has been transformed. (There is only one letter of difference between plant and planet.)²⁵ Like other totalitarian projects before, however, the RR-soy bioeconomy fails to recognize its blind spots. The process of mutation is extending from RR-soy to its environment, provoking genetic and epigenetic changes in weeds, which also acquire resistance to Roundup, and in the human bodies that acquire cancers and other degenerative diseases. By building human agency into soy, transforming it into an RR-soy-glyphosate technological package, it may be becoming something other than a plant, something that Paraguayan peasants conceive of as "evil beans."²⁶

23. Charles, *Lords of the Harvest*.

24. Agamben, *Open*. Contrary to the corporate-speak of precision and control that has gone into the marketing of RR-soy (and bioengineered organisms in general), the gene gun is a rather imprecise tool. It literally bombards soy cells with miniscule bullets coated with the transgene of interest. With a gene gun, it is extremely difficult to control where in the genome the insertion of the transgene occurs. The location of the insertion is important because if the transgene were to be inserted in a part of the genome interfering with some other essential function of the soy plant, it could produce "phenotypic abnormalities" (Homrich et al., "Soybean Genetic Transformation").

25. According to one of the etymologies, both *plant* and *planet* come from the Greek *PIE* (*pele*), "to spread" (etymonline.com). Of all the organisms that we know, the celestial body of planet Earth may be closest in its structure to that of the plant.

26. Hetherington, "Beans before the Law."

Glyphosate impacts on human health have been the subject of an arduous debate. A study by Gary M. Williams et al., quoted by the US Environmental Protection Agency and paraphrased by institutions in Argentina and elsewhere, states that “under present and expected conditions of new use, there is no potential for Roundup herbicide to pose a health risk to humans.”²⁷ Until the World Health Organization’s International Agency for Research on Cancer (IARC) announced in 2016 that glyphosate is “probably carcinogenic to humans,”²⁸ studies that showed potential damage caused by glyphosate had difficulties being considered seriously. Andrés Carrasco, an Argentinean molecular biologist, showed teratogenic effects of glyphosate on frog embryos.²⁹ After he announced the results of his experiments, he was denounced by the local scientific community under the pretext that he had made the announcement before the publication of these results in a peer-reviewed journal. Similarly, neonatologist Medardo Ávila Vázquez was accused by Adrian Simioni of doing “deficient science” when his research showed that in Monte Maíz, where applications of glyphosate are increasing every year, the primary cause of human death is cancer (while nationwide, this is only the fifth or the sixth cause), and the amounts of malformations and hypothyroidism are three times higher than in the rest of the country.³⁰ Among a number of other studies on the toxicity of glyphosate,³¹ the report commissioned by the provincial government of Chaco, Argentina, found that the rate of birth defects increased fourfold and rates of childhood cancers tripled in only a decade in the areas of RR-soy.³² According to journalist Ricardo Serruya, due to the toxic effects of herbicide fumigations of RR-soy, most of rural Argentina has become a dangerous place to live, but epidemiological studies are mostly dismissed as noncausal and circumstantial evidence.³³

There is a similar controversy in the debate on RR-soy’s influence on the soil and its immediate environment. A favorable factor mentioned often is no-till planting that saves the integrity of the soil by avoiding plowing. Nonetheless, in a research study examining the quality of the soil after fifteen years of continuous RR-soy planting

27. Williams, Kroes, and Munro, “Safety Evaluation and Risk Assessment of the Herbicide Roundup.”

28. IARC, *Evaluation of Five Organophosphate Insecticides and Herbicides*.

29. Carrasco, “Reply to the Letter to the Editor Regarding Our Article”; Carrasco, “Teratogenesis by Glyphosate Based Herbicides and Other Pesticides.”

30. Ávila Vázquez, *Evaluación de la salud colectiva socio-ambiental de Monte Maíz*; Simioni, “Raul Montenegro.”

31. Lajmanovich, Sandoval, and Peltzer, “Induction of Mortality and Malformation in *Scinax nasicus* Tadpoles Exposed to Glyphosate Formulations”; Lajmanovich et al., “Toxicity of Four Herbicide Formulations with Glyphosate on *Rhinella arenarum* (Anura: Bufonidae) Tadpoles”; Palau, “Centralidad de la lucha por la tierra.” Beyond Argentina, a number of important animal experiments and epidemiological studies have emerged over the past decade, raising fresh concerns about the impacts of patterns of glyphosate usage on human health. For a recent comprehensive review of concerns about glyphosate toxicity, see Myers et al., “Concerns over Use of Glyphosate-Based Herbicides and Risks Associated with Exposures.”

32. Chaco Government Report, *Comisión provincial de investigación de contaminantes del agua*.

33. Serruya, *Venganza del amaranto*.

in Argentina, Francisco Eduardo Zazo, C. C. Flores, and S. J. Sarandon found a dramatic loss of nutrients as compared to pasture soil.³⁴ A report by Instituto Nacional de Tecnología Agropecuaria (INTA) coordinated by Roberto Raúl Casas concludes that close to a half of Argentinian soils are affected by erosion due to monocultures of which RR-soy is the largest.³⁵ Philip Mercurio and colleagues show the persistence of glyphosate in seawater, especially in its dark areas.³⁶ According to soil scientist Gabriela Civeira, 10 percent of glyphosate reaches plants other than targeted weeds, and in rich soils glyphosate is bound by organic particles and taken to the deep parts of the water table, affecting forests and beneficial pollinators.³⁷ Civeira concludes that all the economic benefits that Argentina owes to the exports of RR-soy may amount to less than the losses to ecosystem services due to glyphosate-laden agriculture. These studies are, however, unpopular in places that grow and benefit from the RR-soy money, such as Rosario.³⁸

Rosario is the third largest city of Argentina, four hours by bus inland from Buenos Aires along the river Paraná. There we meet two scientists with expertise in agronomy, weed science, and soil science. As we walk along a beautiful promenade on the river Paraná, moonlight mixes with the electric lights of vibrant restaurants and bars and glitters on the river, where dark shapes of cargo ships carrying soy move silently along. All these have been built thanks to the RR-soy boom. The two scientists often travel to soy plantations taken over by super weeds, that massively mutated to survive glyphosate, and they advise RR-soy growers on how these should be managed. They believe that the problem lies in the ways in which Roundup technology is misapplied and RR-soy agriculture mismanaged. According to them, one of the least fortunate legal arrangements in Argentina is the possibility to rent the land for soy production for very short periods of time, often for less than a year. Short-term renters do not care as much about the longer-term health of the field and often return it to the owner covered with resistant weeds and/or contaminated with excessive fumigations with which they had attempted to remedy their lack of agronomic care. RR-soy stimulated human greed that is responsible for increased environmental toxicity. It has also shifted cultural values toward excessive trust in technology, viewed now as a guarantor of success.

To conclude his TED Talk, Grobocopatel explains that the difference between the rich and the poor in terms of the bioeconomy is based on their relationship with technology. If people embrace proper technologies, so the argument goes, the progress brought by the biotechnological management of photosynthesis will generate universal well-being. In order to bestow technology as a way toward future happiness, it is advisable to prepare and instruct society to embrace technological innovations in all

34. Zazo, Flores, and Sarandon, "'Costo oculto' del deterioro del suelo durante el proceso de 'sojización' en el partido de Arrecifes, Argentina."

35. Casas, "Erosión del suelo en la Argentina."

36. Mercurio et al., "Glyphosate Persistence in Seawater."

37. Civeira, *Recopilación sobre los efectos del glifosato en agroecosistemas*.

38. See the stories of Andrés Carrasco and Medardo Ávila Vázquez on previous pages.

domains. The push toward increased consumption of technology transforms ideas about education. On huge billboards along the main highway leading from Buenos Aires toward the provinces, we repeatedly see a super-cool-looking youngster surrounded by technological gadgets as the gigantic letters read “Sentíte cómodo con la tecnología!” (Feel comfortable with technology!). Judging by the clothes of the boy and by the interior of his apartment, technology is envisioned not only as a way to success but also as a mark of class. It co-constructs new social hierarchies, responsible for their structural violence,³⁹ but often also for the “slow violence”⁴⁰ of contamination penetrating live tissues, which takes a toll over many years and in many ways that are often not registered, except by the victims themselves. But there has also been physical violence.

After RR-soy entered the country in 1996, no other crops could resist its progress because it was promising higher net economic gains than other plants or even livestock that had been until then the signature of Argentinean agriculture. Farmers either sold or rented their land for soy plantations, or they transformed themselves into RR-soy growers. These were not always peaceful processes, as some resisted the pressures to sell. Between 1997 and 2003, 160,000 families of small farmers lost their livelihoods while the usage of Roundup increased thirteen times.⁴¹ Gastón Gordillo describes “land grabs and destruction” in the region of Salta: “National and multinational corporations were buying up old cattle ranches or receiving large tracts of public land from Salta government and evicting *criollo* residents, often taking advantage of their lack of legal titling. These evictions were frequently carried out by force, with the assistance of the police and armed private guards. Bulldozers then promptly destroyed forests, homes, and corrals to smooth out space and create fields.”⁴²

RR-soy has changed dramatically the structure of agriculture in the Argentinean provinces of Entreríos, Santa Fe, Córdoba, Salta, Chaco, and Formosa. It is now a large-scale industrial process wholly based on biological and automated machine technologies, almost without direct contact between people and plants. As we travel from Buenos Aires to Rosario, then to San Jorge and Córdoba, and later through Salta and Chaco toward Formosa, we are surrounded by what locals call “green desert,” an infinite flow of the fields of RR-soy that has consumed and covered all that was there before (fig. 1).

There are few small farms left, and the few trees still interrupting the monotonous countryside have their tops burnt by aerial fumigation of glyphosate. We pass by numerous service stations displaying impressive agricultural machines. Especially huge are the terrestrial applicators of herbicides ironically called “mosquitoes.” The irony highlights not only their size but also the stinging sensation when the face muscles

39. Galtung, “Violence, Peace, and Peace Research.”

40. Nixon, *Slow Violence and the Environmentalism of the Poor*.

41. Joensen and Ho, “Argentina’s GM Woes”; Branford, “Argentina’s Bitter Harvest”; Arancibia, “Challenging the Bioeconomy.”

42. Gordillo, *Rubble*, 45, 46.

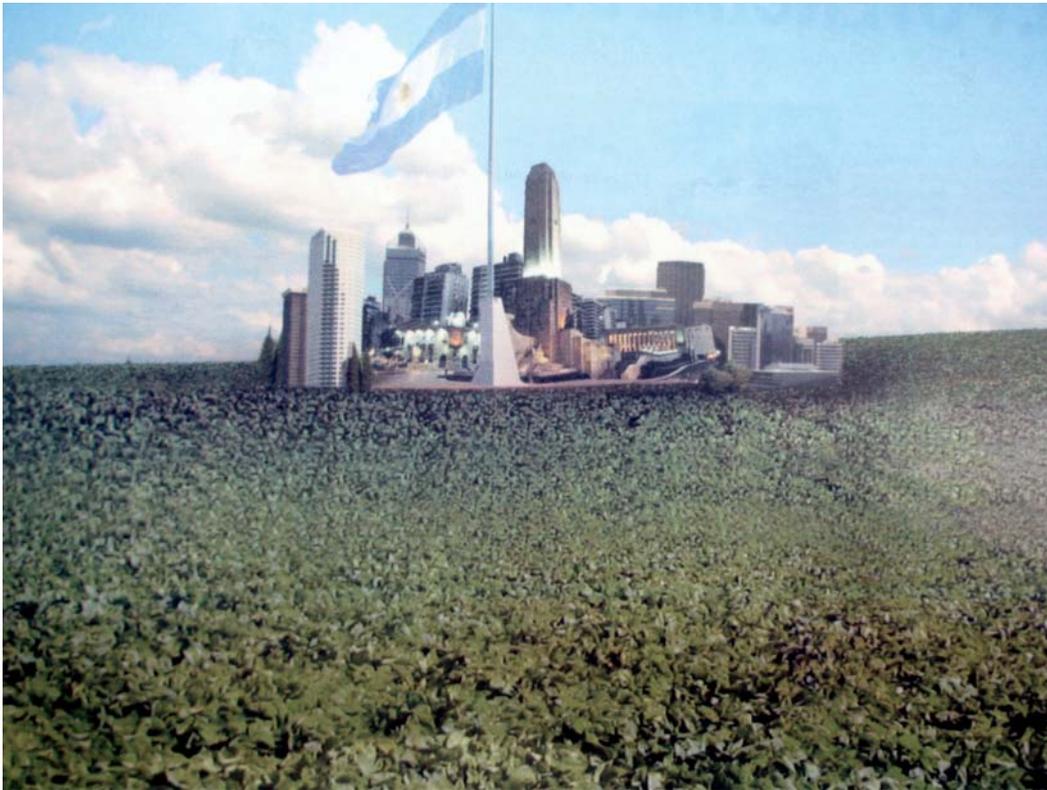


Figure 1. Eduardo Molinari / Archivo Caminante. Fragment of the publicity campaign “Infocampo. La expo” published in *La Capital de Rosario* in June 2008. DocAC/2010.

get numbed after exposure to the herbicide. A proverbially healthy countryside has been turned into a contaminated bio-industrial revolution site.

In *Soy Children*, Molinari argues that RR-soy production organizes new political alliances and modifies the social and cultural structure of the country.⁴³ He relates “the transgenic culture” to Argentina’s history, comparing the campaign of planting RR-soy to the conquest of the desert in the 1870s that led to the destruction of native peoples in the name of civilization development (fig. 2).

The RR-soy campaign similarly did away with small farms and cut into native peoples’ reserves in the name of an industrialization model. Gordillo explains the elites’ disregard for the destruction created by RR-soy in the marginal zones of the national space (e.g., Chaco) as a racial issue that he relates to the campaigns of cleansing the territories from their native inhabitants both in the south and in the north: “These margins have become ‘the desert’ of the twenty-first century: a special emptiness subjected to a new wave of civilizing conquest led this time not by cavalry regiments but by bulldozers.”⁴⁴ But where there is violence, there is resistance. In those margins, human and

43. Molinari, *Walking Archives*.

44. Gordillo, *Rubble*, 126.

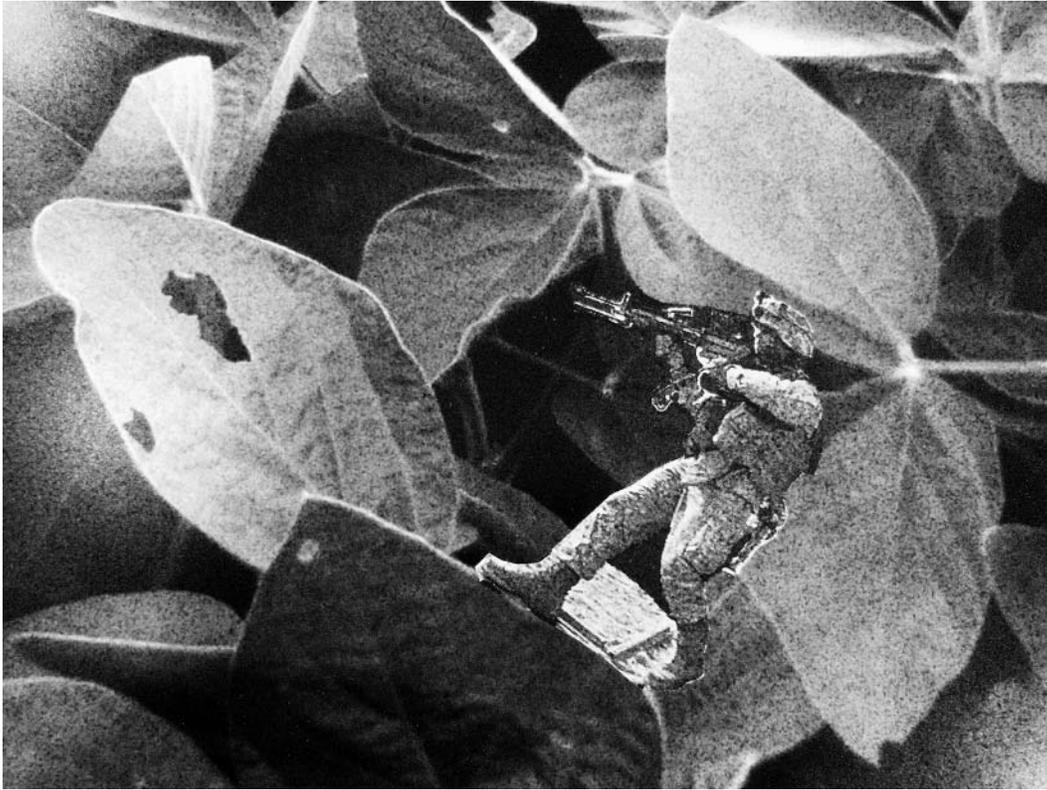


Figure 2. Eduardo Molinari / Archivo Caminante. Collage. Detail from the installation “Los niños de la soja” (Soy Children), 2010.

nonhuman *rogue objects* rise up against the RR-soy economy. If, according to Bryant, “rogue objects are the new social movements, species, and technologies,”⁴⁵ mutated super weeds, such as Palmer amaranth, are among them, to which we turn in the second part of the essay.

Amaranth as a *Rogue Object*: From Below

The more we decrease the distance from what affected people call the “zona de muerte” (zone of death)—the houses surrounded by bad-smelling air that makes the facial muscles go numb—the less attractive is the image of the reality emerging from RR-soy’s partnership with glyphosate, money, and money-making humans. Looked at from the window of a moving bus, the green deserts are dotted with brown stains of weeds burnt by glyphosate, but if one stands closer, bends and looks from below, green leaves still come out of the burnt-brown stalks. The rebirth of these deadened plants brings a sense of hope, perhaps a completely erroneous emotional reaction in the midst of the powerful bioeconomy where pesticides will be applied again and again, each time in more deadly cocktails. The hope comes, however, from the very perception of resistance,

45. Bryant, “Rogue Objects.”

which, even if apparently futile, opens up a different temporal dimension where things move against the globalized traffic. The mutation of weeds that makes them resistant to Roundup, and allows them to overgrow fields, forcing farmers to abandon GE crops, invites one to think of a future when these areas are covered by “third nature” forests. *Rogue objects* begin small, but they often end up bringing huge changes.

Today, in these RR-soy dominated provinces of Argentina, everything announces human power over nature; huge silos and service stations rise up shiny and ominous. A network of small rich towns, whose inhabitants are in various ways connected to the RR-soy business, displays the perks of the culture of RR-soy. The towns are clean and well maintained, with decorative fountains, gates, recreation facilities, and lots of festive lighting at night. But, there are also the poor, most often housed on the margins of the urban zones in the immediate vicinity of the RR-soy plantations that are heavily fumigated. It is precisely in these margins between human and transgenic crop zones where contentious collective actions have arisen, involving affected communities, groups of environmental and civil-society activists, allied medical doctors, lawyers, and scientists in Argentina’s universities.⁴⁶ Among the first collective-action cases was that of Vivian Peralta in San Jorge, which was decided by a court resolution in March 2009.

In Urquiza, a poor district of San Jorge, we talked to Peralta, whose youngest daughter, Alién, suffered bronchospasms every time glyphosate-based herbicides were applied (just twelve meters from her house) since she was five days old. Peralta remembers how time after time she ran with the child in her arms to the hospital along the train tracks. Even as she managed to get help, she knew there would be a next time when herbicides would be sprayed again at them. In these conditions, life seemed unsustainable.⁴⁷ The same year that Peralta fought for her daughter’s life, scientist Andrés Carrasco debated whether he should release the results of his still-unpublished research that pointed to glyphosate’s teratogenic qualities. The citizens of Urquiza asked him to do so. Since they were presenting a complaint at the local court requesting that fumigations not be allowed within a kilometer of people’s houses, they believed that the announcement of Carrasco’s research results could strengthen their case.⁴⁸ Carlos Manessi remembers that initially sixty-four families signed the complaint, but later some withdrew their signatures under pressure and threats from the local RR-soy-allied establishment.⁴⁹ They were made believe that if they remained as a part of the Peralta case, they could stop receiving government help or lose their jobs. Only twenty-five families kept their signatures on the complaint, but they were heard. The court in San

46. Arancibia, “Challenging the Bioeconomy”; Delvenne, Vasen, and Vara, “‘Soy-ization’ of Argentina.”

47. Vivian Peralta, personal communication, San Jorge, Argentina, December 13, 2015.

48. Horacio Brignone, personal communication, San Jorge and María Juana, Argentina, December 13, 2015.

49. Carlos Manessi, personal communication, San Jorge, Santa Fe, Argentina, December 13, 2015.

Jorge imposed a buffer zones of 800 meters (which was later limited to 500 meters) for the land fumigations and 1,500 meters for the aerial ones. The government of Santa Fe province and soy producers appealed the judgment, but in the second instance, the court maintained it. This was one of the first times the court did not demand that people scientifically prove that pesticides were the cause of their ailments, but rather took their testimony as proof.⁵⁰ Since then, similar judgments have been given in seven other cases in the province of Santa Fe⁵¹ and over one hundred cases in the whole country.⁵²

While people organized to oppose increasing fumigations, weeds resistant to glyphosate have skyrocketed instead of subsiding (weeds-science.org). Among them are numerous varieties of amaranth such as *Amaranthus palmeri* (Palmer amaranth, called “pigweed” in the United States and “yuyo” in Argentina), *Amaranthus quitensis*, and recently also *Amaranthus rudis* (waterhemp) as well as *Sorghum halepense* (sorgo de alepo). According to the multinational firm Bayer CropScience, Palmer amaranth can decrease soy yield by over 70 percent and waterhemp by 44 percent.⁵³ For this reason, they were enrolled as anti-RR-soy activists’ allies. Serruya’s *La Venganza del Amarantho* (*Revenge of Amaranth*) pamphlets, manifestos, and videos anthropomorphize amaranth, making it into a hero in a struggle against the villain—RR-soy. These discourses express a vision of an active plant-nature deeply embedded not only in the pre-Columbian past but also in today’s popular culture. They also reveal the biological qualities of amaranth reflected by its name. In Greek, *amarantos* means “unwilting,” and devoted to the goddess Artemis, it symbolized her warrior qualities.

Palmer amaranth is indeed a highly competitive and resistant plant. It can grow two to five inches in just three days⁵⁴ and in a few week’s time is able to reach eighteen inches.⁵⁵ It has long roots, deeply attached to the ground so that it can hardly be removed by hand. Each female plant produces six hundred thousand seeds that are fertilized by pollen carried by the wind from male plants.⁵⁶ Palmer amaranth is surrounded by mysteries and disagreements. For example, while Cornell University’s Department of Animal Science argues that it is poisonous for animals due to a high content of nitrates in the leaves, which can also be potentially dangerous for human kidneys, according to the US Department of Agriculture and Native American ethnobotanical databases, it is edible and nutritious as a cooked green vegetable.⁵⁷ According to Paul Vestal, Palmer amaranth was used by the Ramah-Navajo both ceremonially and during food

50. Aranda, “Freno a los agrotóxicos.”

51. Carlos Manessi, personal communication, San Jorge, Santa Fe, Argentina, December 13, 2015.

52. Raucher, *Advocacy in Multi-Territorialen und Multi-Sektoralen Politischen Systemen*.

53. Bayer CropScience, *Today’s Real World Solution*.

54. Robertson, “Herbicide Resistance May Change Future of Row Crop Farming in Southeast.”

55. Langcuster, “Resistant Pigweed.”

56. Ward, Webster, and Steckel, “Palmer Amaranth (*Amaranthus palmeri*).”

57. Green, “Palmer Amaranth”; USDA, “*Amaranthus palmeri*.”

shortages.⁵⁸ It is not clear how it got to Argentina and managed to take over so many fields, forcing various growers to abandon their RR-soy plantations. The scientists we spoke with speculated that perhaps it has moved aboard secondhand agricultural machinery exported from the United States to Argentina. It also spreads by irrigation and other water flow, by birds and mammals, and even by wind, if strong.

All species of amaranth rely on numbers to spread and multiply, if one seed alone is condemned to a failure, six hundred thousand have a chance. In this and in their capacity to constantly resurface, they teach lessons to activists. Serruya ends his book comparing new social movements fighting against poisonous agribusinesses to the thousands of petals of the amaranth flower,⁵⁹ and Raúl Zibechi implicitly compares peoples' new social movements with the invasions of weeds as he writes of their "underground struggles" that consist in "growing roots" and from that "rootedness" creating "an infinity of small, self-managed islands . . . growing settlements on the margins of large cities by occupying plots of land."⁶⁰ The resistance of new social movements takes its metaphors for action from the plant realm in concepts such as "grassroots" or "plántate" (plant yourself).

Plant resistance and human resistance to transgenic soy are linked not only metaphorically but also materially, across multiple space-time scales. Prior to the arrival of transgenic soy in 1996, soy growers were relegated to pre-crop herbicide application. RR-soy, however, allows growers to apply Roundup multiple times during a crop cycle. Most of the land is rented out by remote landowners, the focus is on short-term gain using the cheapest and most efficient means, which is glyphosate-based herbicides in higher and higher doses. The emergence of mutant amaranth and other resistant super weeds has triggered even more intensive herbicide usage, which in turn has led to increased harmful effects on proximate human communities, and precipitated events of organized peoples' resistance. This *direct* relationship between plant and human resistance to transgenic crops is taken to a different register by the strategic fumigations of peasants in Paraguay, who do not want to sell their farms to soy lords,⁶¹ and by the strategic use of "amaranth bombs" in northern Argentina—mud balls filled with resistant amaranth seeds—by activists fighting against transgenic soy. What happens between these two plants and allied humans really resembles a war.

The core group of activists impeding the construction of Monsanto's GE seed factory in Malvinas Argentinas is very aware of its interspecies alliance with plants. The inhabitants of the town, in resistance against the factory, created a movement called

58. Vestal, "Ethnobotany of Ramah Navajo." See also Minnis, "Famine Foods of the Northern American Deserts Borderlands," 239.

59. Serruya, *Venganza del amaranto*.

60. Zibechi, *Territories in Resistance*, 14–15.

61. "Otro genocidio del modelo del desarrollo capitalista en Sudamerica"; Palau, "Centralidad de la lucha por la tierra."

“Malvinas lucha por la vida” (Malvinas Fights for Life), with all the implications that the *vida* has for human health, but also for plants and the planet. On a wall by the Malvinas bus stop, graffiti representing the idea of “a fight for life” depicts human and plant coexistence, voicing the desire for “Semillas libres, sin agrotóxicos” (Free seeds, with no pesticides) (fig. 3). In this image Malvinas’s resistance to the transgenic bioeconomy becomes a search for an alternative agriculture inspired by precolonial relationships between people and plants that Walter Mignolo conceptualizes as “re-existence.”⁶² Malvinas, a mostly white dormitory town and satellite of Córdoba, reimagines its agricultural landscape through an idealized vision of past indigenous lives that connotes freedom, organic purity, and human connections to the nature.

The blockade in Malvinas Argentinas lasted for almost three years, and in August 2016, a few months after we were there, Monsanto took apart the unfinished construction of the seed factory and left for good.⁶³ A volume of essays coordinated by Patricia Agosto has been written about it,⁶⁴ and songs have been sung by world stars such as Manu Chao, with such memorable lines as “te lo digo, te lo canto, fuera Monsanto” (I say so, I sing so, Monsanto has to go). The camp has been visited by Vandana Shiva and Monique Rubin, and even the Pope has solidarized with its fight. Ávila Vázquez read a study of the environmental impacts of the intended seed factory that showed that winds would have taken toxic fumes directly toward the town, hitting at first an elementary school at a short distance from its location.⁶⁵ The seeds would be soaked in fipronil, a slow-acting insecticide, toxic not only to beneficial insects such as honey bees but also to mammals.⁶⁶ Ávila Vázquez said: “Esta fábrica, parece que la había diseñado el diablo” (It seems like the devil himself designed that factory).⁶⁷ Monsanto’s hurried and flawed report on environmental impacts was rejected by the local authorities, yet the construction of the factory started.⁶⁸ In these circumstances, the citizens of Malvinas supported by people from Córdoba and elsewhere rose up in protest and blocked all the entrances where Monsanto trucks were coming in. Ávila Vázquez smiled when he remembered that it was going to be the largest factory in the world, producing GE seeds for forty-eight thousand hectares, but its construction had been stopped by regular people.⁶⁹

When after the first few weeks of massive protests Monsanto left promising to return, and most people in the blockade had to go back to their everyday work and family lives, a group of youth decided to stay to make sure that Monsanto would not return. As

62. Mignolo, “Pensamiento des-colonial, desprendimiento y apertura.”

63. “Monsanto Se Va?”, “Final de Monsanto en Malvinas Argentinas.”

64. Agosto, *Malvinas*.

65. Medardo Ávila Vázquez, personal communication, Córdoba, Argentina, December 17, 2015.

66. Tomizawa and Casida, “Selective Toxicity of Neonicotinoids Attributable to Specificity of Insect and Mammalian Nicotinic Receptors.”

67. Ávila Vázquez, personal communication, Córdoba, Argentina, December 17, 2015.

68. *Ibid.*

69. *Ibid.*



Figure 3. The graffiti on the bus stop in Malvinas Argentinas: “Free Seeds with no pesticides”

they camped by the side of the highway in front of the factory for over two years, they grew a small organic garden and printed *cartonera*-style books that they gave to visitors for voluntary donations. In the book that we took with us, the protesters represent themselves through the metaphor of “lobitos huerta” (little garden wolves), which implies a return to a more organic animalistic relation with agriculture.⁷⁰ In the manifesto contained by the book, images of people and plants and, in particular, of women embracing a tree and a couple leaning over a sprouting plant, highlight the interspecies character of their thought, inspired by other acts of resistance (fig. 4).⁷¹

Evoking Giorgio Agamben’s *Homo Sacer, Entre barrikadas* envisions the world as a slow-death concentration camp exploited by the multinationals poisoning people, water, and earth and “devouring life in order to defecate money.” It announces that the blockade is a first step in building a new world and that it is important that a new culture be initiated precisely at the gates of Monsanto’s factory toward deconstructing it. As the criticism of extractivism in the first part of the manifesto yields to ideas about how to build an alternative, the following words attract our attention:

Encontrarnos para sentirnos juntos y coordinar acciones directas para arrancar o pudrir los postes (desde abajo).

(We want to meet to feel together and coordinate our actions to pull out or corrode the fence-posts <from below>)

70. *Entre barrikadas*, n.p.

71. In 1972, rural women in sub-Himalayan India led a movement against the indiscriminate felling of trees by embracing these trees.

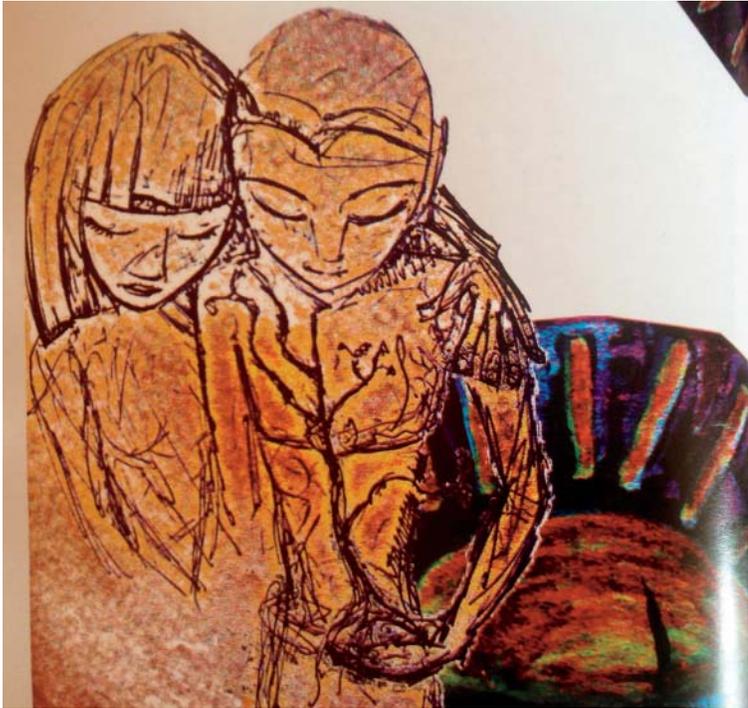


Figure 4. Drawing produced between the barricades during the blockade of Malvinas Argentinas. Credit: Guiye pincel of the group arte x libertad.

La raíz se abriga en la tierra fresca y blanda. Desde ahí se radicaliza la práctica.
(The root is covered by the fresh and soft soil. From there the practice is radicalized.)

Radicalizar es hacer distinto desde la raíz. Desde la semilla.
(To radicalize means to make difference from the root. From the seed.)⁷²

The activists imagine *radical* transformation that eradicates the pillars of the existing economic system and builds the economy anew all the way from the seed and the roots of existence, where life is connected to soil. The common lexical root of “raíz” (root) and “radical” (from Latin *radix*) reminds us again of the connection between new social movements and plants. To “make difference from the root” means to live up to the ideals and adapt everyday routines to them. Malvinas Argentinas exemplifies Zibechi’s idea that new social movements are growing “in the gaps that are opening in capitalism.”⁷³ The activists blocking the entrances to the Monsanto factory are like super weeds squeezing into the spaces between GE plants in order to destroy them. Like super weeds, they are *rogue objects* that appear and disappear (their trajectories are unforeseeable and surprising) but always leave seeds or hidden roots for future reappearance.

In throwing balls filled with amaranth seeds into RR-soy plantations, activists in Santa Fe and Chaco leverage not only the mutant biology of amaranth as a super weed,

72. *Entre barrikadas*, n.p.

73. Zibechi, *Territories in Resistance*, 15.

but also what we are calling “a productive slippage” with its edible variety, which equips it with symbolic meaning due to the significance of amaranth in Pre-Columbian American cultures. In this way, as in the Monsanto factory blockade, existence and re-existence are linked in time. Edible amaranth, *Amaranthus caudatus*, called such due to the shape of its flowers reminding one of red or white tails, is very beautiful. Before the Spanish conquest of the Americas, it used to be one of the main sources of protein for the people of the Andes while a related variety, *Amaranthus hypochondriacus* was grown by the natives of Mexico and Mesoamerica. Its grain contains close to 28 percent protein as well as a considerable amount of lysine that balances the immune system. It is placed on the list of “famine foods” as it can efficiently reestablish the health of patients suffering from malnutrition.

Dalmacio Sandoval once used to grow tobacco, which is what everybody in his area near Salta does, but then he realized that it is “a bad plant” and decided to look for a better ally.⁷⁴ At that time, in an agronomy conference, he heard that amaranth was a superfood of the native people that had kept them healthy and strong before the European conquest, substituting efficiently for meat, which was scarce. Sandoval was moved by the story of the prohibition against growing amaranth that was intended to suppress indigenous Americans, because for these people it was not only an important nutrient but also a sacred crop. Spaniards were coming up the mountain, inspecting natives’ fields and destroying all the amaranth they could find, and they had done such a good job that when Sandoval wanted to plant it, he could not find any seeds anywhere nearby. He then decided to go further up to the mountains by San Miguel and wandered through villages hanging higher on the slopes of the Andes, until finally he spotted one small garden with dried *Amaranthus caudatus* plants. It belonged to an old woman who agreed to give him one stalk-full of seeds under the condition that he plant amaranth in her garden for the next year, because she could hardly bend over. That way he learned some of the old woman’s secrets. Ten years later his amaranth fields are splendid (fig. 5).

Sandoval dreams about feeding amaranth to malnourished children of the local poor, but his crops are hard to sell, and thus his idealism has been challenged. Even though he hates the pesticide industry, he would be willing to put some Roundup onto his amaranth if only this would ensure that his crops enter the local market, but the local growers’ establishment blocks him on all fronts. Sandoval believes that having criticized RR-soy and tobacco (that relies as much as soy on glyphosate-based herbicides) and having proclaimed organic amaranth’s superiority over glyphosate-dependent crops, he has become an outcast among the local growers’ community.

It is plausible that Sandoval’s alternative “ethical crop” is a thorn rupturing the normality of toxic plantations in Salta. We interpret his internal debate over which crops are good or evil as stemming from the past of colonial domination and influenced by the present tensions between different models of development that are outcomes of

74. Dalmacio Sandoval, personal communication, Salta, Argentina, December 21, 2015.

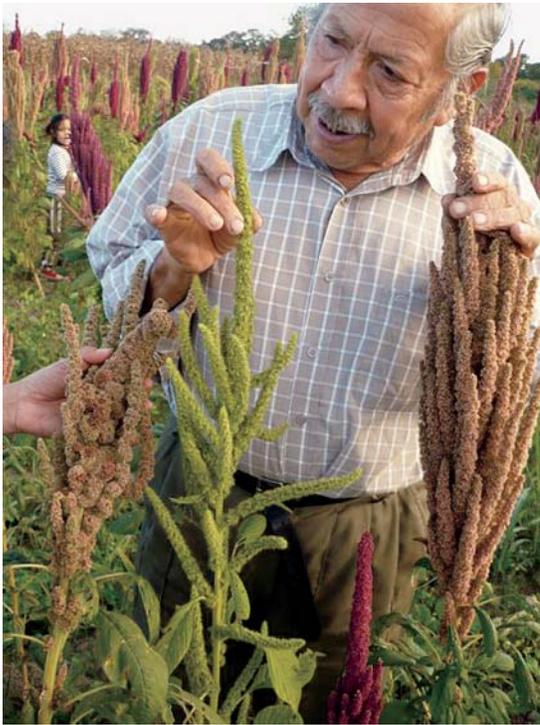


Figure 5. Dalmacio Sandoval surrounded by amaranth in his Cooperativa Tatauaso in Salta. Image from the archive of Marie Sandoval.

that past. It is yet one more story of re-existence as a decolonization through *re-planting*, that is, substituting glyphosate-ridden tobacco with the native edible amaranth that had been removed by Spanish colonizers. By bringing it to his plantation and turning it into his main crop, Sandoval reflected on the past to construct something new. This *re-growing* of the past has a particularly dramatic meaning at the time when the rhetoric of colonization resurfaced in the politics of bioeconomy, whose discourses justify destroying people's ways of life, their crops, and their environments for the sake of a biotechnological revolution that promises to create well-being for all those who will embrace it, like with religion in the past.

The edible variety of amaranth, similar to quinoa, is a very high maintenance crop. It demands a slower rhythm of life adjusted to its needs. Edible amaranth can be planted by hand or seeded by row, but hand harvesting persists because the higher branches mature before the lower ones are ready. In order to determine if the plant is harvestable, one needs to rub the branch between the palms of the hands and see if the grain detaches easily. Rubbing it between hands is also the best way of harvesting. Intimate feelings are born from so much touch between the grower and the plant. Sandoval deplors that amaranth has not made him rich, but he admits that it gave him joy and meaning with which he reconstructed himself, and it also provided him and his family with good nutrition.

RR-soy thrives with big expensive machines, without human physical proximity, it offers considerable profit and fast growth. But, it takes its toll; inseparable from the herbicides, it triggers mutations in its vicinity, it impoverishes soils and threatens

biodiversity. In the last few years, RR-soy production, although still dominant, has begun to slowly decrease in Salta province. Longer than usual periods of drought, perhaps a sign of global weather-change patterns, and the increasing costs of transporting soy have considerably decreased the margin of profit.⁷⁵

Conclusion

In this essay, we explored the development and consequences of GE soy in Argentina through the lens of resistance and by invoking the concept of interspecies resistance—inextricably intertwined networks of resistances of people and plants. We showed how this new way of describing the process of agricultural innovation and resistance to it by the evolution of plants and the resistance of people can be seen as part of a single nature-culture process. Traversing the hinterlands of Argentina beyond Buenos Aires, we traced material connections between the system of transgenic soy agriculture, the Roundup-soaked soy fields overrun by mutant weeds, and the adjoining human communities that are feeling, and struggling against, the pernicious effects of pesticide exposure on their health and well-being. We met activists who leveraged the mutant biology of Palmer amaranth by throwing “amaranth bombs” into GE-soy fields. We also uncovered the symbolic dimensions of interspecies resistance in activists’ discourses—the rhetorical slippage between pre-Columbian legacies of edible amaranth and mutant amaranth, and the metaphorical usage of qualities of plant-being, such as rootedness and spreading, in the Malvinas community’s struggle against the siting of Monsanto’s GE seed factory. These symbolic aspects gained biophysicality in the ideologically infused vegetable garden of the Malvinas Argentinas youth activists and the practically oriented struggle of Dalmacio Sandoval’s venture to grow edible amaranth as an ethical alternative. In the process, we noticed the interspecies character of “re-existence”—alternative decolonizing practices, and its relevance for creating more just and sustainable worlds of relationships. If we had described these phenomena in “ordinary” language, talking separately about the super-weed issue and the people’s resistance, we would have lost the meaning of the entanglements between the vegetal and the human lives that have been at times decisive. We would have missed the significance of the plant-mediated gravitational forces that shape economies and cultures.

By looking together at “the human” and “the nonhuman” in our story of resistance to GE-soy technology in Argentina, we have laid the foundations for a “critical posthumanist” framework,⁷⁶ which we believe will fruitfully complement existing analyses of the unanticipated socioecological dynamics of bioengineered bodies in the Anthropocene. The “interspecies” move we have made draws inspiration from emerging literature in multispecies ethnographies and the critical posthumanities.⁷⁷ Indeed, our story

75. “En Salta la soja pierde terreno a manos de los cultivos regionales.”

76. Braidotti, *Posthuman*.

77. E.g., respectively, Tsing, *Mushroom at the End of the World*; and Braidotti, *Posthuman*.

of interspecies resistance is situated within a broader set of intersecting historical moments, including the emergence of chaos and complexity theories, the rise of neoliberal globalization, and concomitant development of commercial biotechnologies, in which previously self-evident boundaries between humans and nonhumans have become no longer tenable. Here, the bioengineered blurring of human/nonhuman boundaries toward commodifying and financializing “life itself”⁷⁸ has engendered a shared—that is, interspecies—sense of vulnerability, interdependence, and resistance spanning multiple lives and bodies, human and nonhuman, in the face of the threats posed by biotechnology.⁷⁹ As we showed through the case of GE soy and weed and edible amaranth in Argentina, interspecies resistance connotes not only a negative biopolitics of shared vulnerability but also an “affirmative biopolitics,”⁸⁰ in the form of interspecies re-existence. Through material and immaterial networks, people and plants connect, spread, re-root, and re-plant to resist and re-exist. “Re” is a particle of repetition, extending things that in time will show, but it is also indicative of relations that in complex systems of life have an advantage over alienation. Biotechnological revolution, as well as resistance and re-existence, is importantly about plants. Plants co-create human agricultures, mediate economies, but also ways of life and values. Human-plant intimate alliances, wisely established, may be the secret to securing the survival of our intertwined interspecies lives.

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78. Cooper, *Life as Surplus*.

79. Braidotti, *Posthuman*.

80. Esposito, *Bíos*.

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References

- Agamben, Giorgio. *Homo Sacer: Sovereign Power and Bare Life*. Stanford, CA: Stanford University Press, 1995.
- . *The Open: Men and Animal*. Stanford, CA: Stanford University Press, 2004.
- Agosto, Patricia, ed. *Malvinas, un pueblo en lucha contra Monsanto*. Quito, Ecuador: Fundación Rosa Luxemburgo, 2014.
- Arancibia, Florencia. “Challenging the Bioeconomy: The Dynamics of Collective Action in Argentina.” *Technology in Society* 35, no. 2 (2013): 79–92.
- Aranda, Darío. “Un freno a los agrotóxicos.” March 15, 2010. darioaranda.wordpress.com/2010/03/15/un-freno-a-los-agroquimicos/.
- Ávila Vázquez, Medardo. “Agricultura tóxica y pueblos fumigados en Argentina.” *+E* 1, no. 4 (2014): 28–34.
- . *Evaluación de la salud colectiva socio-ambiental de Monte Maíz*. Red Universitaria de Ambiente y Salud, March 29, 2015. www.reduas.com.ar/wp-content/uploads/downloads/2015/03/%C3%BAltimoMMM.pdf.
- Bayer CropScience. *Today's Real World Solution*, 2015. www.cropscience.bayer.us/~media/Bayer%20CropScience/Country-United-States-Internet/Documents/Products/Traits/LibertyLink/LibertyLink-System-Brochure.ashx.
- Braidotti, Rosi. *The Posthuman*. Cambridge: Polity, 2013.
- Branford, S. “Argentina’s Bitter Harvest.” *New Scientist*, April 17, 2004, 40–43.
- Bryant, Levi. *The Democracy of Objects*. Ann Arbor, MI: Open Humanities, 2011.
- . “Onticology—A Manifesto for Object-Oriented Ontology, Part I.” *Larval Subjects*, January 12, 2010. larvalsubjects.wordpress.com/2010/01/12/object-oriented-ontology-a-manifesto-part-i/.
- . “Rogue Objects.” *Larval Subjects*, May 25, 2011. larvalsubjects.wordpress.com/2011/05/25/rogue-objects/.
- Carrasco, Andrés E. “Reply to the Letter to the Editor Regarding Our Article (Paganelli et al., 2010).” *Chemical Research in Toxicology* 24, no. 5 (2011): 610–13.
- . “Teratogenesis by Glyphosate Based Herbicides and Other Pesticides. Relationship with the Retinoic Acid Pathway.” In *GM Crop Cultivation—Ecological Effects on a Landscape Scale. Proceedings of the Third GMLS-Conference 2012 in Bremen*, edited by B. Breckling and R. Verhoeven, 113–17. Frankfurt: Lang, 2013.
- Casas, Roberto Raúl. “La erosión del suelo en la Argentina.” In *El Deterioro del Suelo y Del Ambiente en la Argentina*, edited by R. R. Casas and G. F. Albarracin, 433–52. Buenos Aires: FECIC, 2015.
- Chaco Government Report. *Comisión provincial de investigación de contaminantes del agua*. Resistencia, Chaco, Argentina, April 8, 2010. www.gmwatch.org/files/Chaco_Government_Report_English.pdf.
- Charles, Daniel. *Lords of the Harvest: Biotech, Big Money, and the Future of Food*. Cambridge, MA: Perseus, 2001.
- Civeira, Gabriela. *Recopilación sobre los efectos del glifosato en agroecosistemas*. Castelar: Instituto de Suelos, INTA Castelar, 2012. www.suelos.org.ar/adjuntos/glifosato_en_agroecosistemas.pdf.
- Cooper, Melinda. *Life as Surplus: Biotechnology and Capitalism in the Neoliberal Era*. Seattle: University of Washington Press, 2008.
- De la Cadena, Marisol. “Indigenous Cosmopolitics in the Andes: Conceptual Reflections beyond ‘Politics.’” *Cultural Anthropology* 25, no. 2 (2010): 334–70.

- Delvenne, Pierre, F. Vasen, and A. M. Vara. "The 'Soy-ization' of Argentina: The Dynamics of the 'Globalized' Privatization Regime in a Peripheral Context." *Technology in Society* 35, no. 2 (2013): 153–62.
- Domínguez, Diego, and Pablo Sabbatino. "La muerte que viene en el viento: La problemática de la contaminación por efecto de la agricultura transgénica en Argentina y Paraguay." In *Los Señores de la Soja*, edited by Emil Sander and Pablo Gentili, 31–123. Buenos Aires: CICCUS, 2010.
- "En Salta la soja pierde terreno a manos de los cultivos regionales." *Noticiasagropecuarias*, 2012. noticiasagropecuarias.com/agricultura/soja/87-articulos12/soja/3353-en-salta-la-soja-pierde-terreno-a-mano-de-cultivos-regionales.
- Entre barricadas: Espejo de la lucha en el bloqueo a Monsanto*. Asamblea de Autoconvocadxs. Ruta A88, Km 8,5. Malvinas Argentinas, Córdoba: Invisible, n.d.
- Esposito, Roberto. *Bíos: Biopolitics and Philosophy*. Translated by Timothy Campbell. Minneapolis: University of Minnesota Press, 2008.
- "El final de Monsanto en Malvinas Argentinas." *Notas*, August 4, 2016. notas.org.ar/2016/08/04/final-monsanto-malvinas-argentinas/.
- Fitting, Elizabeth. *The Struggle for Maize: Campesinos, Workers, and Transgenic Corn in the Mexican Countryside*. Durham, NC: Duke University Press, 2011.
- Gaines, T. A., W. Zhang, D. Wang, B. Bukun, S. T. Chisholm, D. L. Shaner, S. J. Nissen, W. L. Patzoldt, P. J. Tranel, A. S. Culpepper, T. L. Grey, T. M. Webster, W. K. Vencill, R. D. Sammons, J. M. Jiang, C. Preston, J. E. Leach, and P. Westra. "Gene Amplification Confers Glyphosate Resistance in *Amaranthus palmeri*." *Proceedings of the National Academy of Sciences USA* 107 (2010): 1029–34.
- Galtung, Johann. "Violence, Peace, and Peace Research." *Journal of Peace Research* 6, no. 3 (1969): 167–91.
- Gordillo, Gastón R. *Rubble: The Afterlife of Destruction*. Durham, NC: Duke University Press, 2014.
- Goven, Joanna, and Vincenzo Pavone. "The Bioeconomy as Political Project: A Polanyian Analysis." *Science, Technology, and Human Values* 40, no. 3 (2015): 302–37.
- Green, Deane. "Palmer Amaranth." *Eat the Weeds*. Accessed May 2016, www.eattheweeds.com/palmer-amaranth/comment-page-1/.
- Grobocopatel, Gustavo. "Futuro y Tecnología del Campo." *TEDx Argentina*, November 3, 2015. vimeo.com/126847082.
- "Gustavo Grobocopatel: El periodismo militante es peor que el terrorismo del estado." *MundoEmpresarial*, December 26, 2015. mundoempresarial.com.ar/nota/291864-el-periodismo-militante-es-peor-que-el-terrorismo-de-estado-gustavo-grobocopatel-.
- "Hallan glifosato en muestras de sangre y agua en pergamino." *El Federal*, July 15, 2016. elfederal.com.ar/hallan-glifosato-en-muestras-de-sangre-y-agua-en-pergamino/.
- Haraway, Donna. *Simians, Cyborgs, and Women: The Reinvention of Nature*. New York: Routledge, 1991.
- Hazlehurst, Jeremy. "Profile: Gustavo Grobocopatel, the Philosopher Farmer." *Family Capital*, May 5, 2015. famcap.com/articles/2015/5/4/profile-gustavo-grobocopatel-the-philosopher-farmer.
- Heineke, Corinna, ed. *La vida en venta: Transgénicos, patentes y diversidad biológica*. San Salvador: Böll, 2002.
- Hetherington, Kregg. "Beans before the Law: Knowledge Practices, Responsibility, and the Paraguayan Soy Boom." *Cultural Anthropology* 28, no. 1 (2013): 65–85.
- Homrich, M. S., B. Wiebke-Strohm, R. L. Mayer Weber, and M. H. Bodanese-Zanettin. "Soybean Genetic Transformation: A Valuable Tool for the Functional Study of Genes and the Production of Agronomically Improved Plants." *Genetics and Molecular Biology* 35, no. 4 (2012): 998–1010.
- International Agency for Research on Cancer (IARC). *Evaluation of Five Organophosphate Insecticides and Herbicides*. World Health Organization, IARC Monographs, vol. 112. March 20, 2015. iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf.
- Jablonka, Eva, and Marion J. Lamb. *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life*. Cambridge, MA: MIT Press, 2005.

- Joensen, L., and M.-W. Ho. "Argentina's GM Woes." *Institute for Science in Society*, March 19, 2003. i-sis.org.uk/AGMW.php.
- Kinchy, Abby. *Seeds, Science, and Struggle: The Global Politics of Transgenic Crops*. Cambridge, MA: MIT Press, 2012.
- Lajmanovich, R. C., A. M. Attademo, P. M. Peltzer, C. M. Junges, and M. C. Cabagna. "Toxicity of Four Herbicide Formulations with Glyphosate on *Rhinella arenarum* (Anura: Bufonidae) Tadpoles: B-esterases and Glutathione S-transferase Inhibitors." *Archives of Environmental Contamination and Toxicology* 60, no. 4 (2011): 681–89.
- Lajmanovich, R. C., M. T. Sandoval, and P. M. Peltzer. "Induction of Mortality and Malformation in *Scinax nasicus* Tadpoles Exposed to Glyphosate Formulations." *Bulletin of Environmental Contamination and Toxicology* 70, no. 3 (2003): 612–18.
- Langcuster, James. "Resistant Pigweed: The Ultimate Monkey Wrench." *Southeast Farm Press*, October 14, 2009. southeastfarmpress.com/management/resistant-pigweed-ultimate-monkey-wrench.
- Lapegna, P. "Global Ethnography and Genetically Modified Crops in Argentina: On Adoptions, Resistance and Adaptations." *Journal of Contemporary Ethnography* 43, no. 202 (2014): 202–27.
- Latour, Bruno. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press, 1993.
- Loach, Ken, dir. *Land and Freedom*. Produced by Marta Esteban. United Kingdom, 1995.
- Marder, Michael. *Plant-Thinking: A Philosophy of Vegetal Life*. New York: Columbia University Press, 2013.
- . "Resist like a Plant! On the Vegetal Life of Political Movements." *Peace Studies Journal* 5, no. 1 (2012): 24–32.
- Mercurio, Philip, F. Flores, J. F. Mueller, S. Carter, and A. P. Negri. "Glyphosate Persistence in Seawater." *Marine Pollution Bulletin* 85, no. 2 (2014): 385–90.
- Meyer, Daniel E., and Christel Cederberg. *Pesticide Use and Glyphosate Resistant Weeds: A Case Study of Brazilian Soybean Production*. Borås, Sweden: SIK-Institutet för Livsmedel och Bioteknik, 2010. commodityplatform.org/wp/wp-content/uploads/2011/03/slut-rapport-pesticide-brazilian-soybeans-1012081.pdf.
- Mignolo, Walter. "El pensamiento des-colonial, desprendimiento y apertura: Un manifiesto." *Revista Telar* 6 (2016): 7–38.
- Minnis, Paul. "Famine Foods of the Northern American Deserts Borderlands." *Journal of Ethnobiology* 11, no. 2 (1991): 231–57.
- Molinari, Eduardo. *Walking Archives: The Soy Children*. Wivenhoe: Minor Compositions, 2012.
- "Monsanto Se Va?" *Ecos de Córdoba*, August 3, 2016. ecoscordoba.com.ar/monsanto-se-va/.
- Moore, Kelly, Daniel L. Kleinman, David J. Hess, and Scott Frickel. "Science and Neoliberal Globalization: A Political Sociological Approach." *Theory and Society* 40 (2011): 505–32.
- Myers, John P., Michael N. Antoniou, Bruce Blumberg, Lynn Carroll, Theo Colborn, Lorne G. Everett, Michael Hansen, Philip J. Landrigan, Bruce P. Lanphear, Robin Mesnage, Laura N. Vandenberg, Frederick S. vom Saal, Wade V. Welshons, and Charles M. Benbrook. "Concerns over Use of Glyphosate-Based Herbicides and Risks Associated with Exposures: A Consensus Statement." *Environmental Health* 15 (2016): 19. DOI: 10.1186/s12940-016-0117-0.
- Nixon, Robert. *Slow Violence and the Environmentalism of the Poor*. Boston, MA: Harvard University Press, 2011.
- Otero, Gerardo. *Food for the Few: Neoliberal Globalism and Agricultural Biotechnology in Latin America*. Austin: University of Texas Press, 2008.
- "Otro genocidio del modelo del desarrollo capitalista en Sudamerica." *Biodiversidad en América Latina y el Caribe*, January 22, 2013. biodiversidadla.org/Portada_Principal/Documentos/Otro_genocidio_del_modelo_de_desarrollo_capitalista_en_Sudamerica_Guarani.Kaiowa.
- Palau, Marielle. "Agronegocios y organizaciones campesinas: Centralidad de la lucha por la tierra." *Con la soja al cuello: Informe sobre agronegocios en Paraguay, 2013–1015*, edited by M. Palau, 70–76. Asunción, Paraguay: BASE, 2015.

- Pengue, Walter A., I. Monterosso, and R. Binimelis. *Bioinvasiones y bioeconomía: El caso del sorgo de alepo resistente al glifosato en la agricultura Argentina*. Barcelona: Instituto de Ciencia y Tecnología Ambientales, 2009. [researchgate.net/publication/271524509_bioinvasiones_y_bioeconomia_el_caso_del_sorgo_de_alepo_en_la_agricultura_argentina](https://www.researchgate.net/publication/271524509_bioinvasiones_y_bioeconomia_el_caso_del_sorgo_de_alepo_en_la_agricultura_argentina).
- Raucheker, Markus. *Advocacy in Multi-Territorialen und Multi-Sektoralen Politischen Systemen. Der Wandel und die Konstanten der Pestizidregulierung im Fragmented State Argentinien*. Berlin: Freie Universität Berlin, 2015.
- Robertson, Roy. "Herbicide Resistance May Change Future of Row Crop Farming in Southeast." *Southeast Farm Press*, August 8, 2006. southeastfarmpress.com/herbicide-resistance-may-change-future-row-crop-farming-southeast.
- Rose, Nikolas. *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century*. Princeton, NJ: Princeton University Press, 2007.
- Serruya, Ricardo. *La Venganza del Amarantho*. Rosario, Argentina: Último Recurso, 2013.
- Simioni, Adrian. "Raul Montenegro: En Monte Maiz se hizo una ciencia deficitaria." *La Voz*, May 14, 2015. lavoz.com.ar/ciudadanos/raul-montenegro-en-monte-maiz-y-malvinas-argentinas-se-hizo-ciencia-deficitaria.
- Tomizawa, M., and J. E. Casida. "Selective Toxicity of Neonicotinoids Attributable to Specificity of Insect and Mammalian Nicotinic Receptors." *Annual Review of Entomology* 48 (2003): 339–64.
- Tsing, Anna Lowenhaupt. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton, NJ: Princeton University Press, 2015.
- . "Unruly Edges: Mushrooms as Companion Species." *Environmental Humanities* 1 (2012): 141–54.
- Tuesca, D., J. C. Papa, and S. Morichetti. "Amaranthus palmeri, una maleza arribada a nuestro país desde el Hemisferio Norte." Instituto Nacional de Tecnología Agropecuaria (INTA), Centro Regional Santa Fe Estación Experimental Agropecuaria INTA Oliveros, 2009. inta.gob.ar/sites/default/files/script-tmp-inta-alerta-amaranthus-palmeri.pdf.
- United States Department of Agriculture (USDA). "Amaranthus palmeri." Accessed May 2016. plants.usda.gov/core/profile?symbol=AMPA.
- Vestal, Paul A. "Ethnobotany of Ramah Navajo." *Papers of the Peabody Museum of American Archaeology and Ethnology* XL(4). Reports of the Ramah Navajo. Report no. 4. Cambridge, MA: Harvard University, 1952.
- Ward, Sarah M., Theodore M. Webster, and Larry E. Steckel. "Palmer Amaranth (*Amaranthus palmeri*): A Review." *Weed Technology* 27 (2013): 12–27.
- Williams, Gary M., R. Kroes, and I. C. Munro. "Safety Evaluation and Risk Assessment of the Herbicide Roundup and Its Active Ingredient, Glyphosate, for Humans." *Regulatory Toxicology and Pharmacology* 31, no. 2 (2000): 117–65.
- Zazo, Francisco Eduardo, C. C. Flores, S. J. Sarandon. "El 'costo oculto' del deterioro del suelo durante el proceso de 'sojización' en el partido de Arrecifes, Argentina." *Revista Brasileira de Agroecologia* 6, no. 3 (2011): 3–20.
- Zibechi, Raúl. *Territories in Resistance: A Cartography of Latin American Social Movements*. Oakland, CA: AK, 2012.