CULTURAL ANTHROPOLOGY

PREDATORY FLEAS, STERILE FLIES, AND THE SETTLERS: Agricultural Infrastructure and the Challenge of Alien-Native Dichotomies in Israel/Palestine

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On a warm winter's day in 2015, I join Orit, a pest inspector, for a tour around one of the fifteen bell pepper hothouses assigned to her supervision in the mid-Arava/Arabah, a desert area in the South of Israel/Palestine. Inside the greenhouse, the temperature is even higher than outside. Orit tells me that her job is to trace and identify "pests"—insects that damage crops in the fields—and to recommend a pertinent course of action. Orit thoroughly surveys the greenhouse and then starts weaving through the rows of peppers. Soon, she points out one specimen, gesturing to where the pepper joins the plant. I try to discern what she is pointing at, but all I can see are silvery marks on the pepper's bottom. But Orit recognizes the signs. She marks the plant with a colored ribbon that indicates "contaminated" and announces to me, "Western flower thrips," before moving on.

Several days later, I am back inside the greenhouse, this time with Asaf, a farmer and the owner of the greenhouse. Asaf is relatively new to the area, having lived there only seven years. As I watch, he picks up a small white flask and shakes brown specks on the leaves of plants singled out by Orit. The specks come alive.

The "specks" are Orius, predatory fleas and "natural enemies" of the Western flower thrip, considered one of the most harmful pests (*mezik* in Hebrew) for bell peppers and tomatoes. The thrips "invaded" the Arava/Arabah in the early

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1980s, arriving with the introduction of intensive agriculture. Orius and other insects contribute to the growers' efforts to thwart damage to their crops. In the professional jargon of farmers and ecologists, these insects are known as the "beneficials"—or "good insects"—as they fight pests like thrips. Orius, too, is an invasive species of sorts, but it is a more recent immigrant than the thrips. Nor did it arrive by accident. The abilities of Orius to reduce the thrip population have become known around the world in recent decades, and they have been brought to the Arava/Arabah in collaboration with farmers, scientists, and the state. Orius stock is grown in special factories of a private company in Israel and sold in small bottles for use in the fields.

A few days later Asaf sends me a grainy photograph of Orius feeding on thrips by sucking out the latter's bodily fluids. For Asaf, the fight against the thrips has proved successful so far; it will allow him to sell his produce to European markets. Orius, like aphids, sterile flies, and other insects now mobilized for "biological pest control," operate as a major part of the more-than-human "agricultural infrastructure" that allows settlement and agriculture in the Arava/Arabah region to continue today.[1]

Figure 1. The Orius, senior representatives of the "Arthropoda mercenaries." Photo by Jack Dykinga, United States Department of Agriculture.

In this article, I follow predatory fleas and other insects, as well as the farmers themselves, to examine the ecological and political impacts of Zionist settlement of the Arava/Arabah desert and the fluidity of definitions of alien and native species. I use the term *agricultural infrastructure* to describe the network of connections that make agriculture possible, beyond the system's physical components such wells, pipes, and wooden pallets. I show agricultural infrastructure to be a political enterprise: it establishes hierarchical boundaries between communities and strengthens land control. It also establishes and maintains human–non-human boundaries, often resulting in compounding ecological harm. Yet a focus on the various dimensions of agricultural infrastructure within a given context of settler colonialism contributes a more nuanced approach than forcing dichotomous contrasts between alien versus native, settler versus local.

Spanning roughly 1.5 million dunams (about 625 square miles), the Central Arava Regional Council comprises 13 percent of Israel's area (within its pre-1967 borders). Some 3,500 Jewish Israelis,[2] constituting 0.03 percent of the Israeli population, reside in seven rural communities that stretch along the Jordanian border and subsist primarily on agriculture—principally bell peppers and other vegetables for export. As someone born and raised in the Arava/Arabah area,[3] I was not always aware of the socio-cultural implications of the settlement and certainly was not cognizant of the "natives" issue. In the early 1970s, my parents moved to the region and began to engage in agriculture as part of the Jewish settlement (*moshav*). With their friends, they considered themselves "pioneers," sent by the state to fight the wilderness and transform it into a prosperous agricultural sector. We, the second and third generation of Jewish settlers, considered ourselves desert children, natives of the region. The idea of defending the desert is embedded in our identities; even though the 1948 war pushed Bedouin out of the region, their traces remain: in place names, regional folklore, and the dread that if we do not hold onto the land, they will (re)conquer it.

As a child, I had little interest in the question of when settlers become natives (Mamdani 1998; Zreik 2016). My friends and I considered the desert our natural home. Only during my university years did I start digging deeper, reading, studying, and exploring the past and present to comprehend the tensions inherent in our activities in the Arava. In the process of my training and work as an anthropologist, I went through a perceptual transformation from a settler who considers himself a native to a researcher who critically investigates the privileges and power relations embedded in that settler ideology. At the same time, as I learned more, I became increasingly uncomfortable with some aspects of the paradigm of settler

colonialism. Despite the similarities between the theories and the reality I knew, the writing on settler colonialism seemed too dichotomous, not nuanced enough, and often indifferent to the existing spectrum between natives and others.

I found ecology to be an excellent lens through which to examine both my perceptions and the general logic of settler colonialism. Local and global ecologies have been significantly influenced by settlement projects. Several scholars have shown how such projects, from North America throughout Australia and Africa and all the way to the Middle East, have sought to re-engineer climate, creating a new environment (Braverman 2021; Davis 2015). Others have demonstrated how plants and agriculture have been used to restore indigenous identity in settler-colonial settings (Monterescu and Handel 2019; Sabbagh-Khoury 2022; Tesdell 2017). Following the perspectives of Tomaz Mastnak, Julia Elyachar, and Tom Boellstorff (2014) as well as Stefan Helmreich (2005), I began to consider invasive and local species, alien and endemic species, and to examine critically how humans identify, comprehend, and act toward them, especially within the paradigm of settler colonialism.

Anthropologists have also played with the comparisons between the discourse on invasive species and settlement projects (Raffles 2010; Comaroff and Comaroff 2001; Bocci 2017), specifically in the space of Israel/Palestine (Braverman 2009, 2021; Gutkowski 2021; Salih and Corry 2022). In addition, the definition of what is considered an invasive species and what indigenous has been at the center of social research for several years. For example, David S. Trigger and Lesley Head (2010) analyzed cultural differences between different groups in Australia in their definitions of "invasive" and "native," while Helmreich (2005) showed how scientists' cultural perceptions affect the different definitions and classification of invasive species, as well as the impact of politics and history on the practices against such species. Following this, Mastnak, Elyachar, and Boellstorff (2014) question the effectiveness of distinguishing between native and other plants as a way of understanding the relationship between the human and the non-human in a colonial context and in the Anthropocene era, while Charles R. Warren (2021) examines the use of the terms *native* and *alien* that create—in his view—a cultural dichotomy based on Western ideas.

Elsewhere, I continue this approach and trace the cultural, social, and political meanings of the question of when an alien species becomes a native, showing how the definitions of *foreigner*, *invader*, *native*, and *citizen* are sometimes cultural, political, and temporary (Kolodny and Shani, in preparation). In this sense, the question of time forms part of politics. When does an alien species stop being

considered as such and by whom? Yet while researchers of the non-human agree on the ambiguity and complexity of these categories, when we return to the human and settler colonialism, a rigid binary tends to remain.

The question of nativeness, or the desire of the settlers to become natives, lies at the heart of many settler-colonial projects (Wolfe 2006; Zreik 2016; Sabbagh-Khoury 2022; Kotef 2020). Although some consider the Israeli case unique because of the claim to be continuing a mythical and historical past rather than one of new settlers (Busbridge 2018), the modern Zionist project shares many characteristics with other models of settler colonialism, especially in an ongoing project of "becoming native" (Zreik 2016; Evri and Kotef 2022). And like other settler projects, the Zionist emphasis lies on intensive agriculture operations and endeavors to both connect and control nature and the desert (Salih and Corry 2022; Davis 2015).

The discussion that developed around Mahmood Mamdani's (1998) "When Does a Settler Become a Native?" and Raef Zreik's (2016) response suggests that only a radical change in the structure of the settler state—and in the settlement practices themselves—can dissolve the dichotomous categories of native and settler. That is, as Yuval Evri and Hagar Kotef (2022) rightly point out, such claims do not specify the ways in which the settler becomes a native, but rather the ways in which that distinction is made less significant. Evri and Kotef, on the other hand, challenge the dichotomy themselves by asking the opposite question. By focusing on Jews who lived in Palestine before the Zionist era and analyzing the connections between language, land, and identity, they show how natives became settlers. Further, they point out the fluidity and temporality of the definitions of *indigenous* and *settler* and how politics, history, and boundary work influence them.[4]

The ethnographic research on which I largely draw has played out in what Donna J. Haraway (2003) refers to as "contact zones"—zones in which encounters and interrelations take place between different species who share neither language nor characteristics but who nevertheless affect one another. In the Arava region, such zones mainly comprise the fields and hothouses adjacent to settlements. Following Daniel Miller (1997),[5] I trace the multiple appearances of agricultural infrastructure, which includes different players, human and non-human alike. My fieldwork was carried out from 2013 to 2016 and consisted of more than fifty in-depth interviews with Arava growers, residents, state officials, scientists, and officials of environmental organizations. I conducted it alongside the daily work of farmers, sessions, different events, conferences, and meetings. This research al-

lowed me to draw a more comprehensive picture of human–environment relations in the Arava, including the forces that forge them.

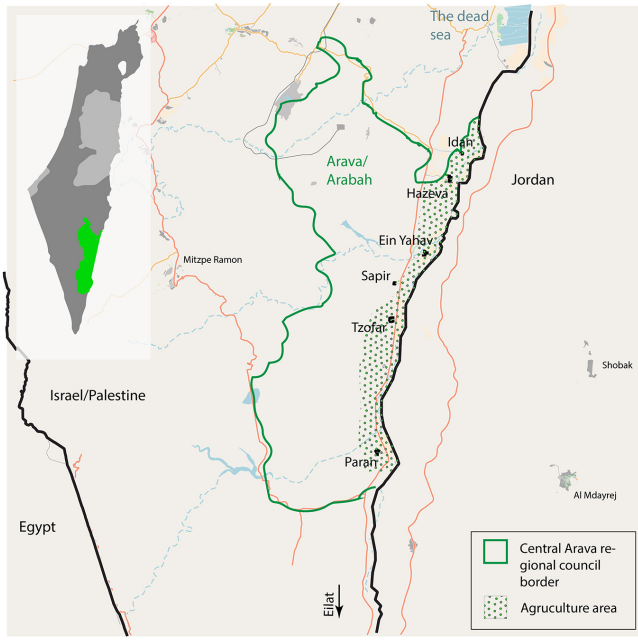

Figure 2. Map of the Central Arava Regional Council.

ON INFRASTRUCTURE AND AGRICULTURAL INFRASTRUCTURE

As a conceptual tool, "infrastructure" brings several heterogeneous elements together. The framework of environmental or ecological infrastructures allows us to examine the making and remaking of worlds that are at once material and semiotic, inhabited not only by people but also by a multiplicity of non-humans (Barua 2021; Jensen and Morita 2015). Scholars have conceptualized infrastructure as a large technical system, an ecology, a site of (geo)political struggle, and an axis that connects nature and culture (Bishara 2015; Stamatopoulou-Robbins 2019; Krieg, Barua, and Fisher 2020). Since the 1990s, the term has become a key concept in environmental management, as the anthropologist Ashley Carse shows (2012). Carse uses *environmental infrastructure* as an analytical term in his study of the Panama Canal to signify the transformation of nature into a coordinated system of service distribution. Other anthropologists have deepened the connection between infrastructure, environment, and politics, including Sophia Stamatopou-

lou-Robbins's (2019) work on waste in Palestine, Caterina Scaramelli's (2019) on swamps in Turkey, or Jessica Barnes's (2017) on irrigation infrastructure in Egypt.

However, the environmental transformation inherent in agriculture, especially intensive agriculture in desert areas, generates a different level of environmental and political change. While other environmental infrastructures are more concerned with disasters, complex structures, or energy resources (Jensen and Morita 2015; Adalet 2022), agricultural infrastructure concerns itself with the connections between water, land, crops, workers, and technical equipment, as well as with territorial control, environmental transformation, and setting national and geopolitical borders. As a geopolitical enterprise, it establishes boundaries between various communities while also maintaining and establishing human–non-human boundaries. It describes the political, economic, and cultural networks that motivate and sustain agricultural practice, as well as the physical and more-than-human links.

On one level, agricultural infrastructure elucidates the political and material efforts to divide human from human—creating borders and hierarchies between different groups around accessibility, control of land and the means of production, and regional and global politics. It represents nationalist and colonialist conceptions alongside an environmental vision of making the "desert bloom" and the appropriation of space and time (Davis 2015; Gutkowski 2018). But it also deals with concrete and material representations: fences, people, fields, lighting, and the army. Agricultural infrastructure allows the creation of a continuum of Jewish-Zionist communities along both internal and external frontiers. It also allows for a physical spatial presence against what the settlers and the Israeli state regard as dangerous groups—such as the Bedouin within Israel's internal borders or their entry, including from across Israel's border with Jordan.

On another level, agricultural infrastructure makes it possible to control and change nature and the desert, turning it green and making it a productive space. But such changes carry with them unintended consequences. The creation of intensive agriculture, irrigation systems, the use of chemicals, the utilization of natural resources, and more lead to changes in the local environment, such as the eradication of many habitats and the creation of others, dramatically affecting biodiversity. Agricultural infrastructure is followed by alien and invasive species that displace native species, such that even the use of biological pesticides usually fails to restore the previous ecological balance. In this manner, alien species, human and non-human, rely on infrastructure as they move from space to space (Gutkowski 2021; Barua 2021).

But as many researchers have already shown, one of the conceptual strengths of infrastructure is that it is not frozen, but changes, develops, and reshapes over time (Barnes 2017). So, too, does agricultural infrastructure, adapting itself according to economic, geopolitical, technological, and social needs.

AGRICULTURE AS A MEANS OF MAINTAINING INTERNAL AND EXTERNAL BORDERS

"*Agriculture Protects the State Borders*," reads a sign on the Arava highway, the road that runs through the region from north to south. This appears like something of an anachronism for most of the Israeli general public, when forces such as neoliberalism are challenging the importance of agriculture for Israeli society and eroding its political power (Shnider 2014; Kaminer 2022b). Yet this sentiment still resonates with the self-identity of the region's Jewish residents. For Israelis, agriculture has played, and still constitutes, an important role in maintaining the state's external and internal borders.

Figure 3. "Agriculture Protects the State Borders." Photo by Liron Shani.

As in other instances of settler colonialism, the desert, like the land of Israel at large in the early days of Zionism, was perceived as an empty "wasteland," its fate lying in the hands of humans (Tesdell 2017; Alatout 2009). Agriculture, with the support of state and military agencies, was the main practice employed to realize the dreams of "making the desert bloom,"[6] while drawing both internal and external national boundaries in the process (Monterescu and Handel 2019; Shani 2018b). Spurred by imperialist views of an overarching agricultural infrastruc-

ture (Tesdell 2017) and by colonialist concepts of struggles against desertification (Alatout 2009; Davis 2015), organized farming proved a key to the success of the settlement project and so developed advanced technology to enable it (Shani 2018a; Tubi 2021). Scores of agricultural communities were set up close to frontier lines, informed by the conviction that their presence would assert Israel's borders more effectively than fences. Following this logic, settlements were also established in the Arava desert along the Israeli-Jordanian border, which was established after the 1948 war and reaffirmed in the 1994 peace agreements.

Initial attempts to establish Jewish communities in the Arava in 1948 failed because of harsh environmental conditions. Only in the early 1960s, when the Israeli military began establishing semi-civilian outposts along the border, did a cadre of young Zionist idealists manage to realize their ideals of cultivating the desert. Eventually, those outposts became a permanent agricultural settlement enterprise, expanding under the national conviction that securing the nascent state's borders meant populating outlying areas. Echoing what we would now term settler-colonialist logic and celebrated as pioneers and the embodiment of Zionist values, these young farmers enjoyed considerable moral and financial support, with the state investing huge amounts of capital in the development of agricultural infrastructure, which included, among other things, deep-water drilling, cultivating agricultural areas, workers, the deployment of irrigation infrastructure, the paving of roads, the construction of dams, and encouragement of financial investment, all backing the boundary drawn between Israel and Jordan.

At the same time, agriculture served—and continues to serve—to maintain internal borders, within what are defined as the borders of the state, or "inside the Green Line." The relationship between humans and land in the Arava dates back thousands of years. During the sixteenth century, the Saidiyin Bedouin tribe migrated to the area from the Sinai and Arabian peninsulas, in search of new grazing grounds, which they found on both sides of Arava/Arabah Creek (Bailey 2006). Elsewhere in the Negev, north of the Arava, twentieth-century battles for Israeli statehood led to the flight and forcible expulsion of Bedouin inhabitants, as well as to protracted territorial struggles between the Bedouin and Israel (McKee 2016; Abu-Rabia 2008; Nasasra 2017). While no significant conflict took place in the Arava, after the drawing of the border with Jordan in Wadi Arabah, Bedouin tribes were denied the right to return to the western Arava Creek. Consequently, there are almost no Bedouin in the central Arava region. Thus, unlike in other parts of the Negev, almost no friction exists between them and the Jewish settlers today. Nonetheless, the Jewish residents remain afraid for their future in the Arava. Time

and again in their conversations and practices, local growers cite the threat of those they perceive as their national competitors, the Bedouin, despite the latter's absence from the region. As many of the residents told me, "If we're not here, someone else will grab hold of the land."

The introduction of agricultural infrastructure as a means of defining the national and internal borders contributed to the transformation of farm practices in the region. In the early years of settlement, the ethic of manual labor was prioritized. That is, the settlers themselves worked the land. However, as communities grew, processing technology improved production efficiencies, challenging the ideal of independence. Initially, Jewish volunteers and backpackers from abroad provided additional labor, but since the mid-1980s, when the economic crisis was accompanied by the massive entry of a neo-liberal approach, things have changed. Government support decreased and growing competition in European and world markets indicated agricultural infrastructure as no longer adequate. Vegetable cultivation, then as now, proved labor-intensive, and exposure to the global market made cheap labor necessary. Currently, the agricultural infrastructure in the Arava relies heavily on the Thai labor force, which began to supplant volunteers in the 1990s.[7] Thai workers arrive for a set period and return home when their visas expire; in recent decades, they have made up about half of the population in the area.

Thus, agricultural infrastructure originally based on the labor of the settlers themselves changed dramatically within thirty years, encompassing an array of employers and landowners versus temporary workers who could not become local (Kaminer 2022a; Shnider 2014). Although agriculture would not be possible without the Thai workers, the Israeli farmers still see *themselves* as the pioneers, the guardians of the state borders, and those who responsible for transforming a supposed wasteland into a green space of productivity. Now, almost sixty years after the establishment of the first Jewish communities in the region, the residents feel that they have changed the desert completely. Moreover, they have made it their home.

But even before settlement, the desert never constituted an actual wasteland. Alongside its human residents, the mid-Arava sustains a vast diversity of non-human inhabitants, permanent or temporary, migratory passersby, and some recent arrivals who have made the region their home (Shani 2018a). But the belief in the need to change the desert has led settlers to ignore everything that predated their arrival (Davis 2015; Dromi and Shani 2020).[8] Water, land, technology, government support, massive capital, and cheap foreign labor have been some of the most prominent components of the agricultural infrastructure introduced and sup-

ported by settlement, but it, too, continues to change. In the early 2000s, settlers realized that their heretofore successful farming practices required adjustment, this time through the recruitment of non-human players.

STERILE FLIES, GLOBAL FRICTION, AND CROSS-BORDER STRUGGLES

The small aircraft takes off at dawn, as the sun is just rising over the Mountains of Edom. A few minutes later, it sets its course, flying back and forth across the Jordanian border several times as it starts releasing its load. Thousands of black "specks" pour from the aircraft to the desert below. Only as the swarm of specks nears the ground can one finally make out what they are: Insects. An awful lot of insects. The aircraft is scattering flies over the Arava.

These are no ordinary flies, but sterilized male Mediterranean fruit flies, or *Ceratitis capitata*. The flies are yet another major example of insects that have become part of the regional agricultural infrastructure. The sterile males, whose mating with female flies produces sterile eggs, allow the Mediterranean fruit fly population to be controlled and reduced to the point of declaring the Arava a fly-free zone. Such a declaration enables agricultural exports to countries like the United States or Japan, which enforce a strict no-entry zone for crops contaminated by the Mediterranean fruit fly. Although battlefield metaphors usually accompany struggles against insects (Russell 2001; Reis-Castro 2021), the struggle against the flies in the Arava has been mobilized as a symbol of the peace processes between humans (Gutkowski 2021).

It is not only flies that you have in the Arava, however. Different insects are present at any given moment, in their thousands, in the air and on the ground: bees, flies, ants, and butterflies. Many insects live and buzz around us, in what the anthropologist Hugh Raffles (2010, 7) refers to as "aerial plankton." When we talk about human–animal relations, we generally refer to our relationship with pets or other common animals. But a large proportion of those animals that come into contact with humans fail to garner scholarly and public attention, although they can occasionally play a substantial role in driving historical events or cultural and institutional changes (Mitchell 2002; Reis-Castro 2021; Tubi 2021).

Typically, Arava growers have held negative attitudes toward insects. They perceived most as pests, creatures that harmed crops, and carriers of diseases, a stain on the quality of their life. For the most part, efforts have aimed to get rid of them, drive them away, or reduce their presence. Flies, however, evoke different sentiments. Most humans dislike them. Even among insect lovers, they fail to

arouse favor. Yet in the Arava, inhabitants see them as part of life in the region, part of this place. As one veteran farmer in the area remarked, "This is not a sanitary issue at all. It's a social issue. Where there are people, there are flies. Where there are no people, there are no flies."

But while the housefly is seen as a nuisance that one can put up with, the Mediterranean fruit fly had hardly made its presence known. Few had even heard of its existence, let alone that it posed any threat, until the demands of the American market and economic aspirations to sell crops to the United States entered the scene.

Yellowish-brown in color, the Mediterranean fruit fly measures about five millimeters in length. Despite its name, it probably originated in West Africa, "invading" Israel early in the twentieth century. It reached the Arava with settlement in the late 1970s, pushing out local fly species and reducing their habitats. The fly is considered a "multi-host": the female deposits her eggs in manifold types of fruit and vegetables. Hundreds of fruit species have been recorded as serving as hosts, but as far as growers are concerned, the main threat is to citrus and deciduous fruits such as pears and guava. The fly also makes use of vegetables like tomatoes and bell peppers, though it causes little visible damage to these crops. The fly's eggs, larvae, and pupae lie hidden (inside fruit or beneath the soil); only adults are exposed to ordinary methods of pest control, making them hard to tackle with standard chemical sprays.

Due to its imposing "invasive" powers, the fly is considered a "quarantine pest" by several countries that constitute agricultural export destinations. This means that once identified, fly-contaminated crops are summarily quarantined and destroyed. In the early 1990s, when Arava growers began to consider exporting crops to the United States, it soon transpired that one threshold condition was the reduction of the Mediterranean fruit fly population. "It was not until the Americans told us about a fly problem that we realized there was a problem. It had never been a bell pepper pest. Literature informed us that bell pepper was a [fly] host, but up until then we never felt its presence," reports Alona, who spent many years working in agricultural instruction in the Arava. "But then, once they told us, we started looking into it, conducted experiments with academia, and realized the fly was actually present in the region and the bell pepper was actually a host, though you could hardly tell." The Arava had to rid itself of the fly.

In modern agriculture, growers rely heavily on their export markets, which are shaped by geopolitical elements beyond the control of the grower, community, or even the state (Shani 2018a). Throughout most of my years conducting

fieldwork, the Arava's target market comprised Europe and, to a lesser degree, the United States. The quality requirements for some of these markets include growing parameters, appearance, and disease control. In addition, many requirements pertain to how crops must be grown, particularly efforts to regulate agriculture-environmental relations. Export requirements vary from one country to another, but generally demand the reduced use of harmful pesticides and fertilizers, reduced waste production, and an "environmental" management of landfills, among other things. The stricter American market has additional regulations for the removal of any threat of fruit fly damage to crops. The so-called environmental enforcement by European and U.S. retail chains has also had a major effect on agricultural-environmental relations in the Arava (Shani 2018a).[9]

In an interview in 2015, Yuval Cohen, a representative of one of the environmental organizations in the Arava, pointed out the driving logic of change in the Arava: "If a European buyer comes along, saying: clean up your act by tomorrow, or you're not going to export any produce to Europe, I bet you they'll be all getting their Greenpeace and Nature and Parks Authority member cards the very next day. Why? Because at the end of the day, it's your bank account that matters."

Such was the case with the Mediterranean fruit fly. To be allowed to export fresh fruit to the United States, the fly had to be eliminated from the entire region. Following discussions, political pressure by Arava locals, and other struggles, the fly was declared a national-level pest. In other words, the fly, which locals had hitherto viewed as a tolerable nuisance or a non-issue, became an enemy to be eliminated because of external economic pressures exerted by the export markets. Thus, the state helped establish a new infrastructure to support agriculture in the Arava, enabling the marketing of agricultural produce to the United States.

Since the late 1990s, the "Zahav" project has been operating in the region. The project, whose name is a Hebrew acronym of "Mediterranean Fruit Fly Control in the Arava," is a collaboration between the Ministry of Agriculture and the so-called flagship project of the regional council and agricultural R&D. As part of the project, thousands of sterile male flies, bred in a special system, are scattered across the entire region. The fly-breeding process involves genetic intervention to eliminate the females, as well as radioactive radiation (Rossler, Ravins, and Gomes 2000). As part of the process, scientists have developed a variety of fly with females who are more sensitive to heat than males: the breeding stages see the fly eggs placed in 34-degree Celsius water, in which only the males can survive. The surviving fly eggs are grown on fermented food strata, where they morph into larvae, then pupae, with every stage controlled and supervised. The pupae are

painted fluorescent red, traces of which are left on the adult flies' heads, later allowing the sterile males to be told apart from their "natural" counterparts under UV illumination. The male flies also undergo an additional stage, where they are subjected to hypoxia (a kind of coma induced from lack of oxygen) and put into a radioactive sterilization facility, a technique co-developed with the IAEA (International Atomic Energy Agency).

I join Haim, an Arava grower who coordinates the egg-breeding project, to learn more about the process. The strongest thing that hits me as I get into his car is the smell: the smell of the fly bags, with their substrates—the source of the odor, combined with their pheromones—as the flies remain under hypoxia. Haim laughs at my disgusted face. "Everyone gets used to it, eventually," he says, patting my shoulder. He and his staff grow the pupae in special rooms, also dominated by an unbearable smell.

Several days after the eggs have hatched, Haim shows me how he moves them to sleep-inducing refrigeration, from which they will be awakened as they are tossed out of an aircraft flying above the Arava. The sterile flies are scattered on both sides of the Israeli-Jordanian border, in collaboration with the Kingdom of Jordan. Fly-scattering is a year-round operation, performed in the early morning, the peak time of the flies' sexual activity. The sterile males, scattered in a ratio of about fifty specimens to every "natural" male fly, or roughly 14 million flies per week, step into the shoes of the natural wild flies, and mate with the females.

Any eggs deposited by female flies following this mating session are infertile, decimating the fly population. And so, the domesticated sterile fly precipitates the extinction of its supposedly local counterpart, which actually invaded the region following humans, and which, in turn, took the place of the "native" fly, which, too, probably came from another area. The sterile fly disrupts the "authentic" "alien" fly and thus highlights the dangers of assuming dichotomous definitions of a native in the face of an invader, challenging the way we perceive them.

The fly-scattering project has been hailed a success, and the Ministry of Agriculture expresses great pride in it, especially in the collaboration with Jordan. The project has subsequently ventured into other regions of Israel, and even yielded (partial) collaboration with the Palestinian Authority. In reality, though, the collaboration with Jordan also remained partial, and in recent years it has been virtually non-existent. Nevertheless, it remains one of the first things described in any article or press release about the project, and it could be the very thing that keeps it alive, now that export to the United States has become an increasingly less lucrative prospect.

As Natalia Gutkowski (2021, 149) points out, Israel has led and mastered this technology and thus succeeded in affirming colonial control over the territory in a way that shows how the fight against pests forms part of a political, organizational, and techno-scientific endeavor (Russell 2001; Tubi 2021). As elsewhere, the war on pests is used to strengthen the justification for the settlement regime (Mitchell 2002; Russell 2001) and constitutes a continuation of the expansion of agricultural infrastructure. But the local twist in our story is how the infrastructure for combating pests as a platform for international cooperation and strengthening peace relations actually enhances the control mechanisms of settlement colonialism.

Figure 4. Agricultural areas on the banks of Wadi Arava, the border with Jordan. Photo by Noam Ofran.

PREDATORY FLEAS AND INVASIVE THRIPS: Biological Pesticides as an Agricultural Infrastructure

As in other agricultural areas around the world, the fight against harmful insects, which "invaded" the area as part of the environmental changes following the settlers' agriculture, took the form of spraying toxic chemicals. These chemicals have significantly damaged the environment, degraded and polluted water resources, and harmed the health of the growers themselves. Even though they were aware of the damage caused by toxic agents, people in the Arava nevertheless continued to use them as an essential part of their agricultural infrastructure,

assuming it was the only way to succeed in agricultural production. External pressure only precipitated the ensuing change.

As part of the "environmental enforcement" of European retail chains, to which Arava farmers tried to sell their produce, there was a growing demand to cease using chemicals. To meet those standards, farmers introduced biological pest control, pitting "good insects" against "bad insects." And so, the aphids, bugs, sterile flies, and others grown in specialty plants have become the farmers' allies, and part of the agricultural infrastructure. Nowadays, biological or integrated (chemical-biological) pest control makes up almost 90 percent of the overall pest control on the Arava bell pepper farms.

To understand the change of attitudes toward insects among Arava growers, we must go back to the so-called contact zones, back to Asaf's hothouse. It is April and palpably hot, with the thermometer inside hitting almost 40 degrees Celsius, even at this early morning hour. Asaf has invited me over again, to show me how the beneficials have gained the upper hand over the hothouse's pests.

Originally from the center of Israel, Asaf arrived here in 2010 following his partner, Michal. Born in the Arava, Michal is my classmate and a second-generation grower in the Arava. Asaf and Michal met when they were both studying Computer Science in Tel Aviv. Until two years ago, Asaf was working with Oded, Michal's father, who came to the area almost sixty years ago as a member of the founding generation of a settlement in the region. But the couple had recently bought their own property, roughly fifty dunams of farmland (0.05 square kilometers), where they grow thirty dunams (0.03 square kilometers) of hothouse bell peppers and twenty dunams (0.02 square kilometers) of date palms.

Just as the western flower thrips came to the region with the intensive agriculture of Oded, my parents, and their friends when they established the Zionist settlement in the Arava, Orius and the other insects forming biological pesticides came to the Arava at the same time as Asaf. By 2010, when Asaf and Michal started large-scale farming, the growing culture that awaited them differed from that of our parents, with biological pest control a key feature. But the beginning of the era of biological pest control proved tough. In the late 1980s, most growers struggled to ditch their familiar pesticides, some of which were highly toxic not only to the environment but to the growers themselves—a fact still unknown back then. Collaboration between inquisitive agricultural instructors, scientists from academia, and a handful of growers who grasped the potential of this approach led to the early "good insects" experiments.

"It was hard to convince growers that if I scattered insects in their field, this was actually supposed to help them," Alona, a veteran member of the agricultural instruction team in the Arava, relates. "It was only after they had seen this working in other fields that attitudes started to change . . . but particularly after authorities started banning the use of different hazardous materials." Government regulations, coupled with market demands (first abroad and then later in Israel) accelerated the introduction of "Arthropoda mercenaries" and changed perception of insects.

Following the tour of the hothouse, Asaf and I go out for some fresh air. Suddenly Asaf points at the small aircraft hovering above the *moshav's* fields. "There you go," he says, "these are your friends," as I watch in wonder as the aircraft scatters the sterile flies. "Your friends, my soldiers," he smiles.

Though meant as a humorous remark, Asaf's reference to the sterile flies, the product of scientific and technological developments, as "his soldiers" demonstrates the map of the human-insect relationship in the Arava, signaling once again the Israeli military discourse and the integration of the non-human in power relations (Russell 2001; Braverman 2021). The insects are enlisted in the battle to secure the land.

Indeed, the "Zahav" project and the use of biological pest control mark the move away from the monolithic lumping of all insects together as pests, pointing to changes in the human-insect relationship around the Arava. But for most of the region's growers, the use of Orius and sterile flies offers yet another tool in the toolbox designed to maximize agricultural capacity. Rather than pesticides, they resort to a small flask full of insects. Under pressure from consumers and regulations to reduce pesticide use, they found another tool for this end. That is, the shift toward biological pest control was neither a voluntary initiative nor the result of ideological change, but rather an economic inevitability. Likewise, the struggle against the Mediterranean fruit fly resulted from the external enforcement of new regulations.

As Rafi Grosglik (2021) shows in his studies on organic food, most growers who practice organic farming in Israel view organic agriculture as yet another branch of conventional agriculture. The adoption of Arthropoda mercenaries can be viewed similarly. Pesticides, as well as the Orius and the sterile male flies, belong in the same interpretive framework of means of production. In this sense, Asaf's use of the term *soldiers* can be compared to the common branding of biological pest-control insects as "mercenaries" (who are there for financial gain). This difference is all the more interesting in our case, where those "fighters" (soldiers

or mercenaries) never chose to join this war; someone else made them this way (literally, by genetic and other means). The "beneficial" insects and sterile flies allow growers to survive in the global, competitive agricultural world.

And yet, insects are not mere partners-soldiers in the economic war. They also partake in the political-colonial struggle, defending the state against the perceived threat of the Bedouin. As already noted, the Bedouin were driven out of the region after 1948, and the region has since been almost exclusively Jewish.[10] But local growers time and again mention the threat of the Bedouin—the national Other within the internal border[11]—in their conversations and practices. Even though both agriculture and its growers are falling out of grace with Israeli society, the sign at the entrance to one community still reminds us that "Agriculture Protects the State Borders." The good insects, in this sense, also form part of the settlement colonialism project by allowing the ongoing agricultural livelihood and presence of Jewish growers in their region. As Gutkowski (2021) demonstrates, the political use of non-human things such as insects and viruses allows the preservation and redefinition of national and ethnic boundaries. The inclusion of insects within the agricultural infrastructure allows Israelis to feel secure of their hold on the land, strengthening the borders, inter-state and human–non-human alike.

AGRICULTURAL INFRASTRUCTURE AND THE QUESTION OF THE ALIEN VERSUS THE NATIVE

In this article, I have shown how different global and local interests challenge the agricultural infrastructure and the material and ideological spectrum it enables. At the same time, I have shown how the people of the Arava, drawing on both human and non-human actors, adjust their agricultural infrastructure to adapt to new realities. Beyond that, tracking sterile flies, predatory fleas, and other insects allows me to challenge some of the tenets of settlement-colonialism approaches, and to sketch a more nuanced analysis. While we recognize the fluidity, political nature, and temporality of the definitions of what is considered invasive/alien species versus native species (Helmreich 2005; Warren 2021; Scoville 2019; Lien 2015), we can exercise similar tools even when the discussion comes to humans (Evri and Kotef 2022).

With the help of the theoretical platform of *infrastructure*, it is possible to bridge the discussion between the human and the non-human within the context of settlement colonialism. Agricultural infrastructure can lead to other things, create connections between things, and change the social and political order (Adalet 2022). In the Arava, changes have occurred due to both external and in-

ternal pressures. It is influenced by geopolitical, economic, environmental, and personal interests and is both flexible and changing. It involves the common technologies of water-pumping and irrigation systems, the conversion of natural areas to agriculture, and sand filling, but it also involves economic subsidies from the state or donations, political ties and informal networks, cheap labor and mercenary arthropods.

Despite the many changes and challenges, the role of agricultural infrastructure persists, preserving the boundaries, privileges, and hierarchy between the ruling group and others, in both the human and non-human realms. On one level, the agricultural infrastructure sustains, and even bolsters, the settlement colonialism project. The very presence of agriculture, the physical presence of the settlements and agricultural areas, all reinforce the national boundaries and underscore the spatial separation of different ethnic groups. At another level, agricultural infrastructure enables (or even requires) environmental change; it allows humans to change the desert into a different environment. In the more-than-human dimensions, the agriculture-protects-our-borders ideology operates not only in the human geopolitical arena but also by fixing the boundaries between the human and the non-human and between nature and culture. It allows humans to control nature, subordinate the desert to culture, and perpetuate the separation between the human and the non-human.

The advent of Orius and other beneficial insects has changed attitudes toward insects among the Arava growers. They mostly consider the "natural" or "wild" insects "bad," while their human-made counterparts, or insects that have undergone some domestication process, are considered "good." In this way, the agricultural infrastructure helps preserve the difference between those perceived as "good" and "beneficial" and those perceived as "bad" and "harmful"; between different nationalities and ethnic groups; between the human and the non-human; between culture and nature. Thus, the "soldier" insects become part of the infrastructure, part of the national and environmental effort to hold onto the desert, and at the same time, change it—to make "the desert bloom." In this way, nature becomes part of politics and geopolitics, part of the Israeli system of political and environmental control.

Agricultural infrastructure enables the continuation of the project of land holdings and the regime of privileges, alongside a deepening of the desire to become a native. Asking the question of when an invasive species becomes a native (Kolodny and Shani, in preparation), as opposed to the question of when a settler becomes a native (Mamdani 1998; Zreik 2016), makes it possible to challenge

the dichotomous model of settlement colonies and perhaps allows a more complex view. Future studies may find the native and the alien to constitute two poles of a spectrum, and that initially alien species may gradually naturalize and become an inherent part of the native culture and ecosystem. Further, this spectrum may be considered a multi-dimensional space, so that the naturalization process may take place along different dimensions at different rates. Some of these dimensions are sociological, cultural, or political and reflect the different ways that various humans or human groups perceive a species.

In this way a parallel conversation takes place in the face of the discourse surrounding insects—the local insects, which were pushed out in favor of the "invaders" who came with the settlers' intensive agriculture, in the face of the "good" insects, the "civilized" insects spread by the farmers in the fields. This stands in contrast to the narrative about human settlers, the "pioneers" who came to the area after the displacement of the Bedouin occupants and view themselves as natives of the area, together with young people like Asaf who have been moving to the area in recent years. Using agricultural infrastructure, we can connect these two discourses and identify how the non-human is used to reclaim the native conception of the settlers in the Arava. Although the question of privilege remains the same (Zreik 2016), such a discussion allows a more nuanced understanding of the encounter between settlers and natives.

The flexibility of agricultural infrastructure to adapt to the changing economic and political conditions, and the massive state support that ensures its continuation, shows its importance for the settlement project and the continued Jewish hold on the land. Thus, the Arava's agricultural infrastructure forms part of Israel's geopolitical relations in the region, what Jean Carlos Hochsprung Miguel, Martin Mahony, and Marko Synésio Alves Monteiro (2019) call "infrastructural geopolitics." Meanwhile, mobilization of the non-humans in favor of the project of turning the settler into a native, as part of the agricultural infrastructure, opens a new space for understanding settlement projects with political, geopolitical, and environmental drive, and for a renewed understanding that these constitute two sides of the same coin.

ABSTRACT

In this essay, I follow predatory fleas, sterile flies, and other insects, as well as farmers, across the Arava/Arabah, an arid desert region in southern Israel/Palestine, south of the Dead Sea, marked by harsh environmental conditions. Following a four-year ethnographic study, I examine the ecological and political impacts of Zionist

settlement in the area and the fluidity of definitions of alien/native species. I use the term agricultural infrastructure *to describe the network of connections that make agriculture possible—wells, pipes, and "beneficial" insects—as part of a theoretical framework that integrates both the human and non-human in the Anthropocene era, while also examining the challenges posed by environmental and agricultural transformation. Agricultural infrastructure is shown in this piece as a political enterprise: it establishes hierarchical boundaries between communities and strengthens land control while maintaining and establishing boundaries between humans and non-humans, often resulting in compounding ecological harm. Yet the use of the term* agricultural infrastructure *within a given context of settler colonialism contributes a more nuanced approach than dichotomous contrasts between alien versus native, settler versus local.* [infrastructure; agriculture; non-human; Israel/Palestine; environment; alien species; settler colonialism]

תקציר

במאמר זה אני עוקב אחר פרעושים טורפים, זבובים מעוקרים וחרקים אחרים, כמו גם אחרי החקלאים עצמם, ברחבי הערבה, אזור מדברי צחיח בדרום ישראל/פלסטין, דרומית לים המלח, המאופיין בתנאי סביבה קשים. בעזרת מחקר אתנוגרפי בן ארבע שנים, אני בוחן את ההשפעות האקולוגיות והפוליטיות של ההתיישבות באזור ואת נזילות ההגדרות של מינים זרים/ילידים. אני משתמש במונח "תשתית חקלאית" כדי לתאר את רשת הקשרים המאפשרים חקלאות - קידוחים, צינורות וחרקים "מועילים" - כחלק ממסגרת תיאורטית המשלבת הן את האנושי והן את הלא אנושי בעידן האנתרופוקן, יחד עם בחינת האתגרים שמציבים השינוי הסביבתי והחקלאי. "תשתית חקלאית" מוצגת במאמר זה כמפעל פוליטי: היא קובעת גבולות היררכיים בין קהילות ומחזקת את השליטה בקרקע תוך שמירה וביסוס של גבולות אנושיים והלא אנושיים, מה שגורם לרוב לפגיעה אקולוגית מורכבת. אך השימוש ב"תשתית חקלאית" בהקשר נתון של קולוניאליזם התיישבותי מאפשר גישה יותר ניואנסית מאשר ניגודים דיכוטומיים כמו זר מול יליד, או מתיישב מול מקומי.

[תשתית, חקלאות, לא-אנושי, ישראל/פלסטין, סביבה, מינים זרים, קולוניאליזם התיישבותי]

NOTES

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1. My interlocutors distinguish between *hityashvut*, the Hebrew word for settlement, mainly within the Green Line, and *hitnahalut*, which refers to settlement beyond the Green Line, principally in the West Bank. The Green Line is the original demarcation set forth in the 1949 Armistice Agreements between Israel and Jordan. Following the 1967 war and Israeli conquest of the West Bank, the Green Line became the de facto border between the Israeli-occupied Palestinian West Bank and the internationally recognized territory of Israel. The Jewish residents of the Arava, most of whom are on the left of the Israeli political map, see themselves as part of a *hityashvut* and view the *hitnahalut* in the West Bank as right-wing political activism and a deviation from Zionism.
2. With the exception of some three thousand Thai workers and a single Bedouin family living within the council's jurisdiction.
3. Since I refer in this article to the way the settlers perceive themselves and their environment, I will refer later in the essay to the name of the area as "Arava."
4. From another angle, Lana Tatour (2019, 1570–72) criticizes the essence of the definition of the indigenousness of the Bedouin communities in Israel/Palestine and claims that it is based on a political discourse predicated on the fetishization of Bedouin culture as premodern and endangered, thus possibly harming their struggle for land.
5. Daniel Miller (1997), whose acclaimed ethnographic works on "things," maintains that the best one can do is to approximate the (non-human) thing and its interconnection with the social.
6. The phrase "making the desert bloom" makes for a strong ethos in Zionism. It refers to the "wasteland" the Zionists supposedly found when they arrived on the land, but mainly it points to the technological, entrepreneurial, and ideological ability of Zionism and the state (George 1979; Tal 2007). An example of this in the context of the Arava can be found in a 2014 report on CBN News, "Israelis Use Technology to Make the Desert Bloom" (https://www.youtube.com/watch?v=68XFaXXHpj0).
7. The employment of Thai workers in agriculture intensified in the wake of rising violence in the Israeli-Palestinian conflict in the early 1990s. The resulting travel and employment restrictions imposed on Palestinians disrupted agriculture in central and northern Israel, which had previously sourced significant labor from the occupied Palestinian territory (however, there were no Palestinian workers in the Arava). Following the shortage of labor in agriculture, cheap labor from Thailand began to enter agriculture, including in the Arava region (Kaminer 2022a).
8. For example, beyond the attraction of many alien species to the food reserves that agriculture creates, and as part of the mobility of infrastructure (Barua 2021; Mitchell 2002), materials and objects that come with agricultural implements (for example, wooden pallets and cultural crops) bring with them non-human objects alien to the local ecology, such as a variety of termites, invasive plants, and harmful insects. Foreign species, associated with human activity and agriculture, begin to repel the native species, becoming "erupting species." Thus, for example, the common fox replaced the desert fox, the cultured bee pushed out the desert bees, and the like. This process has been ongoing for thousands of years, but the scale of Jewish settlement and the intensive agriculture that have occurred since the 1960s have led to a significant change.
9. In the Arava, as elsewhere, the engines of change are neither internal nor occur at the state level; they are enforced by international corporations or supranational organizations such as the European Union as part of what some call "corporate colonialism" (Martin 2018) or "environmental colonialism" (Agarwal and Narain 1990).
10. With the exception of roughly three thousand migrant workers from Thailand, arriving for a set period of time and returning home when their visas expire, and a Bedouin family living within the council's jurisdiction.
11. Unlike the Jordanian neighbors, who are the objects of collaboration efforts, as in the cases of the Mediterranean fruit fly, tourist development, etc.

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