

***Becoming-the-dash*: Exploring the connections between landrace breeding and an eco-social approach to health**

by

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Declaration of Originality

I hereby declare that I am the sole author of my thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Seed–people relationships date back millennia but have been dramatically reorganized in the last 100 years. This reorganization is just one part of the vast array of interconnected factors that together have led to the entrenchment and domination of the current industrial food system. This food system, in turn, is a major driver of global environmental degradation. The results of the ongoing accelerating deterioration of the health of the planet have profound consequences for the health of all beings that live upon it. While much research has been done exploring the role of food systems in influencing the health of both people and planet, less is understood about the role that seeds play. Landrace seed breeding is a traditional form of seed–people relationship in which both are understood to be engaged in a co-evolutionary process of adaptation. In contrast to modern seed–people relationships in which seeds have been commodified and privatized, landrace breeding is understood to be a collaboration between seeds and people. This thesis considers the ways in which landrace seed breeding is connected with an eco-social approach to health through the exploration of the relationships that exist between seeds and people within the context of an ongoing landrace breeding project in Ontario, Canada. Rooted in posthuman and assemblage theory, and employing posthuman methodologies, this study takes the shape of a multispecies ethnography in which seven humans and five landrace populations of watermelon participated. This research found that the relationships between growers and watermelons created a unique space from which a re-orientation of worldviews, new perspectives, and new stories about how humans relate with other species could emerge. In light of the ongoing calls for new ways of knowing and doing by those seeking to address the growing challenge of supporting health from an eco-social perspective, this research suggests that landrace seed breeding may be of importance beyond the agronomic benefits it is known to provide. This research also exemplifies the relevance and utility of posthuman and assemblage thinking (as both theory and research methodology) in facilitating a reimagining of the world around us and the place and role of humans within it.

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Prologue

In 2019, 23 different varieties of watermelon grew together on a farm near Ottawa. A farmer named Manish decided to do something “a little bit crazy” (as he later told me in his words) and planted out several hundred seeds of different varieties to see what would happen. The seeds grew into plants. The plants flowered, cross pollinated and produced hundreds of diverse watermelons, full of mature seeds. He saved their seeds and shared them. These seeds were then planted the next year.

Diverse melons grow in Joseph’s garden too. Melons used to have a hard time thriving there, in Utah. But now things are going better for the melons and the other plants growing in the space he cultivates. By planting all sorts of different varieties of crops all together and letting them cross pollinate, the plants in Joseph’s garden were able to adapt to him and the challenging Utah climate. Each year the melons and other plants grow, flower, cross pollinate, and produce food and seeds. Joseph saves seeds from the best tasting plants. Joseph shares the seeds he saves, tells the story of these seeds, and plants them year after year.

The story of the diverse (landrace) melon crops growing in Joseph’s garden found me as I worked on my own farm one day in 2019. I was intrigued and inspired. I shared my excitement about the idea of trying something similar with a friend who put me in touch with Manish. Manish happily sent me some of the genetically diverse watermelon seeds he had just saved. These seeds reached my mailbox in the spring of 2020.

That summer I planted many of those seeds. They grew into plants who flowered, cross pollinated, and produced eight watermelons with some mature seeds. I saved those seeds to replant next year. Over time, the seeds that I saved from those eight melons grew into three more

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generations of increasingly adapted watermelon. On top of this, and to my surprise, they have facilitated many new connections and relationships.

When I first planted out the seeds I received from Manish I really thought I was just going to try growing some interesting watermelon seeds out. Maybe (hopefully) just like Joseph's garden, I might eventually find some genetic recombination of melon that could thrive in my Northwestern Ontario growing space. I was curious about what would happen. As a farmer I was also acutely aware of the need to be adaptable in the face of climate change. I knew that seeds that could respond to changing conditions were critical for the health and resilience of my farm and my community.

And so it went: I heard a story – I received some seeds – I planted them – they grew into melons – I saved some seeds – I replanted them – they grew into melons – I saved some seeds – I shared some seeds – I started telling my own stories – I replanted the seeds – I shared some seeds – and from it all this research grew. Ultimately it was the story of the watermelons and the humans who work with them that inspired this research. It is the story of these multispecies collaborators that is the focus of this research. It is this story of landrace breeding that began this document, and it is this story I will continue to share throughout it. Indeed, it is a story that will continue to unfold well beyond the pages of this thesis.

Today, more seed producers and growers from several communities are now planting and saving the seeds from this landrace of watermelon. The watermelons seem to be becoming increasingly adapted to the spaces and the growers who tend them. Others are learning about the watermelons – seed companies, market gardeners, friends, neighbours, and raccoons. Manish's seeds and Joseph's story together have grown into a network of plants and people

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working together to explore what can come from embracing diversity– of what together they can become.

Chapter 1: Introduction

Background and Opportunity

There is a growing awareness and sense of urgency around the issue of the rapidly deteriorating health of our planet, the consequences of which are vast, compelling, and entangled: degradation of lands and waters, loss of biodiversity, malnutrition, disease, extreme weather events, and pollution all present significant threats to the health of people and planet (Whitmee et al., 2015). While food is understood to be “the single strongest lever to optimize human health and environmental sustainability on Earth” (Willett et al., 2019 p.3), it is also often cited as the largest driver of environmental degradation. For example, one third of arable land on the planet has been transformed to pasture or cropland (Whitmee et al., 2015). The spread of agriculture into ever more spaces brings the promise of ever more food, but also the reality of displacement for those who were already there. For example, the expansion across the landscape of oil palm plantations is a significant driver of biodiversity loss (Jackson et al., 2010) and also poses a significant threat to the food security and livelihoods of local communities (Seed Change, 2019).

According to Parkes et al., (2020) it is imperative that humanity undertake a “fulsome whole-of-society retooling of the systems and power structures that continue to perpetuate both ecological and social degradation” (p.63). Moreover, we must simultaneously adapt to the changing global environment. Sustainability is no longer enough. For all life on earth, there is a demand for what Jackson et al. (2010) call *sustainagility* – an ability to continue adapting and meeting new challenges in new way. Resilience as the ability to withstand and recover is no

longer enough, rather, we now need to do more than just bounce back but also to transform our reality - to “bounce forward into new ways of seeing and doing” (Parkes et al., 2020, p.63).

Food systems impact our health and the health of the planet (Willett et al., 2019) but the role of seeds in shaping our collective health is too often overlooked. According to the Bauta Family Initiative on Canadian Seed Security (n. d.), “[i]t is quite simple – without seed we do not have food. Virtually all the food we eat begins with the planting of a seed. Seeds are the beginning and the end of the agricultural cycle, the foundation of our food supply, and one of the best tools we have to adapt to climate change” (para.1). Over the better part of the last century, we have renegotiated our relationship with seeds, and by extension with food, people, and the planet (Kloppenborg, 2004). Seed has been co-opted – taken out of the commons by private industry (Kloppenborg, 2004) and folded into the matrix of our productivist food paradigm (Lang & Heasman, 2015). We have discovered increasingly powerful ways to manipulate and control seeds. Yet, how people and societies view seeds, relate to seeds, and use seeds has wide reaching consequences that affect not only agricultural practices but also the systems and structures that impact the interconnected ecological and social factors that impact health and health equity (the eco-social determinants of health). If we are to address the catastrophic challenge of the health of the planet and all who call it home, we must first recognize that we humans are an entangled *part of the ecosystem* (Elton, 2024).

Landrace seed breeding is a millennia-old method used to develop genetically diverse crop populations capable of “producing stable yields under changing conditions” (Lofthouse, 2021, p. xv). In landrace breeding, plants are provided space and time to adapt and evolve while humans select seeds from their preferred plants to be re-sown the next year. Importantly, landrace seed

breeding is a collaboration between plants and people; a dynamic coming together of humans and non-humans. It is a model of seed-human relationship that involves practicing *with* (Phillips, 2016) instead of acting *upon* seeds; and which ultimately transforms both seeds and humans. Landrace seed breeding is a wholly different way of relating to and working with plants than the modern, industrial approach that dominates agriculture in the Global North. The goal of landrace breeding is to co-create a landrace – a heterogeneous crop unified by its unique regional adaptation and reliability. However, through the process of collaboration that leads to a new landrace something else can be seen to be happening. Through their entanglements, human and plant collaborators affect¹ each other. In essence they push and pull each other to evolve new ways of being through their own way of being – through their agency. Agency is a term often used with respect to humans, but it is widely accepted that plants also have agency (Elton, 2024). In plants, agency is understood to be relational rather than intentional (Elton, 2021). As Pollan (2002) describes, co-evolutionary relationships involve the trading of favours between entangled parties in an attempt to advance their own interests. These actions, he explains, need not be conscious.

¹ It is the action of producing an affect (what is being done) which is of interest here, more than the effect (outcome) itself.

On language and vocabulary

Throughout writing this thesis I struggled to find the right words: in the way that someone not used to writing like this can be expected to struggle, but also in the way that one struggles when the words you need aren't there.

In recognizing watermelons and humans as collaborators in landrace breeding, I have tried to explore this practice in a way that decentres humans and challenges the idea of human exceptionalism. In so doing I have come to realize the extent to which human-centric thinking permeates the English language. There is often no concise and clear way to refer to the living beings around who are not human without describing them as “non” or “other-than” (both prefixes loaded with undesirable linguistic baggage). Some scholars have offered up alternatives. Terms like ‘more-than-human’, ‘zoe’, or ‘ones/beings/entities’ have been suggested. While there appears to largely be consensus that we need new words, what those words should be remains unclear. In this thesis, I have chosen to stick with the problematic language of daily discourse (like human/nonhuman) for the sake of clarity and familiarity. It’s a choice with consequences that I outline in the Limitations sections in Chapter 5.

“The fact that one of us has evolved to become intermittently aware of its desires makes no difference whatsoever to the flower or the potato taking part in this arrangement. All those plants care about is what every being cares about on the most basic genetic level: making more copies of itself. Through trial and error these plants species have found that the best way to do that is to induce animals – bees or people, it hardly matters – to spread their genes. How? By playing on the animals’ desires, conscious and otherwise. The flowers and spuds that manage to do this most effectively are the ones that get to be fruitful and multiply” (p.xiv-xv).

This perspective invites critical reflection on the assumption that agency is predicated on intentionality (Elton, 2024). It can represent an important opportunity to challenge the assumption of human exceptionalism. By de-centering the human perspective, this research aims to make visible the role of nonhumans in constructing our realities and explore the “ways that human/nonhuman relationships can be newly conceived through commonality, companionship, and comradeship.” (Koro & Cannella, 2022, p.642).

It took a few years, but eventually I came to see that while I had the basic fact about landrace breeding right, my understanding of it was wrong. Where I went wrong was in concluding that if I grew out genetically diverse varieties of a crop, over time, I will have created a uniquely adapted landrace. The problem with this conclusion, as I came to realize, was that I actually had no idea how to adapt these plants. I do not know the first thing about plant breeding, about how to know what flower from what plant to cross with another flower for any particular desired outcome. As Manish told me of the mango melon that once appeared in his field of diverse watermelons, not even “a hyper advanced magician can do that consciously”.

The fallacy in my understanding was that I was creating the landrace, I was adapting the plants. When I stopped to think about what I was actually doing, I realized it wasn't all that much beyond just planting some diverse watermelon seeds and then saving the seeds from the earliest and tastiest ones I harvested. But the watermelons were becoming more adapted, so who was doing that?

Research Question and Objectives

In this thesis I draw on posthumanist theory and methodologies along with assemblage theory to explore how seed-human relationships can support health from an eco-social perspective. Through this research I aim to: describe the relationship between plants and humans; examine the ways in which humans and plants are mutually affected/affecting; and, investigate the implications of these affects for an eco-social approach to health. I explore this question through a farmer-led watermelon landrace breeding project (FLWLBP) in Ontario (of which I was a part), supported by the Ecological Farmers Association of Ontario (EFAO).

The EFAO Farmer-Led Research program offers organizational, analytical, and financial support to farmers looking to find new solutions to on-farm challenges that they face. Landrace seed breeding is not widely practiced where industrial agriculture is the norm, such as Canada. Consequently, the FLWLBP provided a unique opportunity to gain insight into the relationships and becomings of collaborators in landrace breeding. These collaborators produced and saved seeds, the EFAO Farmer-Led research program united and supported their work, and this thesis looked at the relationships between watermelons and growers within this specific context.

This thesis explores the interconnections between landrace seed breeding and an eco-social approach to health by looking at a rather unlikely collection of landrace breeders (human and non-human) in Ontario, what they are doing, how they are affecting each other, and what they are *becoming*. In so doing it reveals a new understanding of the context, nature, and implications of the interspecies relationships at the heart of a landrace seed breeding project. Simpson (2023) suggests “each person has a responsibility to share their unique gifts with the world in return for the gifts they have received from nature” (p.1). This thesis provides a framework through which to begin to recognize and understand these gifts – to begin to cultivate and adapt not only a new crop population, but also a new way of seeing and being in the world.

This thesis is about health, food, and seeds. In Chapter Two I provide an introduction to the theoretical framework upon which this research is built, namely posthumanism and assemblage theory. I also provide a review of the relevant literature on the interrelated topics of eco-social health, food systems, and seed. Within each of these three topics I present a summary of the current critical discourse and discuss alternative approaches and perspectives.

Building on the theoretical framework of posthumanism and assemblage theory, my research takes the shape of a multispecies ethnography designed to explore the relationship between growers and watermelons in an ongoing landrace breeding project. In Chapter Three I explain the methodological approach used in this research. I outline the key theoretical and design features of multispecies ethnography broadly and my research specifically. I also formally introduce the human and non-human participants of this research, elaborating on my role as one of these participants and exploring the implications of this for my relationship to the collective and this research.

In Chapter Four I present the findings of this research. Congruent with the methodology of multispecies ethnography, these findings focus on the relationship between humans and non-humans and what together they are doing. Accordingly, I use this chapter to tell the story of the journey of research participants over the course of the growing season based on the data collected. This story both contextualizes my research and provides a thick description of the collective.

In Chapter Five, I weave together my findings with the body of knowledge that precedes it. What results is an explanation of how watermelon and humans are entangled in a reciprocal flow of affect.

In the sixth and final chapter, I argue that through an assemblage lens, the implications of the landrace breeding project at the heart of this research for health from an eco-social perspective reach upstream. I suggest that the reciprocal nature of the relationship between humans and watermelons transforms the space between them from a divide into an emergent space from which alternate perspectives and ways of being can emerge. Finally, in this chapter I also reflect on the limitations of this research and possible future research.

This thesis is rooted in both theory and practice. Throughout it I have inserted narrative passages and textboxes in italics to bring both of these critical sources of knowing together. The intention of these passages is to add depth by employing storytelling's capacity to both open up and focus to situate (see Hohti & Tammi, 2023). Ultimately, the goal of this research is to focus on a situated project of landrace watermelon breeding and to explore the possibilities it opens for health from an eco-social perspective.

Chapter 2: Literature Review

Introduction

In the literature review that follows, I begin by exploring posthuman theory and assemblage thinking. Together these two concepts and their associated methodologies make up the theoretical foundation and overarching approach to this research. Next, I provide context for my research through a review of the broader topics of health and agriculture and situate the specific discussion of landrace breeding within the interconnected fields of health sciences and food studies. The idea that health is something that comes from the hospital and that food is something that comes from the store remains prevalent, owing in no small part to the Modernist, Euro-Western worldview. However, this perspective is increasingly being challenged through critical scholarship in health and food research (Dillard-Wright et al., 2020; McMichael et al., 2015; Volt & Meszaros, 2021). In both fields, researchers are advocating for the importance of reconceptualising our relationships with each other and the planet. I then turn to a discussion of the physically small but socio-materially important members of our worldly assemblage - seeds. I review the dominant and critical narratives in the scholarly literature as they relate to the place of seeds in our society and the implications of our relationship with seeds. Finally, I map out the ways in which landrace breeding is understood to be entangled in food studies, health sciences, and our relationships with each other and the planet.

Framing the Worldview

Posthumanism

At its core, posthumanism is a critical exploration of the very concept of the human. It asks: ‘Who gets to be human?’ and in so doing reveals that the boundaries of ‘human’ are

socially constructed, restrictive, and normative (Braidotti, 2013). As Ferrando explains, the term human was originally reserved for the residents of ancient Athens – all others were considered barbarians, other, less-than (Posthumans, 2017). Posthuman theory recognizes that a restrictive conceptualization of the human enables a wide-reaching objectification and exploitation of the resultant ‘other’ (the non-human) (Braidotti, 2013). Posthumanism ultimately challenges the system of binaries set up by such thinking. It employs a flat ontology in which all actors are given equal billing, as opposed to a hierarchical one in which humans as exceptional beings are situated at the top (Elton, 2021). It “displaces the notion of species hierarchy and of a single, common standard for ‘Man’ as the measure of all things” (Braidotti, 2013, p.67). Through challenging the very concept of the human, the constructed separations between humans and others, culture and nature, subject and object; posthuman theory presents an opportunity to more fully recognize the ways in which non-human beings are actors involved in creating and recreating our shared world. Posthumanism represents a shift in how we understand the concept of the human, and also how we relate with the other vital, self-organizing beings on this planet (Braidotti, 2013).

Posthuman theory has emerged out of anti-humanism and is “nurtured by the study of difference” (Ferrando, 2014, p.169). Fuelled by critiques from fields such as post-structuralism, feminism, anti-racism, and post-colonialism; posthumanism draws on these schools of thought to provide a theoretical framework with which to reconsider what it means to be human (Braidotti, 2013). Notably, it also shares many ideas with traditional, non-Euro Western cultures and schools of thought (Nail, 2019; Rosiek et al., 2020). Relationality, non-human agency, and a rejection of the separation of humans from nature are all perspectives shared widely across time and cultures (Schrei, 2019-present).

Just as there are many paths to posthumanism (Braidotti, 2013), posthumanism has developed many branches (Ferrando, 2014). Ferrando (2014) suggests that it is important to recognize the distinctions between two major movements within the field of posthumanism: transhumanism and (critical/philosophical) posthumanism. Transhumanism explores issues and developments in how the human is/can be reshaped through scientific and technological innovations. Transhumanism takes the perspective that the posthuman is the era in which these innovations “will have irredeemably impacted the evolution of the human” (Ferrando, 2014, p.170). It is the stuff of cyborgs, AI, genetic manipulation, and effective accelerationism² (Torres, 2024). In contrast, critical/philosophical posthumanism suggests that we are already posthuman, because we have never really been human (Ferrando, 2014). Critical/philosophical posthumanism is deeply concerned with issues of equity and justice, urging that we “think critically and creatively about who and what we are actually in the process of becoming” (Braidotti, 2013, p.12). It is the later branch, critical/philosophical posthumanism which has informed this research³.

Posthumanism is both theory and methodology (Braidotti, 2013). A posthuman lens is beginning to be applied within the fields of food systems and/or health (Baker, 2021; Dillard-Wright, 2020; Elton, 2019; Elton, 2021; Nisbitt, 2019; Vold & Meszaros, 2021). Posthuman researchers work across various fields to recognize interconnectedness, relationships, and agency of humans and nonhumans. For example, in her 2021 article Elton explored the role of plants as health supporting actors. Posthumanism is consequently understood to be a valuable tool in challenging dominant, anthropocentric perspectives, systems, and practices.

² Effective accelerationism is a movement within the world of the technological elite to hasten the extinction of humans through transformation into transhumanist posthumans (Torres, 2024)

³Taking a cue from the literature, moving forward I will simply refer to it as posthumanism.

Assemblages

An assemblage is a tool for conceptualizing the ever-changing capacities and relationships of interconnected bodies. Through a posthuman lens, an assemblage is understood to be two or more entities in an entangled state (Koro & Cannella, 2024). An assemblage is self-organizing (Levkoe & Wakefield, 2013), rhizomatic and non-hierarchical (Fox, 2023), open-ended (Hohti & Tammi, 2023), and emergent (Spies & Alff, 2020)⁴. In an assemblage, the individual is indivisible from the collective (Elton, 2021); rather, the parts work together to *become-with* (Hohti & Tammi, 2023; Kirksey & Helmreich, 2010). Wright (2014) uses the example of a lightning storm to provide a clear example of *becoming-with*. He explains that in a lightning storm bodies are brought together through the flow of electrons. "Ionized air electrifies bodies to the point that if I touch you with my finger I can cause you a static shock through the same intra-active mechanism that forms a lightning strike. This bodily attunement to molecular difference in the air is a becoming-lightning-storm that operates below consciousness" (p. 278-279).

Employing an assemblage lens enables the redistribution of agency from the individual (most often the human) to a network of bodies (material, social, abstract) (Fox, 2023). In so doing it invites investigation of the relationships and interconnections of all beings. Assemblage thinking is a means by which to explore "the primacy of processes over events, of relationships over entities, and of development over structure" (Levkoe & Wakefield, 2013, p.5). Assemblages are a critical construct of posthuman theory in that they are the key with which to open the door into an "ontological gap" (Braidotti, 2013, p.67) where humans do not take center stage. Through

⁴ Of note is the fact that assemblage theory shares many key concepts (such as relationality, self-organization, and a non-hierarchical orientation) with other conceptual frameworks including Complex Adaptive Systems, Actor-Network Theory (Spies & Alff, 2023) and systems thinking.

an assemblage lens the story ceases to be about humans alone as actors, rather the story becomes about how materially diverse actors are working together and what they are *becoming*.

Assemblage thinking is increasingly employed in food systems research (Levkoe & Wakefield, 2013). An assemblage approach to research provides a critical alternative to the reductionist impulses of positivism (Dillard-Wright et. al, 2020) which silences the voices of many by reducing them to objects robbed of their agency. Instead of breaking things apart, an assemblage approach seeks to understand what is happening in the spaces where all actors come together. It asks: *How are members of the assemblage affecting and being affected? Together, what are they becoming?*

Rhizomatic assemblages as a philosophical and social theory was introduced by Deleuze and Guatarri in 1988 (Fox & Alldred, 2022; Spies &Alff, 2020). It is a theory rooted in Spinoza's notion that "bodies, objects, thoughts, social formations and other materialities are not to be defined by form, substance, subjectivity or fixed attributes, but simply by their capacities to affect or be affected" (Fox & Allred, 2022, p.627). Deleuze theorized that these affective capacities are not inherent, but are actually relational (Fox & Allred, 2022). In essence, the ontological status of any/all bodies exists only in relation to other bodies (Fox & Allred, 2022). Deleuze and Guatarri thus proposed a theory of assemblage in which bodies are connected in a rhizomatic network through which they are both affecting and affective, and which is thus constantly changing, always *becoming* (Volt & Meszaros, 2021).

Mechanisms of power that go on to shape (and lock in) our worldview and actions (Volt & Meszaros, 2021); the dominant discursive practices of today are rational, reductionist, and hierarchical - built on a narrative of human exceptionalism (Ferrando, 2014). As the following sections of this literature review will make clear, the consequences of this narrative are becoming

increasingly untenable. Posthumanism and assemblage theory provide a theoretical and methodological means by which to broaden thinking beyond the individual and challenge the dominant, fragmented conceptualization of the world (Volt & Meszaros, 2021).

Framing the Discussion of Health

People and Planet

As Ferrando explains (2017) posthuman theory suggests that the idea of human is an open notion. Just as the social construct of the human has evolved over time, so have the bodies of humans. This evolution has occurred through the ongoing process of humans responding to environments, and environments responding to humans (Ferrando, 2017). Earth has undergone enormous changes as a consequence of human activity (Buse et al., 2018). Rapid rates of biodiversity loss and extinction, changes in Earth's systems and climate, acidification of the oceans, and disruptions to nutrient cycles are all consequences of humanity's impact on the planet (Buse et al., 2018; Lee et al., 2023). Indeed, the latest Intergovernmental Panel on Climate Change report (Lee et al., 2023) affirms that the role humans have played in globally disruptive climate change has resulted in "...widespread adverse impacts and related losses and damages to nature and people" (p.5).

Shifting paradigms in health studies have done much to challenge a biomedical approach to health, opening the door to exploring what health is, how it is achieved/supported/maintained, and who is involved (Hancock, 2016). This is evidenced by the Ottawa Charter for Health Promotion which took place in 1986 in response to the need "for a new public health movement around the world" (WHO, 1986, n/p). The Charter adopted a view that health is a resource, one which is needed for the complete well-being of individuals and humans alike. It also identified

fundamental elements needed to ensure the conditions of health, including “peace, shelter, education, food, income, a stable eco-system, sustainable resources, social justice and equity” (WHO, 1986, n/p). Critically, the Ottawa Charter gave voice to the perspective that health is not solely the prevue of the individual, but rather is inextricably linked to societies and environments, and that these links “constitute the basis for a socio-ecological approach to health” (WHO, 1986, n/p).

An Eco-Social Approach to Health

This research aims to bring to light the rhizomatic way in which landrace breeding and public health are connected both through, and beyond the garden. Many field developments, such as planetary health, ecological public health, ecohealth, One Health, political ecology of health, and environmental health justice have evolved in response to the impacts of our changing planet on health (Buse et al., 2018). While each field development is unique in its historical and philosophical underpinning, goals, and objective, they are similar in their commitment to engaging with complexity and engaging across boundaries (Buse et al., 2018). Building on this observation and informed by the current literature, I explore an understanding of an eco-social approach to health as one that is necessarily systemic, relational, transformative, and transdisciplinary⁵.

Systemic

Societies and ecosystems are continuously and dynamically interacting; shaping and reshaping each other and impacting the health of all (human and non-human) (CPHA, 2015).

⁵ Here, approach is taken to mean a mindset which informs a process of inquiry for generating and applying “new knowledge to problems arising from complex interactions of societies and ecosystems” (Charron, 2012, p.258).

Recognizing that “[M]ajor failures arise when problems are understood too narrowly” (Levins & Lopez, 1999, p.261), an eco-social approach to health seeks to grapple with and address issues of whole systems (Buse et al., 2018; Levins & Lopez, 1999; Parkes et al., 2019). Also referred to as systems thinking, this broad orientation is key to being able to identify and understand the critical connections between societies, ecosystems, and health (Charron, 2012).

An example of the importance of systems thinking when addressing complex issues can be found in the seemingly paradoxical relationship between food production and food security. How is it that “[w]hile industrial agriculture has undoubtedly raised net calorie availability on global markets, almost 800 million people still suffer chronic hunger” (IPES, 2017, p.25)? The problem of global hunger is not only a problem of insufficient food – it is a problem of multiple, interrelated, cross-scalar *systems* (IPES, 2017, Weis, 2007). Geopolitics, economics, social structures, environmental systems all impact who has access to what food (if any) and how. For example, colonization, high cost, institutionalized racism, and climate change are all important factors in persistent food insecurity in many remote First Nations communities in Canada (Batal et al., 2021).

Relational

An eco-social approach recognizes that everything is connected (CPHA, 2015; Hancock, 2015) and that it is through broad examinations of these interconnections versus narrowly focusing on division, that the complex issues of health are best addressed (Levins & Lopez, 1999). The relationships and connections between humans, non-humans, and ecosystems have long been central to many Indigenous ways of knowing and worldviews (Buse et al., 2018; Parkes et al., 2019). In this way, an eco-social approach is necessarily informed by Indigenous and other approaches to health that are similarly holistic (Parkes et al., 2019).

Importantly, relational thinking demands a rejection of false dichotomies for a focus on interconnections and reciprocity (Parkes et al., 2019). Inherent in the term ‘eco-social’ is a recognition of “the deep, reciprocal interconnections among the ecological, social, cultural, and economic factors that determine the health of all who share this planetary home” (Parkes et al., 2019, p.61). Parkes et al. (2019) suggest that one such false dichotomy is that of ecological determinants of health, and social determinates of health. Recognizing that societies are both influenced *by* and influencers *of* ecosystems makes apparent that a division of determinants of health along social or ecological lines is both unproductive and inaccurate. Levins & Lopez (1999) extend this rejection of dichotomies to also include “social/biological, physical/psychological, genetic/environmental, lifestyle/environment” (p.261).

Transformative

An eco-social approach represents an attempt to change the current dominant discourse and institutional systems. The recent centuries dominated by modernism and the systems born of it have transformed every aspect of our world (CPHA, 2015). Human attempts to subjugate and control each other and the planet have been socially and ecologically devastating. Attempting to mitigate or rectify the impacts of our actions (looking downstream) is not enough, rather, we need to start looking upstream at their source (Dillard-Wright et.al, 2020). An eco-social approach to health maintains that fundamental changes in social values and norms are required to achieve subsequent, necessary changes in our social systems (e.g., economic), relationships (e.g., power), and perspectives (Hancock, 2016). That is to say, it demands transformative action that addresses at their roots, the eco-social determinants of health. Eco-social determinants of health is a term used in reference to the collection of both ecological determinants of health (oxygen, water, food, protection by the ozone layer, nutrient cycling, natural detoxification of waste, a

stable climate, and the soils, water and marine aquatic systems required for the production of food and plants) (Hancock, 2016) and the social determinants of health such as income, education, employment, housing, social inclusion, health care, and food security (World Health Organization, n/d).

Within the call for transformative thinking and action particular attention is paid to issues of equity of justice for humans and non-humans alike (Buse et al., 2018). Inequities in health are preventable, unjust, and systemic (Borras & Mohammed, 2020), and as such must be corrected.

An eco-social approach to health is one that recognizes the need for change – for new knowledges and ways of knowing, new understanding of development, new governance, and new economies (CPHA, 2015, p.14). Yet, it also recognizes that ‘new’ may not be new at all. This approach is not unprecedented, as it draws on ideas and knowledge from a multitude of sources including Indigenous communities, research, and lived experiences. Indeed, it is transdisciplinary.

Transdisciplinary

To grapple with complex systems, all the while recognizing the myriad interconnections putting us in relation with each other (human and non-human) and working towards transforming them all in the service of well-being of all is a huge task. Herein lies an imperative (both philosophical and practical) for an eco-social approach to health to be broad not only in scope and thinking, but also by engaging with partners and allies outside of the field of public health. Collective, boundary-crossing efforts are needed to undertake the daunting and necessary task of transformational change (Buse et al., 2018; Parkes et al., 2019). Moreover, by working across disciplines and beyond – with communities, governments, businesses, citizen scientists, etc. relationships are fostered, understanding grows, and thoughts and systems begin to be

transformed. Hancock (2015) suggests that “[B]ecause the challenges we face are both ecological and social, and interdependent, we need to adopt an eco-social approach not only in population health promotion and public health but in society as a whole” (p.254).

Framing the Discussion of Food

Many scholars have identified agriculture as a site of real and important interactions between human societies (food systems) and ecosystems (Label, 2005; McMichael et al., 2015; Reisman & Fairbairn, 2020). Beginning with a brief overview of the current global industrial food system, I explore the wholly different approach to food systems promoted by food sovereignty and practiced by agroecology. Finally, I explore ideas emerging from this specific intersection of food, people, planet, and health.

Food, People, and Planet

The dominant global food system is both relatively new and highly industrial. Monocultures have replaced polycultures resulting in a great loss of biodiversity (Guthman, 2004) and the displacement or assimilation of Indigenous and peasant farmers (Desmarais, 2007). The soils in which vast fields are planted have often been reduced to a substrate to which fertilizers are added (Guthman, 2004). Insect pests, weeds, diseases, and all others that threaten a crop are typically eradicated through the regular application of an array of pesticides. Precisely because of their efficient uniformity, these expansive acreages are uniquely vulnerable to pest and disease outbreaks and thus utterly dependent on such protective measures (Kloppenborg, 2004). Every step of the process necessitates the use of fossil fuel dependent machinery, and results in greenhouse gas emissions. Indeed, through industrial agriculture food is actually over-produced;

that is to say that it is often shipped great distances to feed animals because there is more than needed to feed the humans (Weis, 2007)⁶. Unwittingly, these crop-fed animals present their own threats to the health of our planet as vectors of disease, producers of greenhouse gas emissions and polluters of water (Weis, 2007). Furthermore, unjust and unsafe working conditions for people abound in industrial agriculture (Guthman, 2004; Weis, 2007). Clearly articulating its impact on the eco-social determinants of health, McMichael et al. (2014) suggest “... every aspect of the world food system contributes to environmental degradation” (p.1363).

If, as is suggested by an eco-social approach to health, the ecological issues brought to bear (in this case by our global industrial food system, and agriculture in particular) refer to the way societies live, then the social forces that have shaped this system must be considered. Our global industrial food system is driven by an extractivist, commodifying, and subjugating *modus operandi*, and its ecological consequences stem from both economic power imbalances and “geopolitical arrangements rooted in colonialism” (Reisman & Fairbairn, 2020). Indeed, capitalism and colonialism are widely agreed to have been key ideologies in the development and maintenance of the global food system (Wittman et al., 2010; Reisman & Fairbairn, 2020; Laforge et al., 2021). To heed the calls for *transformational* changes in thinking made by McMichael et al. (2014), Hancock (2016), Parkes et al. (2020) and many more, is to ultimately challenge the dominant paradigms of capitalism and colonialism. Within the study and practice of food systems, two interconnected field developments are deeply engaged in and committed to this pursuit—they are food sovereignty and agroecology.

⁶ Paradoxically, the over-production of food globally does not translate to universal food security. Rather, widespread hunger, food insecurity, malnutrition persist. This is because today, the “uneven progress and retrogress in the fight against global hunger, food insecurity, and malnutrition are predominantly shaped by economic, political, social, cultural, and ecological factors and forces.” (Borras & Mohammed, 2020, p.305) – *not* by an overall lack of food.

The concept of food sovereignty is credited to La Via Campesina, a global social movement (Rosset & Altieri, 2017) of farming people united in their fight against “destructive economic policies based on the globalization of a neoliberal, industrial, capital-intensive and corporate-led model of agriculture” (Wittman et al., 2010, p.2). Food sovereignty represents an alternative paradigm in understanding issues of food and health, one that stands in stark contrast to the dominant paradigms of food security which focuses primarily on access to food (Borras & Mohammed, 2020)⁷. Food sovereignty is founded upon seven principles, all of which challenge dominant capitalist and colonial practices in global food systems (Desmarais, 2007): a focus on food for people, building knowledge and skills, working with nature, valuing food providers, localizing food systems, locating control of food systems locally, and recognizing that food is sacred (Food Secure Canada, n.d.). A food sovereignty paradigm upholds “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (Borras & Mohammed, 2020, p. 307). Ultimately, it demands the elimination of oppression and inequality from our social relations.

Members of La Via Campesina observe (and live) the manifestations and consequences of inequality and oppression wrought by the globally dominant, industrial food system. In their view neoliberal-driven, globalized industrial agriculture erodes the autonomy of farmers by creating conditions in which farmers are compelled to sell into this system (Desmarais, 2007). In so doing, farmers essentially become beholden to global companies (Kloppenborg, 2004) and are forced to relinquish their role of stewards of land, seeds, and feeders of their communities. La

⁷ With roots in the Universal Declaration of Human Rights in which it was recognized that “everyone has the right to standard of living adequate for the health and well-being of himself and of his family, including food ... ” (United Nations, 1948, p.7), the social construct of food security has evolved over time but doggedly retains its fundamentally capitalist orientation.

Via Campesina recognizes that through this neo-liberal social arrangement livelihoods, cultures, and natural environment are being eroded (Desmarais, 2007). In the quest for food sovereignty, peasant farmers and Indigenous people work to reclaim and retain their rights to and relationships with the land, to use ecologically sustainable practices, and to have the freedom to feed themselves and their communities in ways that are culturally appropriate (Desmarais, 2007).

Agroecology, broadly, is how food sovereignty is achieved. It is the union of the science of interconnections (ecology) and Indigenous and peasant knowledge and practices applied to the ecology of the entire food system, with the goal of transforming how food is produced and consumed for the benefit of humanity and the planet (Rosset & Altieri, 2017). It is the practice of sustainable farming, it is political, and it demands justice.

Like food sovereignty and an eco-social approach to health, agroecology recognizes the need for new ways of doing agriculture in the face of “rapid ecosystem degradation and climate change” (Rosset & Altieri, 2017, p.8-9). For these solutions, agroecology turns to farmer knowledge, traditional practices, and modern ecological sciences. A key principle of agroecology is that solutions be developed from the ground up, shared broadly, and adapted locally (Rosset & Altieri, 2017). As such it represents a transdisciplinary approach. That is to say, an approach that brings together diverse perspectives, practices, and types of knowledge from within and beyond academia. Agroecology also recognizes that this environmental imperative is a consequence of wide-spread social relations, namely capitalism and colonialism (Laforge et al., 2018; Rosset & Altieri, 2017). Specifically, agroecology is concerned with issues of power and control in food systems – control of seeds, land, water, and knowledge. Ultimately, it is a fundamentally alternative and transformational approach to food and food systems that is itself a “social relationship” (Rosset & Altieri, 2017, p. 132) engaged in challenging the capitalist and colonial

status quo⁸. Agroecology offers an approach to food production (and food systems) that is inherently political, daring to focus not only on profit, but rather adopting a whole-system perspective that also recognizes and engages with the myriad social and ecological relationships and interconnections that exist. (Rosset & Altieri, 2017). In so doing, it works to address the primary determinants of health as part of its fundamental approach to managing agro-ecosystems.

Food, People, Planet, and Health

Agroecological systems share six key features: biodiversity, land and water management/conservation, diversified agricultural systems, resilience, farmer knowledge, and social norms of collaboration and sharing (Rosset & Altieri, 2017). Ultimately, McMichael et al. (2014) suggest that, in part, through the decreased use of fossil fuels, increased equality, and better food production and choices, the health of people and planet in the face of climate change can be maintained or even improved. Clearly, there is overlap between what McMichael et al. (2014) suggest and what agroecology does. Following is a brief breakdown of these features of agroecology and their relation to health as I have identified them drawing from the literature.

Biodiversity

Biodiversity is widely recognized as vital for the health and well-being of people and planet. Critically, biodiversity and ecological complexity have been recognized as key components for

⁸ The breadth and reach of colonialism is vast, and has impacted seed production (Hill, 2017). In fact, the theft of germplasm from Indigenous communities to be used in the creation of privately patented seed varieties continues today (Kloppenburg, 2014). Clearly such practices represent the continuation of colonization. However; I would suggest that seed breeding, seed production, the saving of seeds and the planting of seeds are not *inherently* colonial acts (ecological or social). The selecting and replanting of seeds (ostensibly, the breeding of seeds) is a practice that predates contact (Fritz, 2022).

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social–ecological resilience and adaptive capacity” (Jackson et al., 2010, p.82). Biodiversity refers to the collective whole of biological elements from genes to habitats, and thus comprises the source of and capacity for adaptation and transformation (Jackson et al., 2010). One important way that agroecology supports biodiversity is through the use of polycultures (i.e., planting many different types of crops together). This feature of agroecological systems is a practice that is mutually beneficial to farmers and agroecosystems alike in that it increases/maintains biodiversity while also increasing farmers’ ability to deal with climate change (McCluskey & Tracy, 2021). In doing so farmers are not only increasing the adaptability and resilience of their productive spaces, but of the ecosystem more broadly (Rosset & Altieri, 2017). Other benefits of polycultures include a decreased risk and impact of imbalances and loss due to pests and disease (McCluskey & Tracy, 2021).

Land and Water Management /Conservation

Industrial farming practices are known to cause the degradation of land and water (IPES, 2017). Conversely, the whole-farm approaches to production employed by agroecological growers are broadly developed and uniquely adapted to preserve and conserve land and water (Holt- Giménez, 2017). Whereas the industrial agriculture is characterized by highly mechanized crop monocultures that are input intensive; agroecology is a diversity-based, low-input approach to food production (IPES, 2017). While industrial agriculture brings with it issues of water pollution from input run-off, water use, soil erosion, and habitat loss (IPES, 2017), agroecological practices such as no-till or low-till field management and the use of cover crops and green manures increase the soils’ capacity to absorb water – making it available to plants as they need it and simultaneously preventing run-off and erosion (Rosset & Altieri, 2017). Conservation and restoration of landscape diversity supports both land and water through habitat

provision that “can enhance biological control of insect pests in agroecosystems” (Rosset & Altieri, 2017, p.18).

However, issues of land and water are also social issues, such as issues of dispossession, inequality, and colonialism (Desmarais, 2007). Laforge et al. (2018) suggest, “[i]n the Canadian context, one of the most significant dimensions facing the agroecology movement is overcoming historical and ongoing injustices within, and beyond, the food system, particularly as they relate to Indigenous peoples” (p.199). Through active engagement both on the ground and politically, agroecology and food sovereignty seek to redress issues of land use, access, and claims (Rosset & Altieri, 2017). It heeds the call for radical transformation of social relations that support an eco-social approach to health.

Diversified Agricultural Systems

Agroecology comprises more than just farms. Recognizing that the capitalist and colonial impacts on food systems extend beyond agriculture, agroecology includes not only the growing of crops in fields, but also the activities of fishing, hunting, and gathering (Laforge et al., 2018). Agroecology demands food sovereignty (Laforge et al. 2018), food sovereignty demands justice (Desmarais, 2007), and justice precipitates health (McMichael et al., 2014).

Resilience

Increasingly, our understanding of resilience is moving away from simply being the ability to carry-on and rebound back to the status-quo. Instead, a recent definition suggests that it is the “capacity to live and develop with change and uncertainty” (Rockstrom et al., 2023). Rockstrom et al. (2023) identify five necessary attributes of strategies for building such resilience: diversity,

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redundancy, connectivity, inclusivity and equity, and adaptive learning (n/p). Each of these attributes is rooted in an eco-social approach. That is to say, each recognizes the need to engage with and transform the complex systems connecting us all. Importantly, all are also reflected in and practiced by agroecology.

Diversity (as previously discussed) is a cornerstone of agroecological systems, which rely on biodiversity in part because it offers redundancy. Drawing similar conclusions to the food sovereignty movement, Rockstrom et al., (2023) recognize that having the capacity to produce and access to a supply of regional food builds resiliency. Moreover, they acknowledge the value of local and traditional knowledge, skill, and engagement with respect to building resilience broadly. Such a perspective reflects, at its core, agroecology's dependence on traditional farming communities, their knowledge and practices (Rosset & Altieri, 2017).

Farmer Knowledge

In their article exploring farmers' perceptions of their relationship with agricultural 'experts', Aksoy & Oz (2020) identify a link between traditional farmer knowledge and practices and the production and maintenance of genetically diverse, nutritious, resilient, and adaptable crops. Indeed, it is largely in the evolving, place-based experiential wisdom of traditional farmers that the knowledge and skills needed to *do* agroecology are found (Aksoy & Oz, 2020). While the loss of farmer knowledge has been linked to the loss of culture, the use of this knowledge by farmers is an act of cognitive justice, appropriately valuing multiple ways of knowing and ultimately eroding the cultural subordination of those beyond the mainstream (Coolsaet, 2016). Furthermore, it represents a transdisciplinary approach in action.

Social norms of Collaboration and Sharing

Agroecology, through its relational approach, challenges capitalism and colonialism and their destructive influences on our societies – the impacts of which are more than theoretical. Indeed, McMichael et al. (2014) report that through building a sense of connectedness individuals' overall life satisfaction is increased. Additionally, through agroecology, Laforge et al. (2018) discuss the ways in which relationships between farmers and the land are shifted towards a more relational worldview, and thus are ultimately supportive of the primary determinant of health.

Both agroecology and an eco-social approach to health (like posthumanism) are predicated on a fundamental recognition of the interconnected nature of societies and ecosystems, the critical need for equity, and an imperative to embrace diverse ways of knowing and doing. As the following section will illustrate, together food sovereignty and agroecology provide fertile theoretical and practical ground in which to sow the seeds of transformation.

Seeds

Though they are small and often overlooked, seeds matter. Seeds are fundamentally consequential well beyond their role in food production, also playing a critical role in shaping our food systems, our societies (Kloppenburg, 2004; Phillips, 2016), and health. Indeed, Phillips (2016) argues,

Humanity's survival – biological and cultural – has become tied up with the lives of seeds. Seeds are indispensable as a means of reproducing food, as food themselves, as part of ecosystems that support and constrain us, and as part of our cultural heritages. Seeds (and their plants) are part of the socio-natural challenges we face in loss of biodiversity, maintaining food security, adapting to climate change, and sustaining rural

and urban livelihoods. The histories and destinies of both seeds and people have become entwined. (p.3)

In this section, I explore ideas about the nature and consequences of human-seed relationships and present an overview of the critical literature on seeds as it relates to both agroecology and health. Finally, I discuss landrace⁹ seed breeding and its place at the intersection of seeds, agriculture, and eco-social approaches to health.

Seeds and People

For millennia, seeds and humans have been co-evolving (Phillips, 2016; Fowler & Mooney, 1990; Hill, 2017). Employing the sociological concept of practicing together (in which all components are recognized as being in dynamic relationship, actively reconstituting the practice), Phillips (2016) explains this relationship between seed savers and seeds:

Seeds continue because of and despite my efforts, and the seeds feed me, changing my tastes, nutrition and memories. Because the seeds and I are both dynamic and changing, so too are the ways we practice. Through our practices together we reconstitute ourselves and implicated socionatures (p.18).

Through the action of planting, selecting, and saving seeds both humans and seeds are changed. It is this practice that led to the domestication of crops, and over millennia (in its increasingly

⁹ The term landrace is European in origin and translates literally to *country breed* (Merriam-Webster, 2023). It is a term that was originally used in reference to seeds adapted to specific growing conditions and location as a result of natural selection, but has since been more broadly applied to any variety actively bred and maintained on-farm by farmers (Berg, 2008). However, Berg (2008) suggests that seeds actively maintained by farmers are more appropriately termed folk varieties. Within parts of the seed community there is some general discomfort with the term landrace. While I recognize this dislike of the term, I respectfully chose to use it here owing to both a lack of suitable alternative and persuasive argument to abandon it all together.

differentiated forms), to the food we now consume and “the complex structures of human societies” (Kloppenburg, 2004, p.1). Seeds and seed systems developed and used by humans are continually evolving, yet it is only in the last century that completely new forms and relations have emerged with consequences for seeds and humans alike.

Traditionally, humans saved and replanted seeds from genetically diverse wild crops that expressed characteristics deemed valuable, for example not shattering¹⁰ (Fowler & Mooney, 1990). Seeds (and their plants) in turn, responded by adapting to the new conditions in which they were being grown. Humans responded to these changes in plants by again, selecting seeds from individuals most well-suited to their needs. Seeds and plants responded through further adaptations. This mutually responsive, agentic, co-evolutionary dance of plant and human adaptation is, ultimately, landrace seed breeding. It is also an example of a multispecies assemblage, it is also posthuman. However, in the millennia that have passed since humans first began saving seeds, many other hierarchical techniques for the breeding of seeds and ‘development’ of new plant varieties have emerged. These shifts in seed-human relations have had important, rhizomatic consequences, impacting not just seeds and people, but also food, the planet, and health.

Seeds, People, Food, Planet and Health

The way we practice together with seeds has changed, and with each new technique significant and complex changes for societies have resulted now largely reflecting capitalism’s desire to commodify seed and re-order the natural world for maximum profit (Kloppenburg, 2004). The commercial hybridization of corn in the middle of the last century represented a

¹⁰ Shattering refers to a plant’s tendency to drop its seed when mature. A plant whose seed does not shatter will essentially continue to ‘hold onto’ its seeds, thus providing a greater opportunity for others (humans, birds etc.) to harvest them for food or intentional replanting (Fowler & Mooney, 1990).

significant achievement in the commodification and enclosure of seed, and has led to the transformation of seeds, food systems, and societies (Kloppenburger, 2004). Kloppenburger (2004) explains that this advance in breeding technique did this in two important ways. The first was by eliminating the seeds' ability to breed true¹¹, leaving farmers who chose to grow hybrids compelled to purchase new seed each year instead of saving seed. In so doing it opened the door for a re-negotiation of the social arrangement between people and seeds (the commodification of seeds; the subjugation of public research to commercial interests; and the enclosure of plant genetic resources) and ultimately repositioned the production of seed in the private sphere. This shift has effectively established corporate control of seed/plant genetics while simultaneously limiting public access to what had previously been considered a common good.

The advent of biotechnology and the genetic manipulation of seeds have further ushered in a new chapter of social and ecological reckoning with seeds¹² (Phillips, 2016). Where seeds were once considered a common good to be saved, shared, and stewarded for most of agricultural history; they are now increasingly irreproducible, uniform, patented, chemical-dependent commodities (Phillips 2016; Kloppenburger, 2004).

The relationship between seed and health extends beyond the simple fact that our food comes from seeds and the seeds we are planting now are growing into plants that are less nutritious than they used to be (Quinn, 2021; Elton, 2021). The vast majority of commercially available seeds are bred to require intensive chemical inputs in the form of fertilizers and pesticides to be grown as vast monocrops, mechanically managed and harvested, shipped long

¹¹ A seed that breeds true exhibits the same traits as the plant it was saved from; a seed saved from a hybrid will not share the traits of the original (F1) hybrid such as vigour, uniformity, high yield, and any plant characteristics.

¹² Of all the discussions to be had about seed and health, the one regarding the impact of GM seeds is the most robust (Kloppenburger, 2004; Phillips, 2016). However critical, it is not the focus of this research. Suffice it to say that this issue represents another intersection of the co-evolution of humans and seeds with consequences yet unknown and social re-ordering across the globe impacting ecosystems, trade policies, economics and health in myriad complex ways.

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distances, processed or fed to animals (Kloppenborg, 2004). As has been previously discussed, this form of industrial agriculture has significant negative impacts on ecosystems, societies, and health (McMichael et al., 2014).

Today, 60% of the global seed market is controlled by four multinational chemical companies: Bayer, DowDupont/Corteva, ChemChina-Syngenta and BASF (Scotten, 2024). Yet seed as a market commodity is a phenomenon of only this past century (Kloppenborg, 2004; Lofthouse, 2021). This modern reordering of the long-standing reciprocal socio-natural assemblage of seeds and humans reflects the capitalist agenda of controlling nature through reductionism and commodification. It pits us (humans) against them (nature) and attempts to coercively (through enclosure and genetic manipulation) recruit seeds as unwitting allies. By antagonizing our longstanding relationship with seeds, this new corporate seed regime is fundamentally affecting our food, societies, ecosystems, and health.

Landrace Seed Breeding

Before there were genetically modified seeds, modern hybrids, and heirloom varieties, there were people and seeds practicing together to produce landraces (Fowler & Mooney, 1990). Today, the use of landrace seeds occurs predominantly in spaces and places where industrial agriculture and a corporate seed ordering do not dominate the social and physical landscape (Phillips, 2016; van Bueren, 2018).

Through my learning and experience working with landraces, I have come to understand the way that landrace breeding works. A genetically diverse crop population (for example, different types of watermelons) is allowed to grow together as one crop. Farmers and eaters then intentionally save the seeds from the ‘best’ plants. The definition of what is best is unique to

each eater/farmer/seed saver. It could be conceived as an aesthetically motivated decision (e.g., flesh colour, rind patterning), practical (e.g., ease of harvesting, disease resistance), nutritional (e.g., good tasting and easily digestible), and/or climate influenced (e.g., short growing season, frost or drought resistance). Inevitably, by selecting seeds from preferred plants, genetic elements favourable to thriving are being captured. Moreover, by selecting broadly throughout this diverse population (e.g., selecting all pink fruit whether they are big or small, round or oblong, early or late ripening, have solid or striped rind) much of the genetic diversity in the population is maintained. The result is a population of a crop that is well adapted while also well-endowed with the genetic tools to be further adaptable and consequently, resilient.

Landrace seed breeding is accessible in so far as it requires no formal training, no special equipment, just collaboration with plants and ecosystems (Lofthouse, 2021). As such, landraces foster relationships between growers and the ecosystems in which they exist (Bellon et al. 2017). Moreover, landraces are often culturally important to the communities that grow them possessing unique and important culinary qualities, being uniquely adapted to local agricultural practices and systems, and serving as a tangible link to the past (Bardsley & Thomas, 2005; Mahon et al., 2016). More broadly, seeds are understood to embody the history, accumulated knowledge, agency of and relationship between people and plants (Hill, 2017). Landraces, as traditional varieties thus can be understood to have similar cultural significance. In landrace seed breeding natural selection and farmer selection nudge plants to adapt to meet environmental and cultural needs as they simultaneously learn to adapt to the needs of their landraces. Plants and growers are entangled in a mutually affective relationship – they are part of an assemblage. The agronomic result of landraces is a consistently reliable yield, even under changing conditions (Lofthouse, 2021; Bellon et al., 2017). The ecological result of such genetically diverse

populations is resilience and sustainability (Jackson et al., 2010). Landraces are often considered to be historical or traditional seed varieties, yet modern landraces continue to be bred (Bellon et al. 2017).

Interest in the value of landraces is growing with the realization that while crop genetic diversity is threatened by industrial farming and climate change it is also key to climate resilience (Enjalbert et al., 2011; Dwivedi et al., 2017; Bocci et al., 2020; Khoury et al., 2022). Seen through the extractive, reductionist lens of modern agriculture, landraces are recognized as a reservoir of rich genetic diversity from which new, patentable cultivars can be produced. As explained by Kumar et al., (2020), “In the recent past, successful application of crop landraces in improving the food security began with the introgression of dwarfing genes in wheat; slowly paving the way for the ‘*Green Revolution*’ and reflecting the enormous impact that landraces can have on world food production” (p.2).

However, when seen through an agroecological lens, landraces also stand out as rich sources of pride, repositories of traditional knowledge and culture, and instruments of resistance, resilience, and independence (Vasconcelos et al., 2013; Mahon et al., 2016). Kumar (2020) suggests, “...landraces are rightly recognized as the mainstay of sustainable food production” (p. 2). Landraces play more than an important agricultural role in a community; they are culturally, ecologically, and economically (Bardsley & Thomas, 2005) well suited to the task of promoting agroecological resilience.

Despite the awareness that landraces are key to building climate and community resilience, there is a paucity of such cultivars being grown in agriculturally industrialized regions, like Canada (and more specifically Ontario). The widespread adoption of industrial agriculture has induced a transformation of human-seed relationships, characterized by a turning

away from traditional seeds and towards modern hybrid varieties of seeds (Bellon, 2017). Along with this has come a loss of traditional agricultural practices (and knowledge) as a consequence of the needs of these new seed varieties (and the extensive use of fertilizers, pesticides, herbicides, and monoculture) (Coolsaet, 2016; Lofthouse, 2021).

Working with landraces affords important genetic diversity (Vasconcelos, 2013; Bellon et al., 2013), sustainability and sovereignty, and opportunities to engage farmer knowledge, social cohesion, restore pride, and honour culture and traditions (Mahon, 2016; Vasconcelos, 2013). There are several ways that the literature implicitly suggests a strong transdisciplinary relationship between seeds and health. For example, while seed sovereignty is a fundamental part of food sovereignty (Peshard & Randeria, 2020), Borras and Mohammed (2020) argue that the connection between food sovereignty is so strong that health should also be considered a pillar of the movement. In this way, seeds and health can be seen to be connected through food, and agroecology more specifically. An eco-social approach to health recognizes biodiversity as an important determinant of health; and it is through the breeding and regeneration of seeds that biodiversity within agroecosystems is either maintained or lost (Fowler & Mooney, 1990; Kloppenburg, 2004). Furthermore, the act and process of breeding seeds both reflect and inform our relationship to social arrangements and realities (Kloppenburger, 2004; Phillips, 2016; Healy & Dawson, 2019). It follows that landraces represent an opportunity to begin to enact and embody a transformative and wholesale reshaping of our societies to be more relational.

Conclusion

In this chapter I have provided an overview of the relevant literature on the interconnected topics of posthumanism, health from an eco-social perspective, food systems, and

seeds. The review of each topic begins with a recognition that, through policies, practices, and perspectives rooted in, and in support of Modernity, our systems (ecological and social) are nearing collapse. Ecosystems are failing (Horton, 2015). Food systems are failing (FAO, September 1, 2023). Seed systems are under attack from these same, failing forces (Kloppenburg, 2004). Indeed, it has been suggested that Modernity itself is failing (de Oliveira, 2021). Next, it is revealed that alternative perspectives and practices exist that seek to address the issues challenging our systems (ecological and social). These perspectives and practices are relational and holistic (Parkes et.al, 2020; Phillips, 2016; Rosset & Altieri, 2017). It is then suggested that through a reordering of our perspectives, not just our practices, failing systems can be transformed into more just and sustainable ways of being (Dillard-Wright et al., 2020).

There exists much room within the current literature to add to the discussion about health food, seeds, and people. While there is much written about landraces and landrace breeding in a Global South perspective (Diaz-Montenegro et. al, 2018; Mulumba, et. al, 2012) , much of it is quantitative and focused on agronomic or economic benefits. Additionally, scholars like Shiva (1999) have written extensively on the impacts of the restructuring of the global seed system on farmers and communities. However, there remains a dearth of qualitative research on the impact of landrace breeding in the context of the Global North where industrial agriculture has thoroughly transformed the physical and philosophical landscape of farming.

As McGregor (2021) discusses, “we have not been able to solve the greatest challenges of our time on our own, despite great advances in science and technology... Human-centered and generated knowledge has not proven to be enough” (p.14); which is to say, we need other ways of knowing too, other perspectives. This research aims to begin the conversation about the role

landrace seed breeding can play in animating other ways of knowing, seeing, and being in the world in the context of health from an eco-social perspective.

It is at this point that I step back again and point to posthumanism and assemblage theory as being able to provide a critically needed perspective that challenges dominant assumptions of agency and structures of power. Posthumanism challenges us to reconsider our assumptions of human exceptionalism. Assemblage theory provides a way to make visible the interconnections, affects, and relationships that connect everything. This notion of complex interconnections, relationality, and affects permeated the critical discourse within both eco-social health and food systems scholarship. Seeds sit importantly at the nexus of all of these fields: embodying relationships and affecting realities. In the following chapter I explain the methods I used to figure out *what is going on here*, and what are its impacts for health from an eco-social perspective.

Chapter 3: Methodology

It was clear that the watermelons were cared for: “Well supported with compost and collars” I wrote in my observational notes. The collars had been put around each tiny transplant to protect them from potential cutworm visitors, the compost was added to the soil for nourishment.

In the garden we make compost to feed the soil.

In this research I make compost to feed an understanding of what a collective of multi-species watermelon landrace breeders are becoming, and why it matters.

Introduction

In this chapter I present the methodological approach (posthumanism) and design of my research (multispecies ethnography). I introduce participants and the landrace breeding project that units them as the unit of analysis (the assemblage), as well as discuss my role as both research and member of the assemblage. I then detail the methods of data collection, data analysis (diffractive), and reporting (composting storytelling) that I used (and why I used them). Finally, I explore issues of bias and ethical considerations.

Landrace breeding, as has been previously discussed, is inherently relational. It is a practice that positions seeds in our society as collaborators *with* humans as opposed to the property *of* humans (Phillips, 2016). Employing a posthuman lens to gain an understanding of what is going on in landrace breeding is consequently not so much a choice as it is a necessity of methodological congruence. The theory of posthumanism invites research through which to make visible other species (besides humans) and allow their agency to be seen through the relationships that are enacted.

Research Design: Multispecies Ethnography

Multispecies ethnography is an approach to posthumanist research that seeks to move beyond the exploration of exclusively human concerns and interests. It is based on the understanding that all bodies have agency and are in relation with each other. These relations are further understood to be entangled, interconnected, mutually dependent, and mutually responsible (Pacini-Ketchabaw et al., forthcoming, p.3). I use multispecies ethnography as a research design that seeks to explore the connections between species, their affects, and their ethical implications (Pacini-Ketchabaw et al., forthcoming, p.3). Multispecies ethnography is predicated on an ontological perspective that suggests that all bodies are interconnected and constantly affecting and being affected. It follows that the individual is inseparable from the collective (Elton, 2021), and so what must be examined is the relationships between bodies, not bodies themselves. Furthermore, it is assumed that these bodies in relationship are emergent (Koro & Cannella, 2024). Ultimately then, multispecies ethnography seeks to recognize and explore *relationships* and *what is being done/what they are becoming* as opposed to individuals and who/what they are.

While the theory around the de-centering of humans is well-established, the practical application of this theory to academic research is still evolving (Elton, 2021). Multispecies ethnography is experimental and requires researchers to take risks to find ways they can stay open to multispecies interdeterminacies (Pacini-Ketchabaw et al., forthcoming). Multispecies ethnography is fraught with complex issues of representation and positionality, as well as the practical limitations of how and what humans can observe, communicate, and know (Pacini-Ketchabaw et al., forthcoming). These challenges are both exacerbated and reinforced by

language. As Kimmerer explains (2015) “The [English] language allows no form of respect for the more-than-human beings with whom we share the Earth. In English, a being is either a human or an “it” (para.4). However, for all its uncertainty, multispecies ethnography can provide unique and destabilizing perspectives and insights (Hoare, 2019).

In an effort to decentre humans in this research I drew on Elton’s (2021) method for recognizing plant agency which was based on recognizing plant time, participating with plants, and scaling up (p.93). I used this three part method in my data collection (see Appendix F) and as I worked to recognize and conceptualize the agency of watermelons in the context of this research. However, as I attempted to analyze the data collected, I struggled with how to decentre the humans in the research without anthropomorphizing the watermelons. Ultimately, I turned to the three shifts central to multispecies ethnography presented by Pacini-Ketchabaw et al. (forthcoming): looking for friction, common-worlding, and attending to awkward encounters. Taken together, Elton’s method and these shifts were critical in helping me to recognize plant agency through relationships and so I will briefly describe them here.

Plant Time/Looking for Friction

Elton (2021) suggests that through recognizing plant time she was able to see that plants and humans exist in different worlds. Plant time, as Elton (2021) explains, is based on the idea that plants exist “on their own clock” (p.100). Sometimes plants seem to be doing nothing at all, and plant time is understood to be slow. At other times, when the pickling cucumbers are growing faster than you can pick them, plant time is felt as fast. Elton suggests that ultimately, plant time is fungible, and exists as a function of human-plant relationships. The markedly different paces at which plants and humans are perceived to be moving (to be doing) is a friction. Paying attention to frictions is understood to be a valuable way to see relationships as

transformative; to see movement, actions, and affects (Pacini-Ketchabaw et al., forthcoming). Friction requires there to be bodies in relation – it is not something a single body can make happen alone. Recognizing plant time showed Elton (2021) that it was not useful to watch for something to happen. It showed her that agency is not a matter of intentionality, rather it is result of relationality.

Participating with Plants/Common-Worlding

Common-worlding refers to the practice of reassembling our diverse yet fragmented worlds to expand one’s “conceptualization of the social” (Pacini-Ketchabaw et al., forthcoming, p.2). I have taken Elton’s (2021) method of participating with plants to be a practice of common-worlding. As she describes it, practicing with plants (weeding, watering, pruning ...) enabled her to “bring to the fore the beings that have typically been considered merely background to the human plot line” (p.103). Participation with plants can thus be as a means through which to de-objective plants and relate to them as being with their own agency and subjectivity.

Scaling Up/Attending to Awkward Encounters

Finally, Pacini-Ketchabaw et al. (forthcoming) explain that encounters and relationships within the assemblage can be threatening, uncomfortable, and ethically challenging. It is often through such awkward encounters that “we are moved to care differently, to see our entanglements with other species, and to acknowledge our vulnerabilities” (Pacini-Ketchabaw et al., forthcoming, p.12). Awkward encounters do not require a resolution. Rather, they require a commitment to staying with the trouble (Haraway, 2016) - to “be aware of not only of the present in all of its inequities but histories that have shaped the world around us” (Dillard-Wright et al., 2020, p.138). By attending to awkward situations/staying with the trouble, the opportunity

to think collectively can be seen and taken. I have come to understand that it was through scaling up (Elton, 2021) that the awkward encounter between the plants and people in her research was made visible. As she explains, it was only when she took the plants in the urban garden spaces within her research area as a community of plants versus a collection of individual plants, that their “capacity to exert power” (p.107) (their vegetal politics) was identified. The awkward encounter between plants and people in her research centered around the claiming of space in an urban area. The trouble was that plants claimed space, but this space was needed for redevelopment by humans. Accommodations were made, new spaces were allocated to plants, but for some this was not enough - gardens continued to be planted in undesignated spaces (Elton, 2021). The awkward encounter continued.

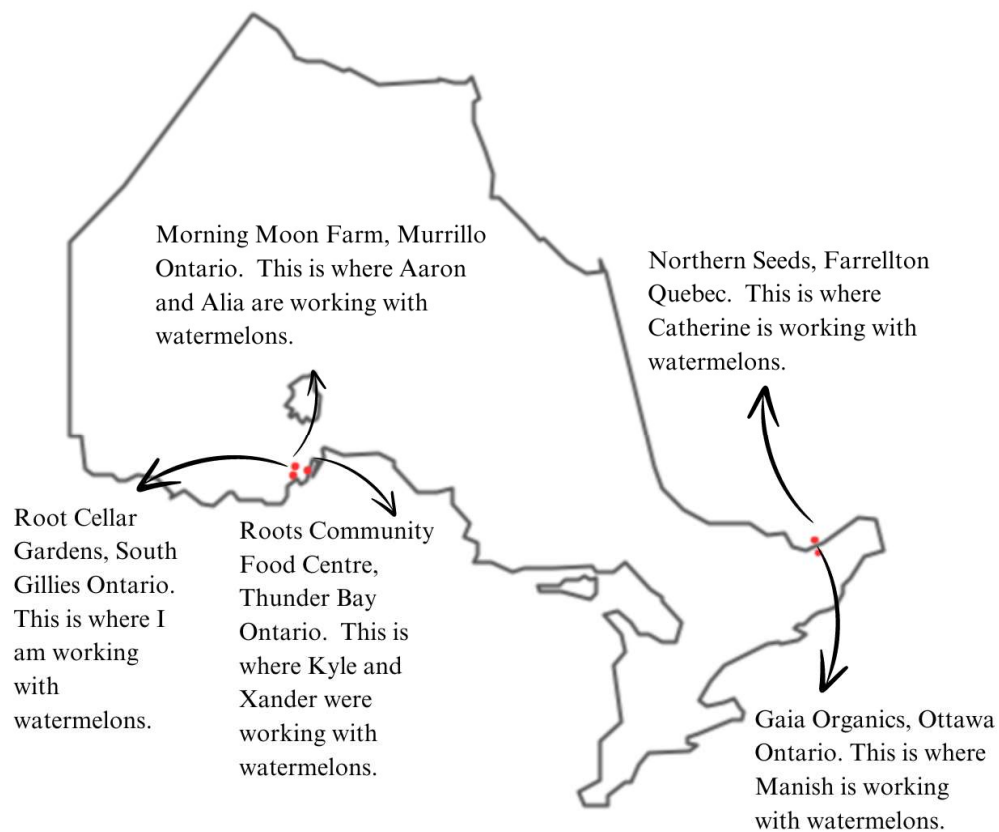
Each of these shifts and step in recognizing plant agency informed this research at all stages. Looking for friction and recognizing plant time illuminated the ways in which the reality of the assemblage was at once co-constructed but also experienced differently by plants and humans. Common-worlding and participating with plants revealed the ways that members of the assemblage were entangled. Finally, attending to awkward situations and scaling up provided a lens through which to see the ways that plants and humans were affected by each other within the context of the assemblage.

Participants: The Assemblage

Stretching 1800km from South Gillies, Ontario to Farrelleton, Quebec (see Figure 1) is the assemblage of growers and watermelons¹³ engaged in the Farmer-Led Watermelon Landrace Breeding (FLWLBP) project at the heart of this research.

¹³ The non-human collaborators in this project begin as seeds, grow into plants, which bare watermelons, whose seeds are saved anew. Throughout this research I refer to the non-human collaborators based on the shape they take

Figure 3.1. Map of the assemblage.



As is congruent with multispecies ethnography, what is of interest to this research is not the *individual* but the *collective* (the assemblage). Because an assemblage, in essence, is infinite (Levkoe & Wakefield, 2013), to study an assemblage in its entirety is an undertaking well beyond the scope of this project. For my research, I have necessarily drawn restrictive boundaries on the assemblage as my unit of analysis; choosing to look specifically at the affects of watermelons on humans, and humans on watermelons, within the context of the FLWLBP. However, it is important to acknowledge here that the individual participants of this project that make up the assemblage wouldn't be an assemblage without the *project* – without the FLWLBP.

at that time, or else generally as “watermelons”. Drawing on Phillips (2016), I encourage the reader to remember that ultimately, the watermelons are seeds-becoming-plants-becoming-seeds.

The FLWLBP provided participants with a shared “reimagining [of] who we are, what we may become, and with whom we might be in alliance”. (Hohti & Tammi, 2023, p.5). The project brought growers together with shared seeds, a shared goal, and shared protocol. And while I did not explicitly explore the project as part of the assemblage, growers did suggest that being a part of it made them feel less isolated and more accountable. Some also understood it to be a very important and unique model of growers and companies working together to challenge the enclosure of seed by sharing seed and engaging in breeding projects collaboratively.

When I first heard the expression “the backyard is too big” it was in an experiential education context, and it was used to articulate how given too much choice, people do nothing because they can’t decide what to do. When I first heard about landrace breeding I was so intrigued and so inspired, but it wasn’t until Manish shared seeds with me that I became engaged. The backyard had been too big, and Manish’s seeds gave it shape and context which in turn allowed me to do something. The FLWLBP similarly provided shape and context for the assemblage.

Context: Farmer-led Watermelon Landrace Breeding Project

My curiosity and inspiration around landrace breeding motivated me to begin a landrace breeding project with watermelon in 2020. Since then, the project has evolved to become a collaborative undertaking involving five small farms across Ontario and western Quebec, supported by the Ecological Farmers Association of Ontario (EFAO)¹⁴, *and of which I am a part in my professional capacity as an organic farmer and seed producer.* This Farmer-Led Watermelon Landrace Breeding Project (FLWLBP) began in the summer of 2022 and is a three-

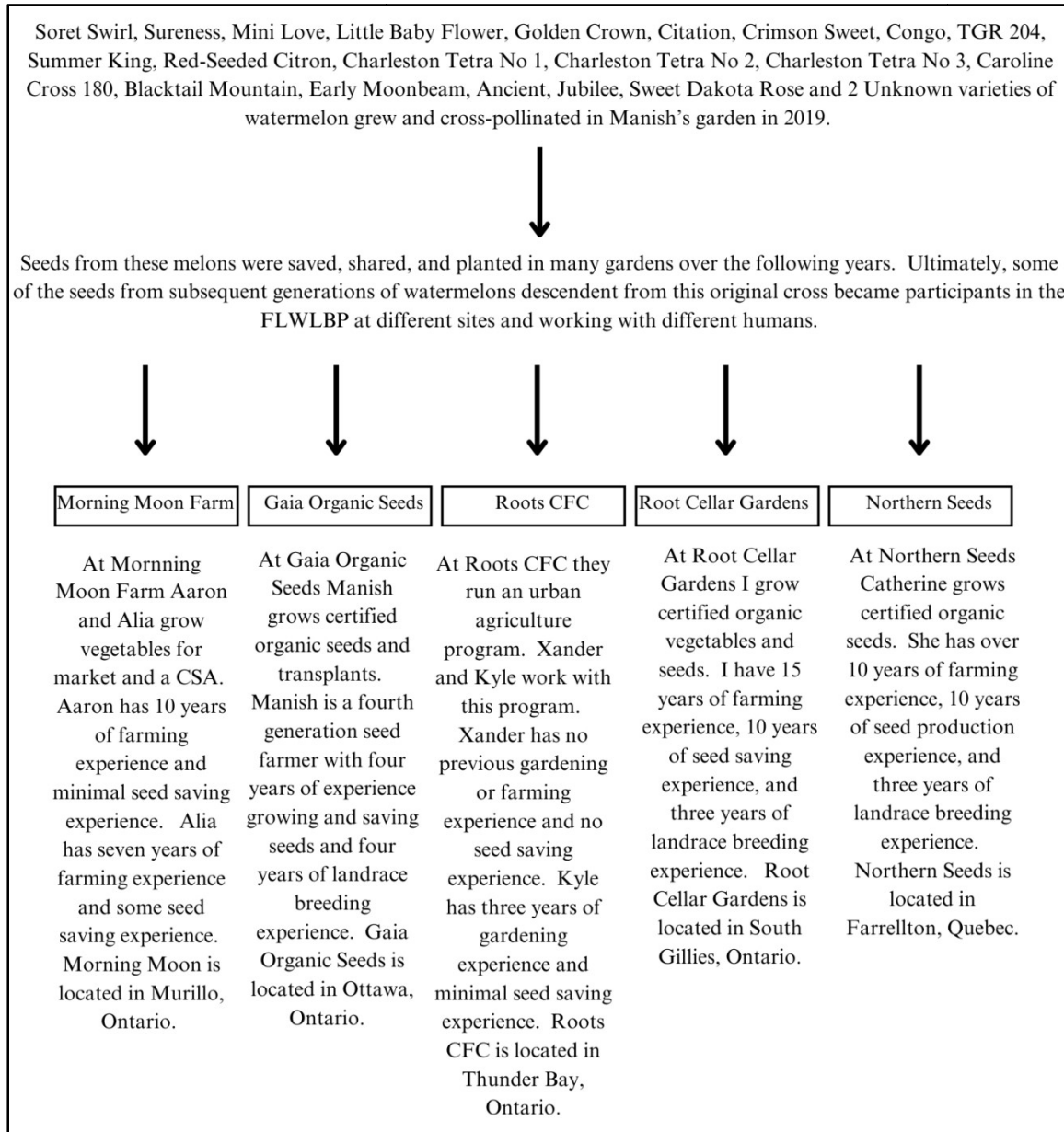
¹⁴ The EFAO is a non-profit organization dedicated to supporting farmers in building ecological, resilient farms and knowledge sharing networks (see <https://efao.ca/>).

year project funded and supported by the EFAO. Together, the farmers involved in the FLWLBP decided on the development of “an early ripening watermelon, with great taste and texture, that is able to mature early enough to be a successful crop [on our farms]” (Ivanoff et al., 2021, p.1) as their research objective [see Appendix A].

Each spring, participating farmers meet with EFAO staff to established/review their research objective and protocols. Farmers plant and save seed from the watermelon landrace each summer and collected data to be returned to the EFAO. Upon the completion of the project (September 2024), EFAO staff will employ both qualitative and quantitative analysis techniques to ‘tell the story’ of this population of watermelon. Through the Farmer-Led Research model, farmers are awarded a \$250 stipend for the completion of the growing and data collection each year. Farmers are expected to work with EFAO staff upon the completion of their project to prepare and present an overview of their research at the annual EFAO conference (for this particular project that will be in December 2024).

Although the focus of this study is on the assemblage, it is helpful to provide some basic background information about the human and watermelon populations at its core. Table 3.1 presents the members of the assemblage. (For complete demographic information see Appendix B).

Table 3.1. *Members of the assemblage*



Inclusion

The participants in this study were seven human participants working with five unique populations of landrace watermelons at five unique sites. All were invited to participate in the research as a result of purposive sampling. During the spring 2023 FLWLBP meeting, I

presented a proposal of my thesis research to the other human participants to gauge their interest in participating. All were receptive and agreed informally. Upon receipt of my ethics approval, I approached each FLWLBP participant formally, and ultimately, all FLWLBP participants also participated in this thesis research.

Exclusion

For this research I have made the unilateral decision to limit the focus of this research to humans and watermelons – ignoring and obscuring the role of all the other agentic beings also entangled in the FLWLBP. However in reality, the assemblage inevitably includes many more (arguably infinitely more) members such as: climate, time, soils, air, water, insects, animals, additional plants, and additional humans (to name just a few). In reality, all were affected through their entanglements. In reality, all were members of the assemblage. In reality, the agency of these excluded actors was felt by humans and watermelons within the assemblage. Excluding them creates important limitations of this research. Unfortunately, given the nature of this study (a Master’s thesis) it was beyond the scope of this work to include them. Thus, it must be remembered, that this study represents a very narrow insight into the vast and complex multispecies relationships that connect us all.

Figure 3.2 shows the artefact that I produced as a participant in this research and depicts my experience in the assemblage growing, harvesting, tasting, sharing, and saving seeds. Of relevance here in picture form is the simplified representation of the assemblage with only humans, melons, and seeds visible.

BECOMING-THE-DASH

not interested in ‘who is what’ but rather the relationship between all members of the assemblage. Who I am must be understood in relation to the assemblage and what is being done and what is it becoming, not in a static, individualistic series of “I am” statements.

To this end, I am a member of the assemblage of growers and watermelon that make up the FLWLBP who is simultaneously engaging in academic research with the assemblage. The relationships within and the *becomings* of the assemblage will be explored in the following chapter. Of importance here is the fact that I have been afforded the opportunity to both engage in and reflect deeply on the FLWLBP. In this way, **I am uniquely privileged within the assemblage.** Through my dual attachments to this project, I have had more time, resources, and support to engage critically in this assemblage. Moreover, I have an academic platform through which to share the story of the FLWLBP.

As in all research, the issue of power is both a challenging and critically important one with which to wrestle. Of particular interest within this project is my dual role as participant and researcher, and the question of power differentials *within* the assemblage. To being, my role as participant and research provides me a unique opportunity to engage with other human participants as both a peer and a researcher. I believe it has afforded me greater insight into the experience of the FLWLBP, and greater

Who’s doing what to whom?

Pollan (2002) suggests “it makes just as much sense to think of agriculture as something the grasses did to people as a way to conquer the trees” (p.xxi). The issues of dynamics and differentials in power within the assemblage in this research are complex and necessarily important to consider. However, a full exploration of them is well beyond the scope of this research. I offer the quote above as a reminder of this complexity. Plants have agency, and though this agency they engage in vegetal politics (Elton, 2021). Their power is seen in the affects they have on the bodies with which they are entangled. In wrestling with the tensions of power within multispecies assemblages we must not only consider them from a human perspective, but also be willing to broaden our field of view wide enough to see the gap in our awareness. As Bridle (2024) suggests, recognizing that “we cannot know everything—because knowing itself is always a form of control, a form of domination—is a necessary step in acknowledging that we are not at the center of things, that actually we belong to a more-than-human chorus; that if we are prepared to listen to, rather than to know in this aggressive fashion, we can actually live alongside more hopefully.” (para. 18)

understanding of the relationships within the assemblage. However I recognize that this dual-role also presents potential ethical dilemmas. These I explore further in the Ethics section of this chapter.

With respect to power differentials *within* the assemblage, this research seeks to explore the ways in which watermelons and humans are active co-constituents of a mutual world. By conducting a multispecies ethnography I have sought to relinquish the traditionally privileged human-centered perspective typical of most research. Indeed, this approach aims to legitimize human-nonhuman relationships within social sciences (Hamilton & Taylor, 2017). However, it also introduces a constellation of new issues of power and representation. Non-humans participate in our shared world in distinctly non-human ways, which presents challenges for a researcher who knows only how to communicate as a human. For example, how do you get consent from a watermelon? Upon receiving consent (or not, in the case of this research) how do you identify, interpret, and make meaning on behalf of beings whose form of intelligence is so different from our own? (This is a challenging undertaking even between humans). Hamilton & Taylor (2017) suggest that what is needed, in the absence of any sort of standard methodological multispecies practice, is a commitment from researchers to *un-learn*. They argue that to being to address issues of power between humans and other species in research requires a willingness to ask different questions, and to experiment with different ways of thinking, knowing, and representing. Bridle (2024) suggests that “it’s impossible for us to know what it’s like to be so

many other forms of being. And yet we have the same goals in mind, which are surviving and thriving on this planet. And we share this world” (para. 43). This notion speaks to a need to both *un-learn* and to adopt an ethic of care - to work to facilitate an understanding of the complex and ever-evolving dynamics of power between researcher and participants (Roger & Mignone, 2018). This difference of intelligences presents a critically important and unresolved (at least in this research) challenge for both posthuman and assemblage thinking, especially as it relates to the distribution and differentials of power *within* an assemblage. Bridle’s (2024) work suggests a practice that may, in time, allow for greater clarity. Through recognizing and accepting the limits of human knowing and standing in solidarity with other beings and forms of intelligence (what he calls *unknowing*), we can make room for other ways of knowing and other intelligences to be seen and heard. (By decentring the human we can make room for other species to come galloping in) (Braidotti, 2013). *Unknowing* he writes “is not the same as ignorance. It’s not a blindness to the world, but it’s a refusal to project our own forms of thinking directly onto it in a way that obscures its actual reality” (Bridle, 2024, para. 39).

I cannot speak to watermelons, yet in my aim to understand and represent the assemblage of watermelons and humans at the heart of this research I am called upon to represent them all – watermelons and humans. I commit to wrestling with and mitigating potential harms that come from this inequitable power dynamic through an ongoing effort to *un-learn*. I have used multiple methods of data so as to best ‘hear’ what all participants have to ‘say’. By taking the assemblage

of watermelons and humans as the unit of analysis for this research, the focus is put on entanglements and relationships that recognizes the common world they share as opposed to putting them in opposition to each other. Through the lens of relationship watermelons and humans can begin to be understood as not so “different that they cannot be researched together” (Hamilton & Taylor, 2017, p.10). In the end, these efforts and practices may very well be wholly insufficient when it comes to addressing the variously complex power dynamics present in this research. However, as Challenger (2024) suggests, no matter how fraught, the act of representing non-humans is itself a critically important political act.

In my original thinking about my role in this research, I wanted to declare myself to be “in nearly every way, an insider in my research”, the one exception being that I am not a watermelon. And this is true. However, I have now come to realize that this distinction is ontologically questionable and methodologically irrelevant within the context of this research. Posthumanism at its core, challenges the idea of who is human and who is not, ultimately suggesting that the distinction of human – non-human is just another false dichotomy used to uphold unjust structures of power (Braidotti, 2013). Multispecies ethnography is not interested in ‘who is what’ but rather the relationship between all members of the assemblage. In light of these perspectives, I now propose that I am, *in every way* an insider in my research. However, I would suggest that what is most important to recognize here is not my status as an insider or an

outsider. Rather, it is the differentials of power that exist both within this research and within the assemblage upon which this study is focused.

Data Collection Procedures

The data collected in this research took many shapes and came from many sources to identify the ways participants both affect and are affected by the assemblage. This section will outline the types of data collected, as well as the procedures used to collect them¹⁵.

Interviews

A set of two conversational interviews [see Appendix C] were conducted with each human participant, for a total of 11 interviews (some participants chose to do their interviews together). While interviews have been critiqued as inherently anthropocentric, Fox & Alldred (2022) suggest “interviews can still serve as sources of data in a more-than-human study, if interviewees are considered not as privileged actors within a socially constructed setting, but rather in the way that ‘key informants’ are used in ethnographic studies: as “insider sources of knowledge about a setting” (p.631). Although the interview guides did not intentionally reflect this methodology, the data collected none the less still provided valuable insights in this regard.

Prior to each initial interview human participants were emailed the following:

- Consent form to sign and return to me [see Appendix D]
- Information letter explaining the study and what to expect from their participation in this research [see Appendix E]

¹⁵ It is important to note that as a member of the assemblage/participant I also collected data from myself/the watermelons that I worked with at my farm. My procedure was the same as with all other participants. My data was used in the analysis, however I intentionally chose to use primarily examples from other participants in the writing of this thesis. This decision was based on a recognition of my privilege/voice in conducting and writing the research and a desire to share other voices, too.

- Recruitment letter [see Appendix F]

Human participants were also provided a paper copy of the information letter and consent form at the first interview if they wanted them. Before starting, I introduced myself and the project. I also reminded each participant that they had no obligation to take part in the interview, that they could choose not to answer any question or to continue with the interview at any time, and that none of that would have any impact on their participation in the FLWLBP. Finally, they were asked if they would like to remain anonymous, if they would like a transcript of their interview, and if they had any questions.

The first interview took place relatively early in the growing season (June/July 2023). All of the initial interviews took place in the spaces nearby where the watermelons were growing so as to conduct research *with* not *on* (Elton, 2021) them (the watermelons). This first interview was introductory - serving as an opportunity to explore context, motivations, goals and expectations. The second interview took place near the end of the growing season (September/October, 2023), around the time that watermelons were ripening and/or harvested. Prior to the start of the second interviews, participants received the same reminders about the research project and the voluntary nature of their participation. They were also asked about their desire for anonymity, transcripts, and if they had any questions. In all cases except two, conversations took place in person, again in the gardens in which they were growing. This second interview was more reflective- exploring experiences, outcomes, and meanings.

All interviews were recorded using an audio recorder except for Manish's second interview which was conducted through Zoom and recorded. While an interview guide was used, in all cases interviews took on a more conversational tone, as these face-to-face conversations and garden visits represented a unique opportunity to talk to each other and connect on issues of

seeds and landrace breeding. In these exchanges participants were not only answering questions, they were also asking them. These interviews represent a snapshot into not only what was important to the researcher in the moment, but also to the participants.

The interviews provided important opportunities to begin to engage with the non-human participants of this project as well. By conducting interviews in the garden (when possible), with the non-human participants, watermelons were provided an opportunity and the power to visibly prompt or contest what was being said about them (Elton, 2021)¹⁶. Recordings of interviews captured not just the dialogue between researcher and human participants, but also the garden sounds that were a part of the context and experience of both human and non-human participants.

After each interview I took time to reflect, review any notes I had made during our conversation, and to make further notes about how the interviews went, and anything of note that stood out to me. Examples of these reflective notes include the mood of the interviewer/participants, missed opportunities for following up on interesting points, and questions that participants struggled with etc. These notes were used to inform subsequent interviews when/where possible.

Artefacts reflecting experiences landrace seed breeding

In advance of the second interview, participants were asked to prepare, bring, and then to discuss an artefact (e.g., photo, drawing, item) that they felt was reflective of their experience working with the watermelons. The creation/choice of an artefact provided human participants with an opportunity to explore and express their work with the watermelons in a non-verbal way. As Kuhl (2011) suggests, visual representations offer deeper texture to a portrayal – the creation

¹⁶ For example, during one interview at the end of the season a mature, healthy watermelon in the field contested the story that all of the good melons had already been harvested and those that remained had been killed by disease.

demands a different type of engagement, and the viewing provides a “more holistic portrayal” (p. 116). All participants except Xander and Kyle were able to bring an artefact to their second interview. Kyle chose to send me photos and an explanation of his artefact the following month.

These artefacts provided unique and unexpected insights, and provided robust reflections on the impacts of engagement with the project. They allowed participants a chance to tell own stories in their own ways.

Photos and Observations

The collection of observation and photographic data of the watermelon participants was primarily collected in the same visits as the interviews were conducted. In some cases, I spent time after the interview to help with whatever was being worked on. In other cases, I was left to take observations and photos on my own while growers moved onto the next part of their days. However, there were two cases where this was not possible. When the first interviews with Aaron and Alia were conducted, they had not yet been able to get the watermelons planted because the transplants were slow to grow to a size where they could be planted out. The other time that interview and observational/photographic data were not collected at the same time was Manish’s second interview. Due to extenuating circumstances Manish was not able to meet with me the day that I went to his farm. As a result, observations were made, photos were taken, but we had to reschedule the interview for a later date.

Elton (2021) and Kuhl (2011) suggest that research with non-humans demands explorations of the places where experiences intersect, that is to say, to look for non-human agency in relations. It is through observations made on-farm at the time of interviews that much of this work was done. I applied Elton’s (2021) methodology for recognizing plant agency in the design of my observation protocol. I used her three steps of recognizing plant time, participating

with plants, and scaling up as prompts for my observations [see Appendix F]. In so doing, opportunities were created to explore the ways in which plants and humans exist in relation to each other, and ultimately, to develop the empathy needed to promote more ethical relationships with non-humans (Kuhl, 2011).

Analysis

Interviews were transcribed over the course of the data collection period (June 2023 to October 2023). Transcripts were shared with participants as requested at this time. Transcripts, artefacts, observations, and photos were then all reviewed. This led to recognition of the need to return to the literature on identifying non-human agency and conducting research with more than humans. It was at this point that I realized that my initial case study approach was inappropriate for this project. It was the watermelons that showed me this. While the FLWLBP represented a clearly bounded case, once I began to try to analyze the data the limitations of my human intelligence became clear. I did not know how to make sense of the data I gathered as it related to the watermelons. I could understand what the human participants were thinking, doing, feeling etc. because they told me these things. What I could not figure out how to do was bring the watermelons into the analysis without anthropomorphizing them or diminishing them to background actors. I reviewed the data again, this time in conversation with the literature on multispecies ethnography, posthumanism, and assemblage theory. I realized at this point that this research was not about a bunch of individual participants in a bounded case, but rather it was about an *assemblage*. I returned to the literature to further explore the discourse on agency, affect, and the emergent characteristics of an assemblage. I returned to the data and identified three themes. I struggled to report these themes. I returned to the literature.

This led to the realization that while I had gained a better understanding of the theories underpinning my research, and I had changed my unit of analysis and lens through which to identify themes emergent from the data, I had not fully transformed my research design. Specifically, I realized that I could not get my data to speak to my research question because I was asking the wrong question. I reconstructed my research question. I further explored the literature on posthuman and multispecies methodologies. I returned to my data analysis – no longer in an attempt to identify themes, but rather to develop a thick description of the assemblage and what it was doing and becoming. I struggled with reporting. I returned to the literature on writing in ethnography, and specifically multispecies ethnography. I identified a composting storytelling method. I returned to the data. I used the concepts of looking for friction, common-worlding, and embracing awkward situations as diffractive lenses through which to once again view the data. I used cartography to map out the rhizomatic connections that I could see emerging within the data but also beyond, to begin to put the data in discussion with the literature.

The process I have just described was challenging, messy, and emergent. Over and over I set out to accomplish the ‘next step’ in the research process, only to struggle at length before realizing that this ‘next step’ wasn’t actually what this study needed me to do and so I returned to the literature to figure out what the problem was. In the end, this process took a shape akin to a diffractive reading of the data (Elton, 2021). As she describes, a “diffractive reading is a process of encountering the data while holding on to theoretical concepts” (p.98). The data (especially the data collected from the watermelons) set me back to the literature over and over. In the end it showed me that this research was not going to reveal themes based on the actions and

perspectives of individual participants but rather it was going to describe the relationships within a multispecies assemblage.

One of the things that is challenging with working with genetically diverse watermelons is trying to figure out when they are ripe. Indicators like being yellow when ripe, or having a dry stem, or a certain shade of ground spot are not universally present within the intentionally diverse plant population. But, what is universal to all watermelons is the fact that their density changes as they mature. This means that by knocking on a melon and paying close attention to the sound that it makes you can hear if it is ripe or not. Diffractive analysis (as I have come to understand it) is essentially knocking data against theory and being attentive to the results.

Reporting the Findings

Building good soil enables resilience in the face of change, buffering against shortage and stress, so that life force can go into something more than survival...into becoming. It is the work of ancestors and ancestors-to-be, to support the becoming of what they cannot imagine, but trust will arise. Building good soil means preserving room for possibility, for a world open to creation again and again (Kimmerer, 2021, p.182-183)

In this research I have chosen to use an approach to reporting that Hohti & Tammi (2023) call “composting storytelling” (p.1). They explain that, like compost (which is constructed of layers of different materials who interact to create and shape new worlds) stories can be understood as reproductive and endlessly intra-active (Hohti & Tammi, 2023). In this model, small stories interwoven are used to foreground the affective relationships emergent from the data. In this approach, storytelling is recognized as an important tool “in which critique emerges along with horizontal movement from closer, warm assemblages to more distant or erased, cool

assemblages” (Hohti & Tammi, 2023, p.1). Taking warm assemblages to encompass bodies in immediate relationship, and cool assemblages to be the more diffuse entanglements, it can be understood that composting storytelling enables critical reflection on the broader affects of the assemblage, and thus allows the data to be put into conversation with the literature.

This method of composting storytelling has proven to be a critical element in the reporting. The stories interspersed throughout this document serve an important methodological role. They bring to light the theory within the relationships of the assemblage. While the typical format of a Master’s thesis is linear and rather formulaic, the flow of affects and relationships within an assemblage are rhizomatic. They spread outward in all directions, are complex, and interconnected. In contrast to more typical research practices which seek to make the complex simple, assemblage-oriented research seeks to represent this complexity (Fox & Alldred, 2022). I use anecdotes throughout this document in an attempt to shift the focus from the researcher to the relationships within the assemblage, to provide opportunities for the reader to reflect on the “lively connections among species” (Pacini-Ketchabaw et al., forthcoming, p.3), and to mirror the interconnected nature of not just the assemblage at the heart of this research, but also the posthuman worldview that underlies it.

In this research I have used a composting story telling approach. In their article, Hohti & Tammi (2023) explain that this approach to multispecies ethnography research reporting is based on two key premises: that nonhumans are social actors, and that when bits of stories are connected in new ways, space is created for new questions and ideas to emerge. Composting storytelling challenges the dominant notion of storytelling as layers of meaning. Rather, “In this approach, the ingredients of stories are not assembled for the purposes of a coherent narrative, but they can accommodate unprecedented things, including things that do not necessarily fit.

Storytelling, when understood this way, is a situated strategy of accounting for the becomings of these elements in messy and thick copresence” (p.5). In composting storytelling it is recognized that that the story and the storyteller (researcher) are inherently part of the assemblage they seek to understand and represent; they are entangled.¹⁷ Importantly, what stories to ‘feed’ to the compost must be carefully considered. Issues of power and representation loom large in attempting to account for experiences that cannot be spoken or may be distorted by speaking. To this end, storytellers are pushed to master less and notice more – to pay attention to the limits of knowledge and cultivate attentiveness.

Bias and Interpretive Lens

Bias is complicated, consequential, and concealed. Let me share a story to explain. Thought to have been extinct, seeds of Gete-Okosomin squash were discovered in a clay pot by archaeologists at a site in Wisconsin in 2008. The seeds were found to be over 800 years old and were passed on to an Indigenous seed keeper. When she planted out these ancient seeds, miraculously, they grew (Agrella, July 28, 2016). This discovery was an incredible testament to the seed storage capabilities of the Indigenous community who saved them and provided a unique opportunity for a second life for the centuries old squash variety.

Since then, seeds from Gete-Okosomin squash have been saved, stewarded, and shared widely; along with the important story behind them. Gete-Okosomin is not just another big squash. It is rare, culturally significant, and long-lost variety. To understand the story behind the squash allows it to be seen as more than a commodity in our capitalist food system, more than an ingredient in our dinner, more than just another plant in our garden.

¹⁷ This term has appeared previously in this thesis but has escaped further explanation until now. The idea of entanglement actually comes from quantum physics, and refers to the phenomenon outlined by Schrodinger, Heisenburg, and Bohr in which it is seen that a body (in this case light) cannot be observed without being changed (Nail et al., 2019).

I share the story of Gete-Okosomin because of the role it has played in reshaping my appreciation of the relationships that have existed between people and seeds since time immemorial. It is a story that challenges the modern, colonial and capitalist bias I have, the factory-installed lens through which I most naturally see owing to the time and place in which I live. But there's another reason I share this story here: and that is that this story, though still widely shared, is not entirely true. In actuality, Gete-Okosomin squash have been grown by members of the Miami Nation for over 5,000 years (Fessenden, June 27, 2016; Traverse, 2024). The story of this ancient squash isn't one of rescue from extinction by settler anthropologists and the subsequent collective efforts of gardeners and seed savers, it is a story of a millennia old relationship between squash and members of the Miami Nation. The clay pot story of Gete-Okosomin gave voice to these squash, but silenced those who, for thousands of years, have lived and grown with them.

Stories are important, but not all stories are accurate. It can be hard to tell the difference between a fake story and a true story – it can be even harder to appreciate and recognize the impact of misinformation in creating and reinforcing bias, silencing voices, and muddying already murky waters. Often, we hear only a part of the story. Partial knowing only complicates things. As a researcher reporting on human-watermelon relations I am acutely aware that I have only partial knowledge. I can only report on the 'knowing' of humans (and more accurately only the human that I am) – I do not have the understanding or tools to purport an understanding of the knowing of the watermelons.

“Stories do not just represent, but also make worlds” (Hohti & Tammi, 2023, p.10). I recognize that the stories that inform my perspectives are not only the ones I tell myself and those that others tell me – they are also the untold myths that we collectively posit as truth and

that undergird the structures of our society (Harari, 2022). In the end, I believe that what I offer here is a recognition of the often obscured challenges of addressing bias, and a declaration of my commitment to stay with the trouble. Through practices aimed at de-centering humans and ongoing diffractive analysis, it is my hope that this research tells a story that can contribute to the building of good soil.

Ethics

Although there was little apparent risk to participants from involvement in this study, it remained critically important to fully and continuously consider the ethical implications of engaging in this study. There are several, standard, institutional ethical considerations for all research projects that were addressed. As the potential risk to participants is low, this was done through the sharing of a participant information letter and consent form [see Appendix D and Appendix C).

The issue of power between the researcher and participants was continuously attended to and addressed in this project – as I, the researcher, was also a participant. Adopting what Roger and Mignone call an “ethics of care” (2018, p.46), this research adopted an ethics protocol focused on ongoing communication and engagement with research participants (human and non-human) and a commitment to *unknowing* (Bridle, 2024). Justice demands recognizing and representing different perspectives (Blue et al., 2021). But it’s a busy, messy, unsettled space where multiple perspectives meet, interact, create or compete. It’s an uncomfortable place; it’s a necessary place. These practices were important tools in working towards addressing the issue of power within this research.

Of specific concern to this study (for human participants) was a perception of coercion and ensuring anonymity. With respect to coercion, it was critical to ensure and reassure

participants that their engagement in the FLWLBP is not contingent upon, nor prescribed in any way by this additional research project. Moreover, it was repeated that continued involvement in this study was not required for continued involvement in the FLWLBP. To this end, with participant agreement, this delineation of projects was written into the FLWLBP protocol as well as included in participant recruitment, information, and consent forms. It was also repeated at the time of scheduling interviews/farm visits, prior to member checking, and prior to the EFAO research symposium.

I am first and foremost a farmer – a grower of food and seeds and curious participant of a collective, farmer-led watermelon landrace breeding project. As such I have had to great fortune to get to know and work with the other farmers that I came to look to as collaborators in my thesis project as well. As part of my ethics protocol, I implemented a policy of dynamic engagement, ongoing interaction, and open communication with other members of the research team out of respect and concern for their needs, interests, and well-being. Ultimately, through employing such an ethic of care it was my hope that these complex and consequential interpersonal risk factors were identified and minimized in a timely and efficient way.

Conclusion

Rooted in posthuman theory, the multispecies ethnographic approach to this research seeks to bring into focus the actions and reactions of both human and non-human collaborators in landrace seed breeding. Through shifting the research gaze from individuals to the collective (the assemblage), this multispecies ethnography strives to account for the interspecies relationships that ultimately shape our shared world. In this chapter I have provided an overview of the ontology, methodology, and methods used in this research. I have also introduced and contextualized the assemblage upon which this research is focused. Finally, I have waded into

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the ambiguous topic of the role of the researcher in this specific multispecies ethnography, suggesting that it presents both the opportunity to gain insider knowledge and the challenge of representation.

Chapter 4: A Story of the Assemblage

Introduction

The objectives of this research were to describe the relationship between plants and humans; examine the ways in which humans and plants are mutually affected/affecting; and to investigate the consequences of these affects for an eco-social approach to health. In this chapter I focus on describing the assemblage. By narrating the journey of growers and watermelons across time, I present the reader with an opportunity to know and feel the relationships and context at the centre of this study. I start each subsection with a quote from participants that speaks to what is happening within the assemblage. I then draw on my experiences as a member of the assemblage and report on the data collected between June and October 2023 (e.g., photos, field notes, interviews, participant artefacts) to describe what members of the assemblage are doing. Finally, for each subsection I share a relevant photograph.

Preamble

It all started with a seed (it always starts with a seed). And then it ended with more seeds. And when you engage this way, from seed to seeds you realize that the end is the beginning (and really what is a beginning and end anyways) because what we're actually talking about here is a cycle that started a long time ago and hopefully will continue long into the future. Humans and watermelons began their journey together over 4000 years ago when watermelons were small, round, striped, bitter, and wild; and humans started the intentional process of domesticating them (Goldman, 2019). From seed to seeds melons grew, adapted, were tasted, selected, and replanted. Over time, the watermelons changed – and so did the humans. As Kimmerer (2013) explains, “food plants and people act as selective forces on each other’s evolution – the thriving of one in the best interest of the other” (p.124). We started off preferring melons that could

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quench our thirst and be used as containers, but in time our tastes changed along with the melons; and so, it is that we now know watermelons as having sweet, highly-coloured flesh (Goldman, 2019). Yet this co-evolutionary journey undertaken together by watermelon and humans is not over. From one seed to countless others over the millennia, myriad collaborations between watermelons and humans together continue; connecting us all to a distant time and place, as well as to the unknown possibilities of the future.

Assembling

It's essential that like, we continue on this journey together. ~ Manish

When Manish planted so many varieties of watermelon all together in the summer of 2019 with the intention of saving seeds from his favourite melons at harvest time; he created a mess of watermelon genetics. Set free to engage in what landrace gardener Joseph Lofthouse (2021) calls “promiscuous pollination” (p.1), melons shared their genes via pollinators across varieties. Typically, in the seed-saving and producing world this is avoided at all costs, because if your yellow melon pollinates with your red melon, you don’t know what you will get from the seeds of those melons when you plant them out the next year. Our typical, modern seed world involves buying a pack of seeds with a description of the plant that they will grow into – understandably valuable information to know for planning. If the seeds Manish had sent me in 2020 were in a pack with a description all it could really have promised was ‘some sort of watermelon’. In the context of the journey of this assemblage that unknown equals diversity, and that diversity is highly valued because of the possibilities it presents - specifically the possibility of watermelon adapted to be able to thrive in the challenging climate in which they are being asked to grow.

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Manish assembled a diversity of watermelons, and then he and I assembled a diversity of growers. Together we created the FLWLBP, scaled up (Elton, 2021), and became an assemblage – individual bodies connected in a new way, making space for new questions, stories, and possibilities.

Figure 4.1. *Manish with watermelon at Gaia Organics, July 11, 2023*



Embarking

It's like we're trying to... well really I guess it's the watermelons that are trying the most, but what we're trying to do is grow watermelon that wants to grow here and that's a cool idea.

~ Kyle

At five distinct sites across Ontario in 2023, the journey is indeed continuing. Watermelon seeds are being planted with the goal of collectively developing northern adapted watermelon that thrives. These seeds planted were saved the year before, from melons that were grown the year before, from seeds that were saved the year before that, from melons that were grown in that year before that, from seeds that Manish shared with me from his crossing of 23 varieties of watermelon in the summer of 2019 [see Appendix A, FLWLBP protocol]. Of course, all the seeds he planted that summer also came from melons from somewhere, and while we can't retrace the path of this journey all the way to its African starting point, we can at least trace it to the time and place where the watermelons of this landrace began.

Figure 4.2. *Germinating watermelon seeds at Root Cellar Gardens, May 3, 2023*



Engaging

Are these going to do anything? Are they actually... are they going to do anything? ~ Kyle

It seemed at first that maybe not everyone was 100% on board with this collective journey. Some growers spoke of having trepidations. As Aaron explained during our first conversation “I’m pretty intimidated by the project of making observations and trying to arrive at something or try to develop something into something more usable. So initially I didn’t want to do it”. Being part of this project required not only setting aside space in their production gardens with no promise of a marketable yield, but also setting aside time and energy to observe, record, taste, and save seeds. In fact, one grower, Catherine, chose *not* to be part of the FLWLBP in its first year (2022) even though she was growing watermelons from the landrace population. She explained, “when Manish first approached me or suggested that I do this I was a bit put off by the... uh not so much by the protocol but the amount of note taking involved for the number of fruit involved at a time when I know that I’m very busy.” But the melons she grew ripened so early and tasted so good that she was convinced to be a part of the project the following year (2023). Despite hesitations, it was observed that in practice, all growers were committed to supporting the watermelons in growing - provided them with the room, resources, and supports that they needed to the best of their abilities.

This commitment to and support of the watermelons began long before the melon plants went in the ground. Seeds were selected, saved, stored, and shared. In the spring of 2023 growers planted watermelon seeds. In time, and due to what Jahren (2016) calls “some unique trigger-combination of temperature- moisture-light and many other things” (p.37), a seed will take a leap of faith and grow. This proved true for the watermelons seeds, who germinated, and in so doing

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showed themselves to have been convinced to continue on the journey. Yet like some of the growers, there was some initial hesitancy in the melons. Many of the melons planted that spring lacked vigour and seemed to just sit there, for weeks on end, with only the smallest of leaves; reluctant to grow. The watermelons showed themselves to be on plant time (Elton, 2021) which was a source of friction between plants and growers.

Figure 4.3. *Slow growing watermelon plant at Roots Community Food Centre (RCFC), June 20, 2023*



Responding

I guess I just learned to be more respectful and cautious because I don't want to step on one plant and have it be like "ah, I was just about to like ripen" or whatever... just respectful and cautiousness, I guess. ~ Xander

By midsummer the collaborative effort to have adaptable watermelons that thrive in northern and eastern Ontario was well underway. Initial hesitations were buried under entangled vines, and tendrils of curiosity. Plants had taken the lead, dominating the space of the garden and setting the pace of the journey. Growers responded to plants by adjusting the way they moved through and around the melons, largely stepping back and allowing them to do their thing; all the while observing them with curiosity, care, and respect as Xander described. At Morning Moon Farm, Alia would observe the watermelons each week as she harvested kale nearby. When visitors came, she would take them to see the watermelons. As she told me, "They [the watermelons] were kind of a thing that I would show people when they would come. I'd be like 'Look! They have the baby ones on!' and they would just lose it. Like, it's an exciting thing for people." Curiosity spread.

At Northern Seeds, Catherine was called to care for the watermelons in a whole new way as she participated with plants (Elton, 2021) and attended to awkward encounters (Pacini-Ketchabaw et al., forthcoming) in the watermelon patch. The previous year she had observed that the watermelons in her garden attracted raccoons. As she recounted, "this year I was a little more proactive which I have really mixed feelings about." For her artefact that reflected her experience working with watermelons as part of the FLWLBP, Catherine chose a raccoon trap. As she showed me the trap she explained, "I tried and tried and tried with live traps, and they did

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not work. And this is not a live trap. It clamps their paws and you dispatch them”. For her, the significance of being called to respond to the needs of the watermelon this way was not technical, but relational: “And I guess what I wanted is not so much to talk about raccoons but is that there’s moral ambiguity in farming that shows up in one way or another every year and it has shown up for me in watermelons”.

Figure 4.4. *Catherine with watermelons, Farrellton Quebec, July 11, 2023*



Reckoning

They might not be talking the way we are but they're definitely communicating...we need to like, know the language. ~ Kyle

As Kimmerer (2013) reminds us, “Plants tell us their stories not but what they say, but by what they do” (p.128). Which begs the question, what does a watermelon *do* when it’s ripe? On the afternoon that I stopped by the garden at RCFC to chat with Xander and Kyle for the second time and to hear about their reflections on their season’s long journey, Xander and I started out by spending some time with the watermelons. They were starting to size up, and Xander had been trying to figure out how to tell if they were ready to be harvested. I shared with him some of the techniques that I’d heard of; then we started practicing “the knock test”. Essentially, as a melon ripens the way a knock on the melon resonates is changed. To hear the difference, you need to get your ear really close to the melon. We were practicing the knock test, right close to the ground where the melons were growing on their vines, when a fellow walked by and asked jokingly “Are they talking to you?”

Melons both inspired and required growers to pay attention, to observe, and ultimately to get to know them. For some this was most challenging in understanding what a melon does when it’s ripe. For others it involved trying to understand not what watermelons were doing, but *why* they were doing it. For example, when I asked Catherine how she thought the watermelons she was working with would describe their journey that summer she replied “maybe their sentence would start out ‘Oh it’s going great and we’re gonna...’ and then it falls out.. it cuts out”, because the melons were killed off by disease before the end of the season. For Catherine, the challenge was to learn about why the watermelons in her patch died prematurely. Catherine worked to try to

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find out the type of disease that attacked the watermelons, sending in samples to a lab for diagnosis and speaking with an area agronomist to no avail. Despite not knowing what the disease was, its impact was clear: dead watermelon vines.

Watermelons and humans are clearly not alone on their journey – they are accompanied by a host of travelling companions including animals, other plants, other humans, insects, and diseases. The roles that non-melon, non-human actors play are not insignificant (although they are largely overlooked in this research), impacting (sometimes dramatically) the ability of the watermelons to realize their potential to become the fruits from which seeds for next year can be saved.

Figure 4.5. *Xander and Kyle checking on watermelons, Thunder Bay Ontario, August 22, 2023*



Harvesting

Harvest has begun, and the search for the one & and many begins. ~ Manish

On a wet, grey morning in early September I joined Aaron and Alia for their watermelon harvest. Diesel tractor running, the space felt tired. Aaron and Alia were focused. The watermelon, now fully entangled with their zucchini and squash neighbours had stopped growing. The harvest started with a knock-test tutorial. Aaron and Alia wanted to share these melons with their CSA customers, so they wanted to try to be sure to give them only ripe melons. As best they could tell, ripe melons went in the tractor bucket; unripe melons went into a bin. The forecast was calling for frost that night, so they were harvesting everything.

When I got to Manish's place later in the fall, it was busy. There were several folks working in the driveway with drills and saws, building something. Manish was off the farm, picking up more building supplies (they were getting ready to hold some events at the farm, including a couple of community watermelon tastings). A friend of Manish's stopped by to harvest some beans for seed. The gardens were still full of plants growing. Wild turkeys wandered around. It was warm and sunny, just like when I had visited earlier in the summer. I took myself on a tour of the multiple spaces where the watermelons were growing. I had just come from Catherine's farm where the watermelon vines were dead, killed by disease. (There had been one overripe, but not rotten melon left on the field which we got to taste together. It was sweet, but mealy. When I left Catherine was still debating whether or not she would save its seeds). But in Manish's garden, the melons were just starting to ripen. Insects hummed. Standing in his watermelon patch was like stepping back in time. Manish had planted his watermelons much later than the rest of us. As he recounted to me during our second conversation, "when you

came by they were almost getting ripe... I was able to harvest - actually, I was able to harvest 10 days after that.”

At RCFC the watermelons were slower to ripen than at Morning Moon or at my place. I had tried to time things so that I could meet up with Xander and Kyle for our second conversation the day that they would be harvesting the watermelons. But when I showed up on September 21 the melons weren't ripe yet. We still chatted, but I also made a point of swinging by again a couple of weeks later when the watermelons were ready to be harvested.

The timing of the watermelon harvest from site to site varied. So did the context. Catherine rushed early in the season to harvest, taste, and save seed from what she could before disease killed all of the watermelon plants in her garden. Aaron and Alia had to harvest everything all at once in response to the threat of frost. At RCFC the bulk of the harvest happened one afternoon well into the fall, spurred on by the end of both the farming and employment season. Manish harvested what was ripe on two separate occasions for the watermelon tasting events he hosted. However, by October the growing season for these watermelons was over, but the journey was not.

Figure 4.6. *Aaron and Alia performing the knock test, Murillo Ontario, September 7, 2023*



Saving

Like there's multiple people selecting in slightly different ways, in slightly different bioregions... that moves things along... it's meaningful. And it's truer to the idea of a landrace too, I think. ~ Catherine

When Kimmerer (2013) states “The plants adapt, the people adopt.” (p.228) she is speaking of the relationship between cattails and humans. But a similar relationship can be seen to be playing out within this collaborative undertaking of growers and watermelons. In the latter context, watermelons express their ability to adapt through their ripeness and their flavour – through their ability to compel humans to ‘adopt’ them. And so, it is at this point that humans again take the lead on the journey by showing, sharing, and sampling watermelon with the intention of selecting and saving seeds from the earliest ripening and most delicious fruits. Although not actively growing anymore, the melons are far from passive, compelling and inviting anyone they can to taste them, celebrate them, and save their seeds.

Growers took different approaches to selecting and saving seeds, responding to and reflecting both the watermelons and their own motivations. For example, in the spring when I spoke with them, Alia and Aaron reflected on a hope that they would be able to share one watermelon with each of their CSA customers, and have them save and return seeds if it was delicious (which, in the end, they were able to do). Manish also included others in the selecting and saving process by hosting two public watermelon tasting events at his farm in the fall. While not an explicit part of the FLWLBP protocol, these growers felt (as did Kyle), that getting people to actively engage invites an important reframing of our collective roll in our food. As Manish

said of the tasting events he held, "holding this like watermelon tasting event was like a bridge that needed to be connected to share this with the broader population."

Unlike with most seed saving, growers did not engage in ongoing rouging of plants throughout the season. Lofthouse (2021) explains the value of such a hands-off approach early in a landrace breeding project is that plants are afforded the freedom and opportunity to adapt more quickly. No doubt selections were being made – just not by humans. The humans didn't step in until harvest time, when the FLWLBP protocol was to save seeds from the first 25 ripe, good tasting melons. A minimal amount of data was collected at the time of seed saving [see Appendix for the seed saving data I collected]. When I spoke with her in September, Catherine had made her selections and saved the seeds of the first 25 great tasting watermelons that she harvested. However, by the time I left she was debating saving seed from the *last* watermelon she harvested – the one that we found in the field that had escaped the disease that wiped out the rest of the watermelons. Because of the collective nature of the project Catherine was hesitant to go beyond the protocol. However, the survival of this particular watermelon was unique and quite likely could prove to be very helpful to the watermelons in the future.

Just like the Mango melon that Manish once found and now continues to look for, some watermelons called to growers to save their seeds regardless of the protocol. At Roots CFC the melons matured later in the season, a consequence of which was that they didn't have enough heat to fully develop their sweet flavours. Here growers chose to save seeds from the 25 *best* tasting melons, instead of 25 *great* tasting melons. For my part, I saved seeds from the first 25 great tasting melons that I harvested, but I also saved seeds from any exceptional melons that matured later, including seeds from a later-maturing watermelon that, when dehydrated, tasted like mango (I sent many of these seeds to Manish).

Watermelons store information in their seeds – but in the FLWLBP data was also collected and stored by humans in various ways. In the spring of 2023, when growers had met on a zoom call to discuss the protocol of the FLWLBP, Kyle was not there – having not yet been given the role at RCFC of working with the watermelons. However, in the fall he asked “Is the watermelon going to be on the call [next spring]?... I know it’s absurd, right but it’s not, it actually isn’t.” Even though the watermelon weren’t on the call, they did influence not only the seed selections that growers made, but also how and what data they collected¹⁸. For example, abundant, ripe watermelons inspired Aaron and Alia to engage others with tasting, selecting, returning seeds, and reporting back to them over systematically conducting the data collection themselves. Because they harvested all of their melons at once, on the last day possible, Xander and Kyle tasted, selected, saved seed, and collected data on all the watermelons all at once. For my part, I did this over the course of two weeks – tasting, selecting, reporting on, and saving seed from watermelons as they ripened in the field and I harvested them. Manish collected data on all the watermelons he harvested (not just the first 25 good tasting ones) during two watermelon tasting events he hosted. He also collected data above and beyond that required for the FLWLBP, such as Brix (sugar content) measurements. When I asked him what he was going to do with all the data he said that he wanted to know which melons were sweetest so that he could allow them to cross with other interesting melons (such as salmon coloured ones) that were less sweet – to continue to see what was possible.

In the end, the seeds that were saved reflect not so much the articulated protocol of the FLWLBP, but rather the experiences and opportunities that watermelons and growers encountered along their journey together.

¹⁸ The techniques and processes used by growers to store seeds were not explored in this research because this final stage of the journey largely occurred outside of the data collection period.

Figure 4.7. Tasting, selecting, and saving seeds at RCFC, Thunder Bay Ontario, October 3, 2023



Sharing

“We went to Rosencrantz café where we do our CSA pick up. We just stopped in (not our CSA pickup) and we were chatting with Jaime the owner who we gave a watermelon to. And he saved every single seed from that watermelon..... I don’t think he ever would have considered growing watermelons, and then he was like ‘This is unbelievable! We’re growing watermelons, and I’m sharing them with my family’.” ~ Alia

Watermelons inspired saving seeds, but they also inspired sharing. Their fruit is large, “delicious” (Catherine), “mouth-watering” (Aaron), and easily consumed raw. Their seeds are

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mature when the fruit tastes best – making it easy and inviting to select, save, and share. Within the assemblage growers selected and saved seeds. They also shared seeds. In 2022 I shared melons with Aaron and Alia because the ones in their garden had been killed in a windstorm. They saved the seeds from these melons and planted them in 2023. Catherine became involved in the project because Manish had shared seeds with her in 2022, and they grew into such early, delicious watermelons that she was convinced to be part of the FLWLBP in 2023. And of course, none of this would have happened had Manish not shared seeds with me in 2020.

But the sharing reached wider than the FLWLBP, too. Melons shared their genetics with each other, and then shared their fruits with others. Growers harvested the fruits, and some of these were shared with friends, family, neighbours. Of the people who received these fruits, some even went on to save and share their seeds. As Aaron said during our first interview, watermelon seed is “a good gateway seed because you’re saving without having to think too hard about it.” Watermelons compelled humans to save their seeds, ensuring that as Catherine said “it’s like, not entrusted but it’s carried on by ... by a community.”

Figure 4.8. *Watermelon seeds returned to me by an anonymous customer, Neebing Ontario, September 2023*



Pausing

It's only like, one go per season - so here goes 2023... ~ Catherine

With seeds came a pause – plant time slowed way down. Once seeds were cleaned, dried, and stored they required little if any attention and effort from growers. The FLWLBP required that data collected and photos be submitted to the EFAO, but after that there was little that *needed* to be done until the spring.

Over the course of the 2023 growing season, growers and watermelons carried on their co-evolutionary journey. Watermelon seed saved the year before were planted. These seeds grew into plants with more watermelons, cross pollinated, responded to environmental and cultural conditions, and matured. Along the way watermelons inspired curiosity in growers, presented challenges, and required growers to learn and respond to them. Growers obliged by being present and observing, asking questions, and taking action as they saw fit. By the end of the season all watermelon populations had matured to the best of their ability. Growers harvested melons, tasted them, and saved and stored their favourite seeds, and collected data. Watermelons were also shared beyond the assemblage. They were given to friends and family, sold to customers, and tasted by curious members of the public. In some cases, seeds from these dispersed melons were also saved.

The assemblage of growers and watermelons grew, relationships and awareness of the “the full cycle in our interactions with the crops” (Kyle) grew, and the journey (although paused) continues...

-seeds-becoming-plants-becoming-seeds-becoming-plants-becoming-seeds-becoming-seeds-

Figure 4.9. *Watermelon seeds labelled and ready for storage, Neebing Ontario, September 2022*



Conclusion

The entangled evolutionary journey of watermelons and humans that began thousands of years ago in a location thousands of kilometres away continues still. In this chapter I told the story of one small leg of the journey undertaken by the assemblage of the FLWLBP from planting to harvesting during the 2023 growing season. Drawing on multiple forms of data I shared quotes, reflections, and images along the way. I focused my analysis and presentation of the findings to the relationship between humans and watermelons in an attempt to avoid centering humans and/or anthropomorphizing watermelons. In the following chapter I discuss this relationship further, exploring ways in which watermelons and humans were mutually affected through their participation in the FWLWBP.

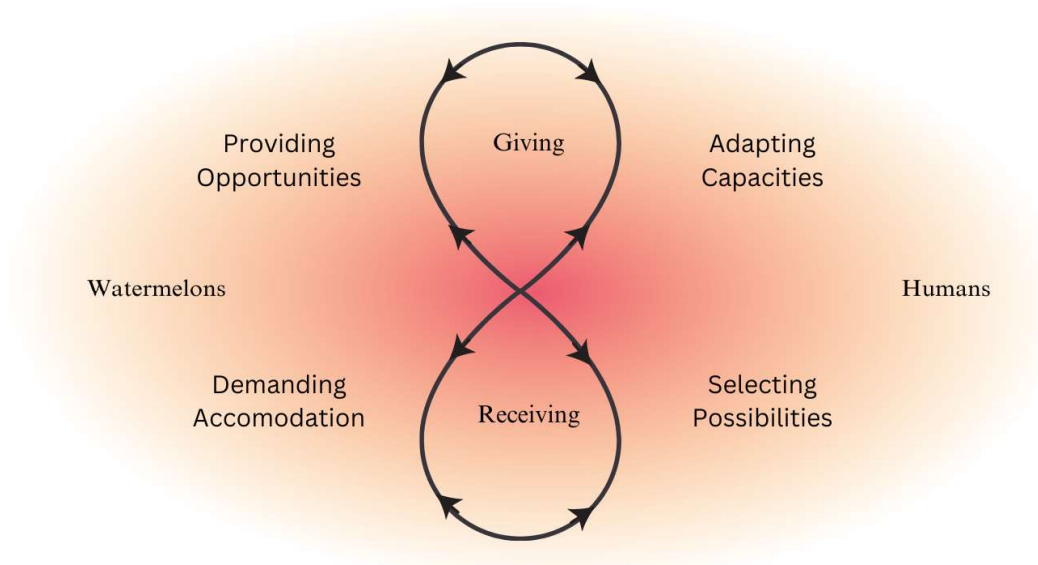
Chapter 5: Affect and Reciprocity

In the previous chapter I told the story of the assemblage of FLWLBP participants. In this chapter I weave my findings together with the literature to explore the reciprocal nature of the assemblage.

The Flow of Affect

The flow of affect within the assemblage is one way of looking at how what the watermelons do affect humans, and how what humans do affect watermelons. Beyond this, as Fox and Alldred (2022) state, it is also “[t]he means by which lives, societies and history unfold” (p.628). It was only after many false starts and much consideration that I chose to lean on Phillips’ (2016) work to conceptualize the way that watermelon and humans affected and were affected by one another within the assemblage of the FLWLBP. The problem had been trying to figure out a way to talk about the flow of affect without defaulting to a human-centred, reductionist perspective. Phillips’ work allowed me to conceptualize the FLWLBP assemblage in a way that was representative of the findings of this research, constrained enough to be able to present cohesively, yet also indeterminate [see Figure 5.1]. Within this model both watermelons and humans are represented as having space between them yet are also connected by a reciprocal flow of affect. [Here, the flow of affect is seen to be unending and multi-directional; a constant renegotiation of giving and receiving.](#) The space of the assemblage is both blurry and porous. The boundaries are not defined. There are no clear delineations (no false dichotomies) between giving and receiving, human and watermelon, or even any of the named affects. And while the model is visually simplistic, the phenomenon it represents is complex.

Figure 5.1. *The flow of affect within the FLWLBP assemblage.*



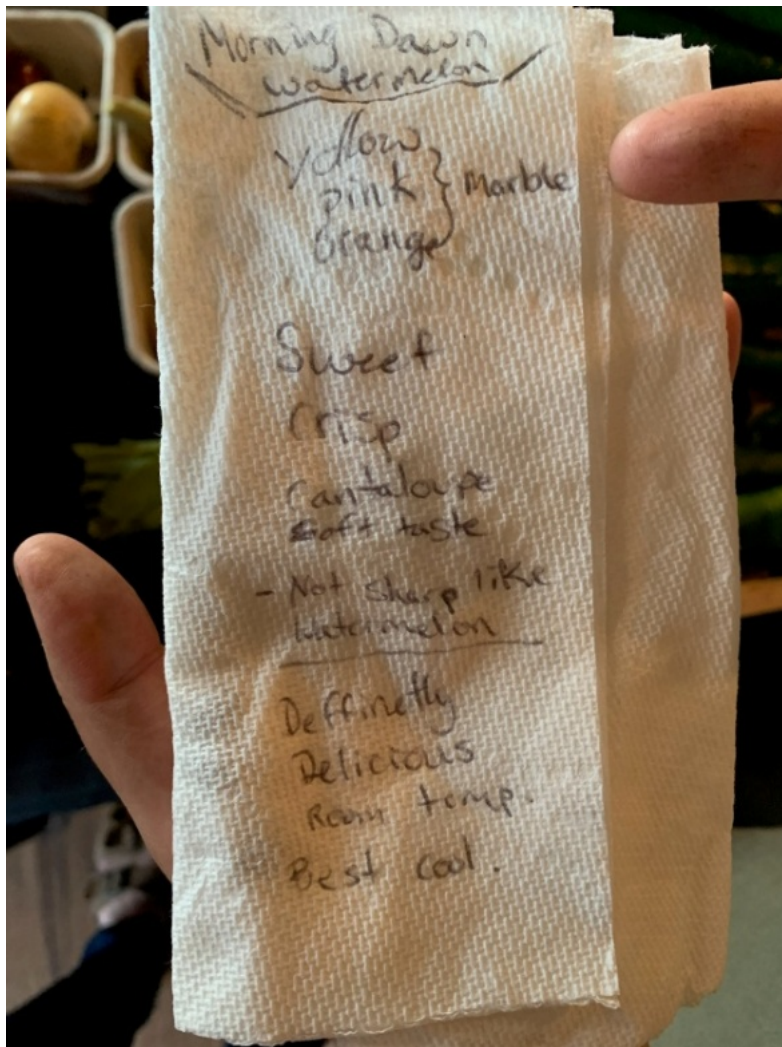
Selecting Possibilities

Phillips (2016) explains that “[a]n important part of saving [seeds] involves selecting from those seeds that thrive – choosing which seeds will continue” (p172). As previously mentioned, the stated goal of the FLWLBP was to develop a landrace population of watermelons that thrive in northern/eastern Ontario [see Appendix A]. Growers understood that this would be achieved through the saving of seeds from the earliest great tasting watermelons they harvested from their gardens, and planting them out again the next year, for three years in a row. In other words, growers would be required to select possibilities.

There were hidden complexities within these decisions which each grower navigated to the best of their abilities, such as who selected and how to decide what seeds to save. Aaron and Alia decided that it was important to engage others (their CSA customers) in the process of selecting possibilities and asked customers to return seeds to them if they loved the watermelon

they received in their weekly share. Some of their customers even shared notes from their watermelon tasting, along with saved seeds [see Figure 5.2].

Figure 5.2 *Tasting notes shared with Alia and Aaron* (photo credit A. Stam)



Kyle also reflected on the value of getting others involved in the selection process, suggesting that there is a different impact that can come from getting the community to “actively engage” in the process of selecting while also getting the watermelon to actively engage in a “genetic mix and match”. Manish hosted two watermelon tasting events open to the public which

he described as “a bridge that needed to be connected to share this with the broader population- to have their input and integration with the project, you know? So, it's like bringing community together to make this go forward and [bring it to its right place, where it should belong.](#)” For her part, Catherine reflected on the value of saving seed from a later maturing melon in her patch that seemed to have resisted the disease that killed so many others, even though it wasn't early or particularly delicious.

The role of selecting possibilities didn't only involve deciding which seeds to save, however. It also involved making choices about which seeds to plant, and also which plants to grow. Manish made the decision to plant out seeds that others had saved and shared with him (myself, Catherine, and a friend of his in BC) along with the seeds that he himself had saved. All the growers in northern Ontario made the decision [to plant out small plants lacking vigour in the spring of 2023](#)¹⁹. Selecting possibilities can be understood to be an end (saving seeds at the end of the season) and a beginning (planting seeds in the spring). It is cyclical, not linear. As Kyle reflected during our second conversation, “what I've learnt is the value of being mindful of the full cycle.” Throughout our conversation he returned to the importance of recognizing and [engaging with the full cycle of plants, from seed to seed.](#) He explained that thinking of the cycle helped him to recognize gaps in his understanding:

I found out that a carrot is a biennial, and so I, they only flower every two years and only produce seed every two seasons. And so, for every carrot you have it takes two years to produce a seed to grow that carrot. And so just, I mean just thinking about that I think it expands the relation to... we're talking about food crops, so it just, it evolves the relationship to the food crops and I think it grows an appreciation and the relationship

¹⁹ For my part I know that had it not been for the context of the FLWLBP I would not have planted the vast majority of the watermelons I planted that season because they were just so small and puny looking.

becomes more intimate and there's a humility and a respect for what needs to happen, what happens all the time that I've personally in large part taken for granted in the past. So, there's just a goal... an inspiration, desire, goal to be more engaged with these things in that way.

For these growers, selecting possibilities was absolutely about, as Catherine says "eating vast quantities of watermelon" and extracting seeds. But it was also understood to be more than this. Critically aware of the corporate reconfiguration of the global seed systems, Manish believes that selecting possibilities through seed saving is essential work as a means through which to keep seed in the commons. For his part, Aaron recognized that through this project there was the potential to increase food sovereignty.

Demanding Accommodation

In time, and due to what Jahren (2016) calls "some unique trigger-combination of temperature- moisture-light and many other things" (p.37), a seed will take a leap of faith and grow. However, along the way seeds and plants will, as Phillips (2016) says, demand accommodation. Through my observations it was clear that growers recognized that the watermelons required space to grow, water, warmth, and good soil. When I spoke with them, growers described the soils in their gardens. When I toured their gardens, I saw that they used various mulching techniques to keep moisture in the soil and hold back weeds, and had systems in place for watering the plants if/when required. Although I am unsure as to if it was intentional or coincidental, all growers except Manish also had flowers planted nearby the watermelons. Considering that the evolution of landraces is accomplished on the backs of pollinators, the presence of flowers nearby was (intentional or not) a beneficial accommodation.

Other watermelon demands were less universal, but still anticipated. At RCFC they had previously had issues in the garden with cutworms. As a consequence, all of the watermelons planted there were given protective collars. [For Aaron and Alia, the space the watermelon required meant that they couldn't plant their regular squash crop.](#) As Aaron explained “what we’re doing is taking a row away from our winter squash and putting our watermelons there.” They had to accommodate the watermelon by changing their production and garden plan.

As the season progressed, watermelons demanded accommodation from growers in different ways and at different times. Xander describes the ways in which he accommodated the watermelons at RCFC saying that he would “tend to them and weed them, watering them, [and] take off some flowers to make sure that they would actually put more energy into the fruit itself.” For Catherine, accommodating the demands of the watermelons meant trapping raccoons and trying to figure out what disease caused the watermelons to die off prematurely. Recognizing when and what watermelons required was not always easy. Catherine spoke of how projects like the FLWLBP require her to be attentive, and that she appreciated that. “Like I love just touring the field and looking at things and checking and evaluating each of them... I like that slowing down.” For Catherine, the fact that the watermelon needed her attention was a gift she both gave and received.

Figure 5.3. *Protecting watermelon from wind and cold*



Adapting Capacities

In giving plants what they require, humans can be understood to be adapting their own capacities (Phillips, 2016). Growers had their capacities affected in practical ways, like learning the knock test and even learning to save seed for the first time. Aaron and Alia's capacity to produce squash was diminished in order to provide space to the watermelons. Catherine's ability to protect the watermelons in her patch was increased through the use of a raccoon trap to "dispatch" the animals that threatened the plants she works with and depends on. Growers had their cognitive capacities affected, too. Xander recognized his work with the watermelons as a chance to learn. Alia spoke of how for her landrace breeding was new, and so "calls you in to that present moment to be curious"; it affected her capacity to be aware. Aaron found that working with the watermelons gave him some reprieve the pressure he puts on himself in the garden. He explained, "it was cool to do a seed breeding project where you're not so focused on yields and really, you kind of just hope for the best". Catherine's ability to slow down was increased by the requirement to be attentive to the watermelons. For his part, Kyle reflected that working with the watermelons helped to inform his disinclination for "reducing something to something less than what it is, So, [the watermelon, you can't isolate it that way because it isn't isolated.](#)"

Presenting Opportunities

For the watermelons, the end of the growing season was the time that they reciprocated, gifting fruit and seed. This is the time that watermelons are most easily understood to be presenting opportunities. "[S]ometimes the seeds make it so easy and obvious that to imply that they are doing anything less than inviting or even suggesting saving practices seems inadequate"

(Philips, 2016, p.178). [Here, watermelons can be seen to exert their agency in the assemblage through their ability to entice eaters, and through the proliferation of their mature seed within their ripe flesh.](#) Ripe watermelons provide opportunities for growers (and others) to save their seeds – to select the possibility of them having a chance to grow again in the future. For Manish the importance of recognizing and receiving the opportunities presented by watermelon extends beyond the material. He shared the story of the uniquely flavoured, textured, and coloured melon that appeared in his population of watermelon one year. Reminding him of the taste of home (India), he took to referring to this unique melon as Mango Melon. When he talks about finding the Mango Melon he says he was “allowing nature to gift me from whatever its doing”, and reflected, “It like puts us to question like who we are as a civilization and how we interact with nature and also to share inspiring stories.” For Manish, the opportunities presented by watermelon and their seeds allowed him to be “more immersive and integrated with food and people who consume it”.

Alia recognized that the watermelons provided opportunities to not only her and Aaron but also to their wider community. She shared,

[So] many people in our CSA and in our inner circle community (who aren't in our CSA but who got watermelons) felt, and feel excited about them, and were impassioned by the idea of saving seeds and then asked questions about, were texting me about, were excited about it, have seeds to give us, and like, are excited to keep some for themselves and like... without the watermelons we wouldn't have those interactions and those connections and they wouldn't be thinking about how you breed seeds and how food grows in these intricate ways so that's really cool...And I think similar to the way it

shifted our perspective as like this hopeful fun thing in farming, it provided that for our broader community in that way as well.

The people with whom they shared watermelons were moved to eat them, and also to adapt their capacities (to learn to save the seeds) and ultimately, to select possibilities.

Conclusion

In this chapter I have provided a model and conceptualization of the reciprocal flow of affect within the assemblage of the FLWLBP. In the following and final chapter I put the story of the assemblage and the flow of affect within it into dialogue with the literature to explore the implications of this research for an eco-social approach to health. I also outline important limitations of this research and provide suggestions for future research.

Chapter 6:
Becoming-the-dash and Implications for an Eco-Social Approach to Health

Research has already shown that working with landraces has an important role to play in the conservation of biodiversity, production practices, and knowledges (Fenzi & Couix, 2022; Khoury et al., 2022; Vasconcelos, et al., 2013) and thus to the resilience of agroecosystems and communities (Kliem & Sievers-Glotzbach, 2022; Vasconcelos et al., 2013). When looking to address the downstream impacts of the pervasive norm of human exceptionalism, landrace breeding has been shown to be a valuable practice. In this final chapter I begin by discussing the flow of affect within the assemblage as a *becoming*. I ultimately propose that it is in this *becoming* that the *upstream* implications of landrace seed breeding for an eco-social approach to health can be seen. Finally I draw attention to the limitations of this research and offer recommendations for future research.

Becoming-

The flow of affect in any given assemblage can be understood to represent a *becoming* (Fox & Allared, 2022). Wright (2014) explains that the metaphysical concept of *becoming* is “an epistemological framework that undermines solipsistic thinking, because we learn about our position in a complex system not through abstract knowledge, but through the affective capacities of our own bodies and the bodies of the more-than-human world” (p.279). In the previous chapter I explored the affective capacities of watermelons and humans within the FLWLBP assemblage. In this section I address the question: what is the assemblage of FLWLBP participants *becoming*?

The-Dash

In English punctuation dashes hold space and connect. Critical scholars play with language, recognizing that the way it is written and assembled can further embed dominant Western perspectives (Koro & Cannella, 2024). With respect to health from an eco-social perspective, the dash between eco and social communicates to the reader that eco and social are separate, yet related systems. While the dash brings them together, it can also be seen as keeping them apart – to be reinforcing the dominant western narrative of the separation between nature and culture. I propose however, that by *becoming-the-dash* the assemblage is re-storying the space between eco and social. In *becoming-the-dash* watermelons and humans are not creating a separation but rather creating an emergent space in which to refashion our relationship to land through the connections it embodies.

Modern seed-people relationships (and human-vegetal relationships more broadly) are “informed by human exceptionalism and colonial extractivism animated by the flows of global capital” (Williams, 2024, para.1). The commodification of seeds has played a role in reinforcing this anthropocentric notion that humans are at the center of control – capable of and responsible for reshaping the world around us to meet our needs (like food). As Kimmerer (2013) writes:

For the greater part of human history, and in places in the world today, common resources were the rule. But some invented a different story, a social construct in which everything is a commodity to be bought and sold. The market economy story has spread like wildfire, with uneven results for human well-being and devastation for the natural world. But it is just a story we have told ourselves and we are free to tell another, to reclaim the old one...to celebrate our kinship with the world (p.31).

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Watermelons and humans are different – but the findings of this research show that regardless of their differences they are none-the-less able to engage in reciprocal, mutually affective, relationship. For their part, watermelons demanded accommodations from growers, and also provided opportunities. Growers responded to melons with openness, curiosity, attentiveness, a willingness to work together. They saved and shared seeds, selecting possibilities for their collective human and watermelon future. Together melons and humans did not just work towards developing uniquely adapted watermelon cultivars, they also managed to re-imagine the story of how diverse beings on this planet can relate.

For his artefact Kyle carved a watermelon for Halloween. He explained: “My reasons for choosing to carve the watermelon in place of pumpkin is to connect watermelon with a crop that 'wants to grow here'. Pumpkins are commonplace in this area in autumn...imagine instead of pumpkins it was watermelons on porches around town.” In response to my request to come up with something that represented his experience as part of the FLWLBP he carved out a new space for watermelon - he told a new story.

Figure 6.1. *Kyle's artefact* (photo credit Tonkins, K.)



In the end, I suggest that this relationship represents precisely the kind of transformational, relational, systemic shift called for from within the field of eco-social health.

Limitations

While not apparent to me when this research project began, there are three important limitations inherent in this study. The first limitation is the restrictive boundaries I applied to the assemblage. An assemblage, any assemblage, is ultimately infinite (Levkoe & Wakefield, 2013). Understanding that any action undertaken by a body, no matter how small, will impact other bodies with whom it is in relation, and that this affect will flow ad nauseam through endlessly connected chains of bodies. One sees quickly that truly there is no limit to affects, and there is no limit to assemblages. However, to study the affect of a single atom across the universe is the prelude of researchers of a different kind than I. My limited capacities to perceive, comprehend, research, and report the full extent of agentic relationalities are real, and consequently reflected in this study.

My choice to narrow my focus definition of the assemblage to the humans and watermelons came about iteratively. Initially, this project was designed as a case study in which the practice of landrace breeding would be explored through the case of the FLWLBP. Owing to the co-evolutionary relationship between seeds and people, as well as the hands-off approach taken in landrace breeding, it seemed important to me to also consider the watermelon as participants in the project, to include them as part of the case. As I describe in Chapter 3, through the process of trying to analyse the data I collected I came to realize that I was not conducting a case study which included both human and watermelons, I was conducting a multispecies ethnography. Accordingly, the unit of analysis changed – from the case of growers and watermelons in the FLWLBP to the assemblage of growers and watermelon in the FLWLBP.

Unfortunately, this simple substitution created inherent limitations in my research. How can one talk about growers and watermelon without also considering the spaces in which they grow, the soil, the climate, the “dog [that] walks through those melon plants definitely on the stalks, stems, on the leaves and stuff all the time” (Alia), the raccoons that “mess stuff up” (Catherine), the diseases that pop up, the bees that “are attracted from one pollen to another pollen” (Manish), et cetera, et cetera? Appropriately, I acknowledge that the resultant findings represent only a sliver of insight into a vast and complex world of interspecies relationships embodied within the assemblage of the FLWLBP.

Throughout the reporting of this project, I have found myself trying to keep the assemblage from spilling out of the tidy parameters I have given to it. Where it does escape, I have just left it hanging; possibilities for future research, contemplation, engagement. For example, what of Aaron and Alia’s friends and neighbours who were compelled not to bemoan the seeds in the FLWLBP watermelons they received, but rather to select and save them? Where does that affect flow to next? What of the pollinators, and the fact that nearly all growers had planted flowers near the watermelon patch? What of the unseen – the microbiome, the histories and the unheard ways the watermelon communicate? As (Hohti & Tammi, 2023 suggest, “[T]he simple story of mutual flourishing also does not hold when life is sustained at the cost of other life” (p.8). Indeed, what about the raccoons in Catherine’s patch and the disease that killed the melons she tried to protect? However, I have left such complications (such as the moral ambiguity Catherine faces with respect to the raccoons in her garden) unexplored. No doubt, by focusing exclusively on the watermelon and human participants of the FLWLBP as the assemblage much was missed. I maintain though, that this approach also allowed for much to be

seen - a partial knowing to be sure, but a valuable glimpse into the murky space of interspecies relationships none the less.

The second limitation in this research is language. Initially, I thought the challenge would be in working with the term *landrace*. As Kyle said "...it's talking about genetics and it has the word race in it. So, it's hard not to like go to, like racism." However, as I began to recognize the congruence between *landrace* breeding and posthumanism, the challenge of language quickly became much more pronounced. As Kimmerer (2013) observed, "[T]he arrogance of English is that the only way to be animate, to be worthy of respect and moral concern, is to be a human" (p.57). Moreover, "[g]rammar is how we chart relationships through language, including our relationship with the Earth" (Kimmerer, 2015, para.1). Not only were the words I needed not available to me, in trying to work with what I had I was reinforcing a worldview incongruent to the foundation of this research. I began to realize that the term *human* itself was problematic; and by extension, any term predicated on a hierarchical, human centered conception of the world (which, as it turns out is quite a few).

Kirksey & Helmreich (2010) argue that as multispecies ethnographers we need not only aim to de-center the human, but that in addition "we need to take natural and cultural categories as we receive them and try simultaneously to rethink and undo them" (p.563). We need to not only explore the relationships between species; we need to question the idea of species itself. Many researchers have suggested new terms that seek to evade the built-in human exceptionalism of the English language (Braidotti, 2013; Elton, 2021). My decision to largely forgo challenging the limitations of the English language through the use of alternative terms within this research was methodological. I chose to use the language of the assemblage, not of the academy of posthuman researchers. As a member of the assemblage, I also thought of myself

as a human and the watermelons as non-humans. It is only as a researcher that I am beginning to question these distinctions.

Finally, I would suggest that the issue of the differentials of power *within* the assemblage remain unresolved in this research and in multispecies research more broadly. Fascinating projects exist that are attempting to address the issue of power within assemblages, such as *Animals In the Room*. This interdisciplinary collective of researchers has come together to establish how best to “recognize the dignity of other species and the ability of animals to act for and communicate their interests” (*Animals in the Room*, 2024, para. 1). And while I engaged in practices such as *unknowing* and composting storytelling in an attempt to create spaces for other ways of thinking and knowing and begin to address the issue of interspecies power, the fact remains that I do not know how to ask and receive consent from a watermelon.

Beyond the Dash: Recommendations for Future Research

Observational comedy is all about bringing to light topics that are at once familiar and overlooked. Jerry Seinfeld, one of the masters of observational comedy, asks when reflecting on the development of seedless watermelon “What are they planting to get these seedless watermelons? The melons aren’t humping, are they? They must be planting something – how does this work?” (Likipedia, 2017). Truly, there is so much more to learn.

Despite their ubiquity, seeds often go overlooked and unconsidered. Take for example, the EAT-Lancet Commission on healthy diets from sustainable food systems (Willett et al, 2019), one of the world’s most influential science reports on food systems and health (EAT, 2024). This report represents a multidisciplinary attempt to quantifying and addressing the wicked, entangled challenge of diet, health, food systems, and planetary boundaries (Willett et al., 2019). Focusing on both nutrition and planetary boundaries (such as biodiversity), the EAT-

Lancet Report ultimately suggests that we can collectively be fed while living within the ecological limits of the planet through adopting a planetary health diet (Willett et al., 2019). Yet within its pages, seeds are only mentioned twice – both times in reference to their nutritional value to humans.

Those who do recognize seeds and our relationships with them continue to show that they are consequential (Kloppenborg, 2004; Van Bueren et al, 2018; Vasconcelos et al, 2103). As Phillips (2016) concludes after her research into seed saving practices, “how we interact with nonhumans involves not only those relations, important in and of themselves, but possibilities and worlds beyond them – connecting everyday practices like saving seed with food and supply chains, culinary and production traditions, and ethico-political valuations” (p.214). Which is all to say, there are many more questions, there is much more research needed.

Aaron was motivated to participate in the FLWLBP by the possibility of contributing to “a realized increase in food sovereignty in the world”. Was this accomplished? If landraces are to have a place in local food systems, what systemic changes need to take place to support them? But also, what are the broader impacts of landrace breeding – beyond the growers and plants? Kyle reflected on the FLWLBP:

I think people want to be engaged in their experiences and I think it [landrace breeding] encourages investment in those experiences...if you can kind of remove those barriers to the source of what’s actually happening and start getting people in there... so watermelon tasting and getting them to vote on which one is their favourite and saving seeds for this purpose, for example, I think would have a more like, I don’t know... it’s not bigger impact but it’s a more tangible impact because it’s involving the community.

Additionally, there is a growing body of research exploring plant intelligence (Mancuso, 2018). In this research I have used the understanding that plant agency is not dependent on intentionality (Elton, 2021). Yet increasingly, researchers are recognizing intelligence and intentionality in plant behaviour (Gagliano, 2018; Jahren, 2016; Mancuso, 2018). Further, it has been acknowledged that an increased understanding of plants as intelligent “has the effect of unseating us a little bit from this assumption that we’re sitting sort of on the top of the evolutionary heap” (Rosin, 2024, May 2). Combining the science behind plant intelligence research and posthumanism would be an enlightening transdisciplinary approach to deepening understandings of the relationships within multispecies assemblages in landrace breeding and beyond.

Conclusion

This research asks how growers and melons are affected and affect within a landrace breeding project in Ontario, and what this means for health from an eco-social perspective. In this chapter I explored the reciprocal nature of the assemblage through the flow of affects it embodied. Most importantly, I suggest that the assemblage at the heart of this research is *becoming-the-dash*. Through the interplay of give and take between watermelons and human the assemblage is coming together to create an emergent space from which new possibilities and perspectives can emerge. Recognizing that this research is limited by both its scope and the language it uses, I ended this chapter with suggestions for future research – of which there are many.

Epilogue

In the years since Manish shared the seeds of his 23 watermelon-cross and I began working with them as Joseph described (saving seeds from the best tasting ones that thrive in my garden) I have noticed that delicious watermelons appear on the vines earlier and more frequently. I have also noticed that the quality of the seeds they produce is inconsistent. Preparing for the third and final year of the FLWLBP I wanted to be sure to have enough strong watermelon plants to grow out so I started a lot of extra seeds. When nearly 80% of them actually germinated I was pleasantly surprised. I was also conflicted. What to do with all of these germinated seeds that I know I won't be able to plant out?

I thought about Jahren's (2016) reflections on how germinating represents the greatest act of trust for a plant. I thought about the flow of affect within the FLWLBP assemblage, and how these seeds were presenting me with opportunities to grow them and also simultaneously demanding accommodation. I could choose to refuse them the possibility of growing into plants, or I could somehow adapt my capacity so they could all be planted.

I didn't have time to muse about this for long. The next day I was leaving on a road trip for a week which meant I needed to make a decision about what to do, soon. I couldn't just leave the seeds to attend to when I got back because they would be dead by then. I also did not have the space (or time) to plant them all. The following morning, in an attempt to buy myself time to work through my indecision, I scooped up the battered clamshell full of sprouting watermelon seeds in damp paper towel and carried it out the door, setting it beside me in the car as we drove away.

In all honesty, I always struggle with discarding seeds, transplants, thinning plants out of the garden, rouging off-type plants in the process of seed production, and rejecting 'imperfect'

*produce after harvest. But there was something particularly affecting about these germinated watermelon seeds with whom I had journeyed to this point that made it impossible for me to discard them. In this moment, the watermelons showed me in no uncertain terms what I had previously only experienced as a vague, unnameable feeling: that it's not all about me. These seeds-becoming-watermelons were not objects, they were subjects of their own lives – lives entangled with my own and to whom I was mutually responsible. My experience working with the watermelons in the context of the FLWLBP challenged me to un-know, to be curious about and attentive to them. It allowed me to make space (ontologically, emotionally, and physically) for them to a degree I never had before. We were on this journey **together**, the watermelons and I (and infinite others).*

By the time we got back home, 4000km later, my seed-clamshell was empty. Hundreds of seeds-becoming-watermelons (Phillips, 2016) had inadvertently found themselves new growers with whom to collaborate and journey. Some are now growing on an organic oat farm in the Interlakes region of Manitoba. Others are putting down roots father north, in Flin Flon. Their westernmost range now extends all the way to Paddockwood, Saskatchewan where the last couple of hundred seeds were planted and are now being supported at Crooked Rake Farm. The network of plants and people working together to explore what can come from embracing diversity and taking our cues from plants – of what can come from landrace breeding - continues to expand. The co-evolutionary journey of watermelons and humans continues. Together we continue to write another story.

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Appendix A – FLWLBP Protocol

Watermelon landrace breeding project

Farmer-researchers:

Name	Farm	Phone	Email	Region
Evalisa McIlfaterick	Root Cellar Gardens	(807) 577-9937	rootcellargardens@tbaytel.net	NORTH
Jordan Lees	Roots to Harvest	(807) 285-0189	jordan@rootstoharvest.org	NORTH
Alia Wurdemann-Stam & Aaron Halcovitch	Morning Moon Farms	(807) 633-9829	info@morningmoonfarm.ca	NORTH
Kevin Belluz	Belluz Farms		belluzfarms@gmail.com	NORTH
Manish Kushwaha	Gaia Organics	(613) 219-8463	manish@gaiaorganics.ca	EAST

Project type: Breeding trial

Research priorities: Seed selection, production, & breeding

EFAO Contact: Rebecca Ivanoff, rebecca@efao.ca, (519) 760-2971

Objective

Farmers in northeastern Ontario are looking for an early ripening watermelon, with great taste and texture, that is able to mature early enough to be a successful crop in Zone 3, and Manish would like to grow the selections from Evalisa so that this population is also adapted to Zone 5 in the Ottawa area. Using mass selection in an isolated location, he would also like to further select a population of small golden-yellow melons, which he is calling mango, so that he can further stabilize this selection into a variety.

Background

Watermelons, which originate in northeast Africa in the Kordofan region of southern Sudan, have been bred for thousands of years and many still prefer the hot climates with and need a long and warm growing season. Northwestern and Eastern Ontario have relatively short, temperamental growing seasons. Evalisa became interested in landrace seed breeding after hearing an interview with Joseph Lofthouse. She thought it would be great to use that technique, working with the plants, people, and ecosystem, to try to develop a watermelon that grows consistently well in zone 3.

Evalisa received seeds from Manish, another grower from eastern Ontario, who was looking for other farms to grow out his open crosses.

From out of the original 22 variety cross, Manish has selected a small golden-yellow coloured melon, with dark green tiger stripe pattern on the outside, thin skin, mango-like taste, and thick flesh texture.

Experimental Design

Population

In 2019, Manish allowed 22 varieties of watermelon to cross pollinate together creating a genetically diverse, multi-parent population of watermelon ready for selection and recombination. The list of crossed parent varieties is listed in Appendix 1 below.

In 2020, Evalisa grew out seed received from Manish and grew them out near Thunder Bay, and grew them again in 2021 and had Ontario Gold watermelons in the garden, a yellow early ripening variety which likely crossed into the population. Evalisa selected for early ripening (did it mature in our short season), and saved seed from 6-8 melons in 2021. In 2021, she planted seed from these 6-8 melons as well as some seed from the original cross and saved 2-3 dozen melons for seed, and harvested 100 melons overall. In 2021, Jordan grew out a selection of 2019 and 2020 selections at Roots to Harvest and saved seed from 6 melons that ripened and tasted great.

Planting and Cultivation Recommendations

The trial should be grown as you would normally grow watermelon in the field, including bed and row spacing. The table below provides suggestions based on recommended cultivation practices for watermelon. Use the suggestions if they make sense for your farm.

Plot size	Plant melons together in an area which allows for a minimum of 25 plants (see below for recommended planting populations)
Row and bed spacing	In-row: 24"-36"; between row: 60"-70"
Seeding date	Early May
Transplanting dates	Early June
Days to harvest	80-120 days
Harvesting*	When tendrils change to yellow/brown, before frost.

Seed selection*	Select seed form the first 25 melons which meet the early maturity, with good taste and texture requirements
-----------------	--------------------------------------------------------------------------------------------------------------

*Note: If you experience a poor harvest during a growing year where watermelon fruit production is low, only select seeds from those melons which met the criteria of early maturing, with good taste and texture. If this means you only save seed from 8 melons this is okay.

Field Layout

In each year every site will use a mass selection method to create an early ripening watermelon, with great taste and texture, that is able to mature early enough to be a successful crop on their farm. Growers will plant-out the recommended populations (see below) in one area of their farm at least 500m (about 1650 feet) from other watermelon plantings. To ensure that this is the case, growers are encouraged to speak to their neighbours. Growers will harvest and assess watermelons on the criteria of early maturation, with good taste and texture until they have collected seed from 25 melons (see note above for poor harvest years). In subsequent years growers will use seed from the watermelons selected at their site to plant-out the recommended population in 2023 and 2024 (see below).

Mango Melon Stabilization (2022)

Manish will grow each of the 8 plants individually across his fields so that they are spread out at least a 300 ft distance between them. He would like to plant them close to flowers that are blooming during the flowering period of watermelon so bees are always distracted and individual plants have more chances of not crossing with each other and hopefully it will give something similar if not already crossed in the previous generation.

Recommended planting populations for each site

Each site will need to have a minimum of 25 plants to ensure a diverse population. We recommend the following plant-out population sizes for each site:

- Evalisa: ~100 transplanted plants
- Jordan: ~ 50-100 transplanted plants (50 for sure)
- Morning Moon Farm: ~ 50 transplanted plants
- Manish's Site 1: ~100 transplanted plants

Mango Melon:

- Manish's Site 2: 8 transplanted plants

2022

In 2022, each site will plant out a random selection of diverse multi-parent offspring seed from Manish's cross (seed provided by Evalisa at the northern sites). These will be seeded and transplanted out with a minimum of 25 plants needed for the population but more plants are recommended (see site recommended populations above).

2023

In 2023, each site will plant out a proportional number of seeds from each of the 25 melons you saved seed from in 2022. These will be seeded and transplanted out with a minimum of 25

plants needed for the population but more plants are recommended (see site recommended populations above).

2024

In 2024, each site will plant out a proportional number of seeds from each of the 25 melons you saved seed from in 2023. These will be seeded and transplanted out with a minimum of 25 plants needed for the population but more plants are recommended (see site recommended populations above).

Statistical model

Data collected from this trial will be used to tell the story of a watermelon landrace breeding project. From the data collected if any quantitative data meets the criteria a statistical analysis will be carried out.

Measurements

Quantitative & Qualitative

Crop management records and cultural practices

The following information will be collected on this sheet **once for each year of the trial:**

- Date seeded
- Number of seeds sown
- Date transplanted
- Number of transplanted plants
- Number of transplants which were successfully on July 1st (Population for selection, min:25 plants)
- Isolation distance met: y/n. If not, what varieties might be crossing into the population (this is your chance to chat with neighbours to find out what they are growing....)
- https://docs.google.com/spreadsheets/d/16TaIS0vzpnGF2ba8SN9X-XBA9n1o14I_2acyFEGy9yU/edit#gid=623295064

Harvest and tasting information

The following information will be collected on this sheet for **every harvest date:**

- Fruit harvest date
- Fruit number continues throughout the year until seed is harvested from 25 plants
- Flesh colour: red, pink, orange, yellow, white, mix, green
- Rind colour: Dark Green, medium green, light green, white, yellow, brown
- Rind pattern: solid, stripped, mixed, spotted, other
- Fruit shape: round, oblate, oblong, elongated
- Fruit size: big, medium, small
- Taste: do people enjoy eating, texture, flavour, overall rating
- Save seed from this watermelon: yes or no

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- https://docs.google.com/spreadsheets/d/16TaIS0vzpnGF2ba8SN9X-XBA9n1o14I_2acyFEGy9yU/edit#gid=1832397700

Seed saving

As mentioned above, growers will try to make sure that no other watermelon is planted within a 500m (about 1650 feet) radius of this planting as all watermelons (*Citrullus lanatus*) will cross pollinate. If this is not possible please make note of other close watermelon populations which may cross.

- Harvest seeds when fruit is fully ripe.
- Taste flesh and take data.
- Cleaning and Processing Seed: Rinse seeds well in a strainer or colander and then spread in a thin layer to dry on coffee filters, paper plates, or old window screens.
- All seeds from selected watermelons must be saved separately so that an even distribution of each can be planted out the next year
- Saved seed will be kept in **different** packets which correspond to melon number on the tasting sheet

Final harvest

The following information will be collected on this sheet **once for each year of the trial** after **seed is saved from 25 watermelons** which have met the criteria:

- Harvest dates
- Total number of fruits harvested after the 25 watermelons selected for seed
- https://docs.google.com/spreadsheets/d/16TaIS0vzpnGF2ba8SN9X-XBA9n1o14I_2acyFEGy9yU/edit#gid=1653680294

Photos

Please take photos of the following times/items for all three years of the project:

- Farmer-researchers with their FLRP sign
- Germination
- Transplanting into the field (during and finished)
- Flowering/ flowers
- Younger fruits
- Fruits ready for harvest
- Harvest actions shot
- Tasting and selection (photo of rind and flesh for each melon seed is saved from)
- contrast/shots of multiple melons
- Any other photos of the trial

Research Plan

Please note that if data is submitted after the submission deadline, EFAO staff cannot guarantee that your data will be analyzed and written up before the Research Symposium and/or the next growing season.

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Time	Task	Methods & Measurements or Action Item
Early May, 2022	Seeding	Start seeds in cells
June, 2022	Transplanting	Transplant seedlings into field
July, 2022	Observations	July 1, 2022: plant population count of surviving transplanted seedlings
August & September, 2022	Harvest and Observations	Harvest melons when ripe/ready, taste all melons until you have selected seeds from 25 melons which have met the criteria of early maturing, with good taste and texture.
October, 2022	Submit data and photos	To EFAO staff
December 31, 2022	Farmer-fee and research expense invoice with receipts for expenses	Submit invoices at this site: https://efao.ca/data/
January/February 2023	Finalize and publish research report	Work with EFAO staff to review polished research report for publication.
May, 2023	Seeding	Start seeds in cells (equal amount of representation from each of the 25 melons you liked)
June, 2023	Transplanting	Transplant seedlings into field
July, 2023	Observations	July 1, 2022: plant population count of surviving transplanted seedlings
August & September, 2023	Harvest	Harvest melons when ripe/ready, taste all melons until you have selected seeds from 25 melons which have met the criteria of early maturing, with good taste and texture.
October, 2023	Submit data and photos	To EFAO staff
December 31, 2023	Farmer-fee and research expense invoice with receipts for expenses	Submit invoices at this site: https://efao.ca/data/
January/February, 2024	Finalize and publish research report	Work with EFAO staff to review polished research report for publication.
May, 2024	Seeding	Start seeds in cells

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June, 2024	Transplanting	Transplant seedlings into field
July, 2024	Observations	July 1, 2022: plant population count of surviving transplanted seedlings
August & September, 2024	Harvest	Harvest melons when ripe/ready, taste all melons until you have selected seeds from 25 melons which have met the criteria of early maturing, with good taste and texture.
October, 2024	Submit data and photos	To EFAO staff
December 31, 2024	Farmer-fee and research expense invoice with receipts for expenses	Submit invoices at this site: https://efao.ca/data/
January/February 2025	Finalize and publish research report	Work with EFAO staff to review polished research report for publication.

Staff check-ins

Rebecca will check in with the group via email at seeding, transplant, observation, harvest, and seed selection times throughout each of the three growing years.

Materials

Please list all materials, supplies and equipment that will be reimbursed for this project. If possible, please also indicate a short-list of any in-kind materials, supplies and equipment that you will use.

Material	Unit	Quantity Required	Total Cost*	Note
2022 Multi-parent crossed Watermelon seed			In-kind	Provided by Evalisa from her 2021 crosses. Jordan at R2H will use some seed from their 2021 saved seed as well.
2023 site specific selections seed				Each site will use their own seed which was selected in the 2022 season

2024 site specific selections seed				Each site will use their own seed which was selected in the 2023 season
All seedling, planting, and harvesting equipment			In-kind	
Total				\$0

References

1. Cucurbit Breeding Methods (North Carolina State University): <https://cucurbitbreeding.wordpress.ncsu.edu/watermelon-breeding/breeding-methods/>
2. Watermelon Landrace Breeding blog post by a student in Colorado: <https://keen101.wordpress.com/tag/watermelon-landrace/>
3. Watermelon Descriptor Form from Vegetable Seed Producers Network: https://docs.google.com/document/d/0B4DtYMLW_SyLQ2p5ak1IOXBycVU/edit?resourcekey=0-nRdxJUbv7Ld4NcIwsJdCcQ
4. A chromosome-level genome of a Kordofan melon illuminates the origin of domesticated watermelons: <https://www.pnas.org/doi/full/10.1073/pnas.2101486118>
5. How to Grow and Save Watermelon: <https://www.seedsavers.org/site/pdf/grow-save-watermelons.pdf>

Acknowledgement

We would like to acknowledge Manish Kushwasha who generously provided the original seed from his open pollinated cross of 22 diverse parent watermelon plants. We would also like to thank all of the farmers who provided their seeding, planting, and harvest equipment in-kind.

Farmer-fee

All farmer-researchers will receive three years of funding with the ability to collect a \$250/year/site farmer-fee in 2022, 2023, and 2024 if requirements are met.

Invoices for Farmer-Fees & Reimbursements

Research expenses

- Submit an **invoice along with copies of receipts** for all qualified expenses using form found at <https://efao.ca/data/>
- **Deadline:** December 31, 2022

Farmer-fee

- Submit an **invoice** for your farmer-fee using form found at <https://efao.ca/data/>

- **Deadline:** December 31, 2022

Memorandum of Understanding

Please fill out the MOU at <https://airtable.com/shrIAcZ7bowmTQwvd>

EFAO Account Information

As a farmer-researcher, you must maintain current membership with EFAO throughout the duration of your trial.

We use your mailing address to deliver cheques, farmer-led research signs and any trial supplies.

To check the status of your membership, log in here:

<https://efao.z2systems.com/np/clients/efao/login.jsp> or contact Martina, martina@efao.ca.

Farmer-fees and Reimbursements

I agree with the following:

- The deadline for reimbursements and farmer-fees is December 31, 2022.
- To receive reimbursement for qualified research expenses, I will submit an invoice and copies of receipts at the form found at <https://efao.ca/data/>.
- To receive my farmer-fee, I will submit an invoice to <https://efao.ca/data/> after I have submitted the final data and photos.

Photo Use

We like to share snippets and stories of farmer-led research through EFAO's print publication, e-newsletter and social media accounts, using photos and updates that you send us. We will credit you when we use any photos.

Choices (Select all that apply on the MOU):

- EFAO has my permission to share photos in EFAO's print publications
- EFAO has my permission to share photos in EFAO's e-newsletters
- EFAO has my permission to share photos in EFAO's social media
- I do not want my photos share in these ways
- Other

Farmer-Led Research Agreement

I agree with the following:

- I will complete my trial to the best of my ability following the written protocol.
- If circumstances change and I am unable to conduct my trial, I will notify EFAO staff as soon as possible.
- I will keep in contact with EFAO staff with updates and questions, or to make changes to my protocol .
- I will submit data to the EFAO by the date specified in the written protocol.

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- I acknowledge that if I submit data after the submission deadline outlined in the written protocol, EFAO staff cannot guarantee that my data will be analyzed and written up before the Research Symposium and/or the next growing season.
- I will work with EFAO staff to interpret data and write the research report.
- I will take photos of my project throughout the season(s).

Program Participation

There are several farmer-led research events held throughout the year including webinars, field days, and the Research Symposium. The Research Symposium is held in conjunction with the annual EFAO Conference at the end of November/early December.

When and where possible I will:

- Attend farmer-led research events, including webinars and field days
- Attend and present my research findings at the Research Symposium
- I will complete the feedback survey related to the program

Data Use

You own all data generated on your farm as part of your farmer-led research trial with EFAO. You can notify EFAO at any time to remove EFAO's privileges to use and share your data, photos and farm information. To opt out of sharing your data, please contact Sarah Larsen via email (sarah@efao.ca) or mobile (226-582-0626).

I agree with the following:

- By participating in the EFAO's FLRP, I agree to share with the EFAO the data collected as part of my trial, along with photos of the project and any farm information (e.g. soil type, previous farm practices, and soil tests) that I deem relevant.
- By sharing my data, photos, and farm information with EFAO, I agree that EFAO can use this information in research reports, posters, and summaries of my trial (e.g. summaries on the EFAO blog and in EFAO's print publication).
- I understand that I can notify EFAO at any time to remove EFAO's privileges to use and share my data, photos, and farm information.

Signature

Please fill out the MOU at <https://airtable.com/shrIAcZ7bowmTQwvd>

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List of 22 varieties that Manish originally planted together to allow them to cross pollinate.

#	Variety Name	Type	Chromosome #	Flesh Colour	Rind Pattern:	Rind Colour	Note
1	Sorbet Swirl	Hybrid (F1)	Diploid	Orange	Tiger Stripe	Green	
2	Sureness	Hybrid (F1)	Diploid	Yellow	Tiger Stripe	Green	
3	Mini Love	Hybrid (F1)	Diploid	Red	Tiger Stripe	Green	
4	Little Baby Flower	Hybrid (F1)	Diploid	Red	Tiger Stripe	Green	Discontinued
5	Golden Crown	Hybrid (F1)	Diploid	Red	Tiger Stripe	Yellow	
6	Citation	Hybrid (F1)	Triploid	Red	Tiger Stripe	Green	Seedless as it is triploid
7	#1 Unknown						To the best of Manish's knowledge, Unknown 1 died in the seedling stage
8	#2 Unknown						unknown 2 failed to bear fruit.
9	Crimson Sweet	OP	Diploid	Red	Tiger Stripe	Green	
10	Congo	OP	Diploid	Red	Tiger Stripe	Green	Gigantic
11	TGR 204						No Information Online
12	Summer King	Hybrid (F1)	Triploid	Red	Tiger Stripe	Green	Seedless as it is triploid
13	Red-Seeded Citron	OP	Diploid	White	Tiger Stripe	Green	Red Seeds

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14	Charleston Tetra No 1	Breeding Line					Manish was given seeds by another watermelon enthusiast who did mention these seeds were from the USDA GRIN system
15	Charleston Tetra No 2	Breeding Line					
16	Charleston Tetra No 3	Breeding Line					
17	Caroline Cross 180	OP	Diploid	Red	Tiger Stripe	Green	Enormous
18	Blacktail Mountain	OP	Diploid	Red	Solid	Dark Green	
19	Early Moonbeam	OP	Diploid	Yellow	Tiger Stripe	Light Green	
20	Ancient	OP	Diploid	Red	Solid	Dark Green	Red Seeds, Very Large
21	Jubilee	OP	Diploid	Red	Tiger Stripe	Green	Large!
22	Sweet Dakota Rose	OP	Diploid	Red	Tiger Stripe	Green	Bred by David Podoll of North Dakota to ripen in Northern, Short Seasons and Fluctuating Weather Conditions. OSSI Pledged

Appendix B – Detailed Participant Profiles

Aaron Halcovitch

Demographics

Aaron has 10 years of farming experience, and limited seed saving experience. This was his second year participating in the FLWLBP (although the crop was destroyed early in the season in the first year by a windstorm). He is an owner/operator of Morning Moon Farm in Murillo, Ontario where he and his partner Alia grow 1 acre of mixed vegetables for sale through a CSA and nearby farmers market. Prior to this project, watermelon was not a regular crop that Aaron grew.

Data Collection

Aaron's first interview took place at Morning Moon Farm on June 19, 2023 and was 45 minutes long. Because the watermelons were not planted yet, I returned on July 4, 2023 to conduct my field observations then. I returned to the farm again on September 7, 2023 to do my second set of observations and round of photos. Because of time constraints I wasn't able to interview Aaron at that time. Our second interview took place at my house later that month on September 16, 2023. This interview was conducted with Aaron and Alia together, included the sharing of their artefact, and lasted approximately an hour.

Xander Hudson

Demographics

Xander was a participant in the Urban Agriculture Program at Roots Community Food Centre (Thunder Bay, Ontario) in 2023. At this time, Xander had no previous gardening or farming experience, no seed saving experience, and no landrace breeding experience. This was Xander's first time as part of the FLWLBP although RCFC has been participating since 2022. Xander's focus in his work in the garden at Roots CFC was on learning.

Data Collection

I visited Xander at the Roots CFC urban farm site in Thunder Bay four times during the season for data collection purposes. The first visit was on August 22, 2023 and included an interview with him and Kyle together that lasted around 50 minutes. After that interview I conducted my observations of the watermelons and took photos. The second interview (also at Roots CFC urban farm and together with Kyle) took place on September 13, 2023 and lasted just under an hour. At this time I also conducted my second round of observations and took photos. I stopped by the farm site twice more after this – once on September 26, 2023 to see how the watermelons were doing, and finally on October 3, 2023 while Xander and Kyle and a friend were tasting and selecting seeds. I took some photos during this final visit, too. In the end, Xander did not provide me with an artefact, although he had mentioned that he wanted to make a friendship bracelet as his artefact when we were chatting about it on October 3rd.

Manish Kushwaha

Demographics

Manish is the owner/operator of Gaia Organic Seeds, in Ottawa Ontario. In 2023 there was approximately 5 acres in production on his farm, with an addition 20 acres being brought into production. Manish is a fourth generation seed farmer with four years of experience farming, growing and saving seed, and landrace breeding. His business is focused on growing and selling certified organic transplants and seeds.

Data Collection

I conducted my first interview with Manish in person, at Gaia Organics Seeds on July 11, 2023. We chatted outside near the watermelons, and after our discussion (which lasted about 45 minutes), Manish toured me around his farm and I took some photos. I then took time to conduct observations with the watermelons and to take more photos. I returned to Gaia Organic Seeds on September 21, 2023 for our second interview and to conduct a second round of observations and

take more photos. Unfortunately Manish was unavailable for an interview at this time. I did take photos and conduct observations. Manish also shared the start of his artefact with me at this time – a poem. We were finally able to do our last interview on October 31, 2023 via Zoom. This interview lasted about 45 minutes. In the days following, Manish sent me the finished version of his poem (artefact).

Evalisa McIlfaterick

Demographics

I have over fifteen years of farming experience, ten years of seed saving experience, and three years of landrace breeding experience. This was my second year participating in the FLWLBP. I own and operate Root Cellar Gardens in South Gillies Ontario, where I focus on growing certified organic seed for other Ontario seed companies, a local seed collective, and my own retail seed packs. I also grow certified organic produce, primarily for storage and winter sale. I farm on 2 acres (with one acre in production and one acre in green manure at any given time). At 44 years old I am the oldest participant of the FLWLBP.

Data Collection

My first interview with myself took place on June 10, 2023 in the greenhouse at Root Cellar Gardens. It lasted just over 30 minutes. I also made observations of the watermelons in the field that day. My second interview with myself took place at my home (due to poor weather) on September 5, 2023 and lasted 56 minutes. I made observations of the watermelons in the field the following day. I began making my artefact at the end of August (a collection of drawings of each of the watermelons from which I saved seeds) and finished it in late September²⁰.

²⁰ I took photos as per the data collection protocol of this thesis project with both sets of observations, but as part of the FLWLBP (and just as a curious excited gardener) I also took photos and made observations throughout the season.

Kyle Tonkens

Demographics

Kyle is a program facilitator at Roots Community Food Centre (RCFC), urban agriculture program, Thunder Bay Ontario. In 2023 there was approximately 1 acre in production at RCFC. Kyle has three years of gardening experience, minimal previous seed saving experience, and no previous landrace breeding experience. Kyle's focus in the garden at Roots CFC is on working with staff to tend to, harvest a wide variety of vegetable crops. This was Kyle's first time as a member of the FLWLBP, although Roots CFC had been a part of it in 2022.

Data Collection

I visited Kyle at the Roots CFC urban farm site in Thunder Bay four times during the season for data collection purposes. The first visit and interview (done together with Xander) was on August 22, 2023 and lasted around 50 minutes. After the interview I conducted my observations of the watermelons and took photos. The second interview (also at Roots CFC urban farm and with Xander) took place on September 13, 2023 and lasted just under an hour. At this time I also conducted my second round of observations and took photos. I stopped by the farm site twice more after this – once on September 26, 2023 to see how the watermelons were doing, and finally on October 3, 2023 while they were tasting and selecting seeds. I took some photos during this final visit, too. Kyle sent me photos of his artefact via email with a short description of it in November.

Catherine Walleberg

Demographics

Catherine has over ten years of farming and seed saving experience, and three years of landrace breeding experience. This was her first year officially participating in the FLWLBP, although she grew some watermelons from seeds Manish gave her the previous summer. She is the owner/operator of Northern Seeds in Farrellton, Quebec, where she grows certified organic

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seed for sale through her own retail seed packs and on contract for other organic seed companies in Canada. She also raises beef cattle on her 20 acre farm. In 2023 she had about ¼ acre in seed production. Prior to this project watermelon was not a regular crop that Catherine grew.

Data Collection

Catherine's first interview took place in the field at Northern Seeds on July 11th, 2023 and was approximately 45 minutes long. After the interview Catherine toured me around her garden and I made observations and took photo. Her second interview took place in the greenhouse at Northern Seeds on September 21, 2023 included the sharing of her artefact, and was approximately an hour long. After the interview I went to the garden to make observations and take photos, while Catherine worked in the greenhouse.

Alia Wurdmann-Stam

Demographics

Alia has seven years of farming experience, and some seed saving experience. This was her second year participating in the FLWLBP (although the crop was destroyed early in the season in the first year by a windstorm). She is an owner/operator of Morning Moon Farm in Murillo, Ontario where she and her partner Aaron grow 1 acre of mixed vegetables for sale through a CSA and nearby farmers market. Prior to this project, watermelon was not a regular crop that Alia grew.

Data Collection

Alia's first interview took place in the field at Morning Moon Farm on June 19, 2023 and was 50 minutes long. Because the watermelons were not planted yet, I returned on July 4, 2023 to conduct my field observations. I returned to the farm on September 7, 2023 to do my second set of observations and photos. Because of time constraints I wasn't able to interview Alia at that time. Our second interview too place at my house later that month, on September 16, 2023.

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This interview was conducted with Aaron and Alia together, included the sharing of their artefact (which they chose and presented together), and lasted approximately an hour.

Appendix C - Interview Guide

Notes to self before beginning the interview:

- Remember that the goal is to *understand and get to know participants*
- Be present, engage, be confident, probe
- Give them space to make meaning
- Stay focused on what you want to learn vs what a question asks

Before the interview begins:

- Introduction of self:
 - Evalisa McIlffaterick; organic farmer and seed producer and landrace seed breeder; Master's of Health Sciences student at Lakehead University; my interest in this topic comes from my experiences farming and working with seeds in northwestern Ontario and a desire to support the community I work in through the work I do.
- Introduction of the project:

This project is titled **Breeding Diversity, Community, and Health: Exploring the Connections Between Landrace Seed Breeding and an Eco-Social Approach to Health.**

 - Ultimately, I am curious about what and how landrace seed breeders think about the work they do. I'm hoping that your experiences and perspectives will help me to get a sense of how this type of seed work is connected with an eco-social perspective of health.
- Introduction of the interview:
 - The interview should take about 1 hour. The goal of the interview is to get to know about you and your experiences with, and perspectives on, landrace seed breeding. There are no wrong answers and you do not need to answer anything you don't want to.
- Consent and documentation:
 - Remind participants that they are under no obligation to participate, that they can cease to participate anytime, and that they can decline to answer any questions at any time. Confirm their preference for autonomy/confidentiality, permission to record the interview, sign any consent forms/other documents as required, determine if they would like to review transcript of interview; any questions or concerns?)

Notes		
Participant name:		
Date and time:		
Location:		
Pre-interview material covered:		
Consent forms signed:		
Transcript requested?		

INTERVIEW 1	Question	Probes
<p>Section 1 – Positioning</p> <p><i>(The goal with this section is to understand who the participant is in their own words, where they live, and how they see/define their work with landrace seed breeding.)</i></p>	<p>1. Please tell me a bit about yourself.</p>	<ul style="list-style-type: none"> • Do you have a favourite seed/plant to grow? • How long have you been growing? Saving seeds? Seed breeding? Landrace breeding? • If you were a plant or seed in your garden which one would you want to be?
	<p>2. Tell me a bit about where you are farming/landrace seed breeding</p>	<ul style="list-style-type: none"> • Where are you located? • What is it like there? ...rural/urban, remote, climate, culture, feel, ecology, history.... • How long have you been there? • Describe your garden (size, what's in it, its purpose) and what you do
	<p>3. Tell me about your season. I'm specifically curious about if there are one or two things that have stood out for you this year so far.</p>	<ul style="list-style-type: none"> • Are there any outstanding things that have happened so far this year? • How does it compare with other years? • Can be things affecting the farm directly (weather, soil, water, insects, disease, etc...) or more broadly (customers, community, global trends)... or more personally for you.
<p>Section 2 -Motivations</p> <p><i>(The goal of this section is hear from participants why they have decided to engage in this farmer-led landrace breeding work)</i></p>	<p>4. At this point I'd love to learn more about why you've chosen to be involved with the breeding a watermelon landrace. I have a</p>	<ul style="list-style-type: none"> • What do you think is important about landrace breeding? Or interesting?... or other... • What do you hope to gain from this project? • Have you ever been a part of or done anything like this

	<p>handful of questions to this end, but would love to hear if even just broadly on this topic if there is anything that jumps into your head that you'd like to start off with sharing...</p>	<p>before?</p> <ul style="list-style-type: none"> • What do you think could be some benefits of breeding a landrace watermelon? • Was it a hard decision to take on this project? Why/why not? • Why landrace breeding over other techniques?
<p>Section 2 -Motivations</p> <p><i>(The goal of this section is hear from participants why they have decided to engage in this farmer-led landrace breeding work)</i></p>	<p>5. At this point I'd love to learn more about why you've chosen to be involved with the breeding a watermelon landrace. I have a handful of questions to this end, but would love to hear if even just broadly on this topic if there is anything that jumps into your head that you'd like to start off with sharing...</p>	<ul style="list-style-type: none"> • What do you think is important about landrace breeding? Or interesting?... or other... • What do you hope to gain from this project? • Have you ever been a part of or done anything like this before? • What do you think could be some benefits of breeding a landrace watermelon? • Was it a hard decision to take on this project? Why/why not? • Why landrace breeding over other techniques?
	<p>6. What do you feel are the broader outcomes or implications of your landrace breeding activities, at a societal or global level? / How do your activities relate to health beyond the health of those who eat the melons directly?</p>	<ul style="list-style-type: none"> • This research project is interested in understanding the interconnections between landrace seed breeding and an eco-social approach to health. An eco-social approach to health is essentially a view of health that tries to look at the whole picture. It recognizes that our societies and our environment impact our health in all sorts of complex ways (racism, inequality, soil, air, food, education, pollution, etc.). I'm wondering what thoughts you have about how breeding a landrace might connect to such a perspective of health.

<p>Section 3 – Expectations/experiences</p> <p><i>(This section seeks to get a picture of what farmer-researchers expect from their work with landrace breeding and what that has looked like so far)</i></p>	<p>7. Next I’m interested in trying to understand what you think it will be like to work with these watermelons, to engage in landrace seed breeding, and why? I would love to hear about hope and fears, specific outcomes, for the melons or yourself or your farm or more broadly.</p>	<ul style="list-style-type: none"> • How do you think breeding a landrace watermelon will fit into what you’re doing on your farm/how not? What will it change? • What do you think that the challenges of breeding a landrace watermelon will be? • What about the benefits? • What do you think you might learn? • How have your perspectives on this project changed since you started? • What do you expect to enjoy/not enjoy about breeding a landrace watermelon?
<p>Section 4 – Clarity</p> <p><i>(The goal of this section is to give a bit more autonomy to the participant to share anything else that feels important to them, and thus both leaving them feeling heard and ensuring nothing important to them is left out.)</i></p>	<p>8. The goal of this interview is to understand why you’ve decided to breed a landrace watermelon, and what that experience has been like for you so far. Do you feel like you’ve been given the chance to share to this end? Is there anything more you would like to share?</p>	

Final thoughts:

- Thank participants (for sharing time, understanding, experience...)
- Let them know about expected timeline for receiving transcript, research results, remuneration
- Provide them with contact information should they need for any reason

INTERVIEW 2	Question	Probes
<p>Section 1 – Check-In</p> <p><i>(The purpose of this section is to get gain contextual awareness)</i></p>	<p>1. Its harvest season – how are things going, how are you doing?</p>	<ul style="list-style-type: none"> • Where are things at in your season now? • How did things go? • How you feeling and what are you focusing on these days?
	<p>2. With respect to the landrace breeding, but also more broadly, how was your summer?</p>	<ul style="list-style-type: none"> • Were there any outstanding moments/successes/challenges in your season you'd like to tell me about? • How did it compare to other years – with respect to systems, weather, staffing, etc... • How did the melons specifically do/compared to other things?
<p>Section 2 – Reflection</p> <p><i>(The purpose of this section is to understand the participant's thoughts and feeling about the experience of breeding a landrace watermelon)</i></p>	<p>3. If you chose to bring in an artefact that represents your experience with landrace breeding now is the time that I would love to see it and have you tell me a bit about it.</p>	<ul style="list-style-type: none"> • Why did you decided to do it this way? • What is the most important thing you'd want me to take away from this? • The point of this was to provide another way to understand your experience with landrace seed breeding without having to rely just on words and answering questions. Is there anything else you'd like to share that hasn't been captured yet (in words or by the artefact)? • What was it like to put this artefact together?
	<p>4. How would you describe your relationship with the watermelon landrace?</p>	<ul style="list-style-type: none"> • Was it what you expected? How/how not? • How would you describe the experience of landrace breeding this summer? • What if anything do you think you gained from having bred a landrace this summer? What if

		<p>anything does you think you lost?</p> <ul style="list-style-type: none"> • What do you think your involvement with landrace breeding and landraces will look like in the future?
	<p>5. How did your landrace breeding change things?</p>	<ul style="list-style-type: none"> • Practices, thinking, systems...? • The garden ecosystem? • Family/friends? • Customers? • Others?
	<p>6. This project is ultimately about trying to understand the ways that engaging with landrace breeding connects with some broader ideas such as food systems, health, and the climate crisis. What are your thoughts on this having undertaken a landrace breeding project this past summer?</p>	<ul style="list-style-type: none"> • Practically speaking have you seen any ways this practice relates to these topics? • How have your thoughts on these topics been impacted by your landrace breeding work? • Based on your experiences working with landrace breeding, what connections/interrelations do you see between this practice and these ideas?
<p>Section 3 – Clarity</p>	<p>7. Is there anything else that you think I should be asking about this topic?</p>	

Final thoughts:

- Thank participants (for sharing time, understanding, experience...)
- Let them know about expected timeline for receiving transcript, research results, remuneration
- Provide them with contact information should they need for any reason

Appendix D – Consent Form



Name of Participant _____

(Please print)

- I have discussed the details of this research project and agree to participate in the research.
- I understand that the purpose of the research is to explore the interconnections between landrace breeding and eco-social health in Ontario.
- I understand that my participation in this study will bring minimal risks or harm.
- I understand that my participation in this study is voluntary and that I may withdraw at any time for any reason without penalty.
- I understand that there is no obligation to answer any questions that I feel are invasive, offensive or inappropriate.
- Unless explicitly agreed to otherwise, I understand that information I provide will never be attributed to myself individually.
- I understand I may ask questions of the researcher at any point during the research process.
- I understand that, with my permission, this project will also draw on data, photos, and observations submitted to the EFAO Farmer-Led Research Project: Watermelon Landrace Seed Breeding.
- I agree to have this interview recorded (please circle one): Yes No
- I agree to have photographs taken of my farm (please circle one): Yes No

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- Would you like to receive a copy of the research results (please circle one): Yes No
- I understand that my ongoing participation with the EFAO Farmer-Led Watermelon Landrace Breeding Project is in no way contingent on my participation in this research project

I am fully aware of the nature and extent of my participation in this project as stated above.

Participant's Signature

Date

If you have any questions or concerns about this study, please contact Dr. Charles Z Levkoe (clevkoe@lakeheadu.ca; 807-346-7954). If you have questions about your rights as a research participant in general, please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

Appendix E – Information Letter



Breeding Diversity, Community, and Health: Exploring the Connections Between Landrace Seed Breeding and an Eco-Social Approach to Health

Dear Potential Participant,

Thank you for your interest in this research project. Your time and help are truly appreciated. This letter gives some basic information on the research, what you can expect, how the data will be handled and used in the future. If anything is unclear or you want more information, please feel free to ask any question you wish - our contact details are at the end of this document.

What is this research about?

This research project is part of Master's of Health Sciences thesis, and will explore interconnections between landrace seed breeding and an eco-social approach to health. It is being conducted alongside the Farmer-Led Watermelon Landrace Breeding Project of which you are a part; however, **you are by no means required or expected to participate in this additional research project as a requirement for continuing your involvement with the FLRP.**

Essentially, this research project seeks to draw on the data from the Farmer-Led Watermelon Landrace Breeding Project, and add to it additional data collected through interviews with farmer-researchers. While the Farmer-Led Watermelon Landrace Breeding Project's objective is to develop a regionally adapted, early, and good tasting watermelon and to tell the story of this melon through the data collected; this research project seeks to draw on your experience of landrace breeding to better understand the motivations, practice, and impacts of landrace seed breeding on the plants, people, and communities involved.

What is being requested of me?

You are being invited to participate in this research because you are a participant in the EFAO Farmer-Led Watermelon Landrace Breeding Project. I am asking you to participate in two, interviews to share your perspectives about your motivations for being involved in this EFAO project, your experiences of it, and the impacts of it on you, your farm, and your community. Ideally, these interviews would take place at your farm where I will also be able to observe and photograph your landrace breeding project as it is underway. In preparation for the second interview you will also be asked to find/prepare/create something that you feel is reflective of your relationship to breeding a landrace watermelon. I am also asking to be able to use the data you collect as part of the EFAO trial (agronomic data, observation, photos etc.) in this study.

Your participation is completely voluntary; you may refuse to answer any questions, refuse use of your Farmer-Led Watermelon Landrace Breeding Project data, or withdraw from the study at any time with no penalties to your ongoing participation in the EFAO Farmer-Led Watermelon Landrace Breeding Project.

Are there any benefits or risks I should be aware of?

Conducting this research will inform a greater understanding of the interconnections between landrace breeding and an eco-social approach to health. Ultimately, it will help further an understanding and articulation of why seeds matter in a broader health context. While there are very few perceived risks from participating in this research, I recognize that it will require making a couple of hours available for on-farm interviews, which can be hard during the growing season. I realize too that some questions may be perceived as sensitive, and you may not want certain information made available to myself or others. Your participation is voluntary and you are only being asked to offer information you feel comfortable sharing. Again, please note that *your participation in this study is not required for your continued involvement in the EFAO Farmer-Led Watermelon Landrace Breeding Project.*

How should I expect to be treated?

This research aims to maintain the highest standards of ethical conduct and integrity. Centrally, this means that in participating in this research you should feel that you, and your contribution to this research, have been treated with respect. Participation is entirely voluntary and all information offered will be treated in good faith. You are welcome to refuse to participate, withdraw from the research at any time and refuse to answer any of the questions asked without any negative consequences for yourself or your organization. All questions about the research, its aims and outcomes will be answered openly and honestly. While I retain final editorial control over what is written, you are free to withdraw any information you have contributed at any stage by contacting me and indicating your wish to do so.

You will have the choice as to whether your comments will be attributed to you or your farm individually. If you choose to remain anonymous, you will be given a pseudonym and the name and location of your farm will not be revealed. Your confidentiality will always be the number one priority. Only myself and Dr. Levkoe will have access to the interview transcript and identifiable materials collected during my on-farm visit. Secondary data collected from the EFAO Farmer-Led Watermelon Landrace Breeding Project will be made confidential for use in this study if you choose. Please note that it may not be possible to keep your identity completely anonymous from other research participants due to the nature of the project.

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

What will happen to the data after it is collected?

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All raw data, photos, audio recordings and typing up of interviews collected for this project will be encrypted and stored on password protected computers and in locked filing cabinets for up to five years and then destroyed. The final research results will be submitted as my Master's of Health Sciences thesis. In addition to this, I will draw upon the data collected to create a handbook on landrace breeding for gardeners in Ontario. An article for publication in a peer reviewed journal will also be written based on this research. Finally, upon request, findings from this research will be shared at E.F.A.O. or other related conferences.

If you have further questions about these processes or feel uncomfortable with any aspect of them, please let us know as soon as possible.

Thank you again for your time and assistance,

Evalisa McIlffaterick

(807)577-9937

eemcillf@lakeheadu.ca

MHSc student, Social-Ecological Systems, Sustainability, and Health

Dr. Charles Levkoe

807-343-8010 ext. 7954

clevkoe@lakeheadu.ca

Canada Research Chair in Equitable and Sustainable Food Systems

Appendix F: Participant Recruitment Letter

Breeding Diversity, Community, and Health: Exploring the Connections Between Landrace Seed Breeding and an Eco-Social Approach to Health

Dear Potential Participant,

As a student in Lakehead University's Master's of Health Sciences program, I am conducting a research project about the interconnections between landrace seed breeding and health from an eco-social perspective. To understand these connections I hope to be able to conduct this research collaboratively with participants of the ongoing EFAO Farmer-Led Watermelon Landrace Breeding Project. This research will involve the collection of multiple forms of data including research observations, photos and semi-structured interviews. Other data, including participant observations, participant photos, and agronomic data collected as part of the farmer-led breeding project will also be used. Ultimately, this research seeks to explore the motivations, practice, and impacts of landrace seed breeding on the plants, people, and communities involved.

I am inviting your participation in this research project as you are currently participating in the farmer-led watermelon breeding project identified above. For this study, your identity would remain confidential in any results. Your participation is completely voluntary and not required for your continued involvement in the breeding project.

If you are interested in participating, please contact me at eemcillf@lakeheadu.ca, or (807)577-9937 and I will send you further information about the project.

Sincerely,

Evalisa McIlffaterick
Student, Master's of Health Sciences

Appendix G– Observations

Element	Look for/consider...
<p style="text-align: center;">Context</p> <p>(Kinesthetic empathy gained by paying attention to things like smells, sights, sounds, how it feels to be in the space, how people and plants move, physical aspects of the space, presence of authority)</p>	<p>Sights</p> <p>Sounds</p> <p>Feel</p> <p>space (lots or little) neighbours</p> <p>climate</p> <p>nature of activities happening around</p>
<p>What I observed</p>	
<p style="text-align: center;">Plant Time</p> <p>The evidence of plant time is found in growth of plants and actions of gardeners</p>	<p>What is happening with plants, where are they at, what do they need, is plant time fast or slow right now... what does this look like/mean for humans and plants?</p>

What I observed	
Participation with plants	What is happening right now? How are growers participating with their plants? Is this different than with other plants in the garden? What is the work that humans are doing, what is the work that watermelons are doing? Where are the interactions between humans and watermelons?
How do plants exist in relation to others?	
What I observed	

<p>Scaling Up</p> <p>Need to think about the individual plant in relationship to the collective of plants and then the context (plant time) and plants as participants.</p>	<p>Different scales – each watermelon as a community of watermelons in a patch of watermelons, each patch of watermelons as a part of a whole garden ecosystem, each garden as part of a wider ecosystem...Pollinators as connectors of plant communities, Plants and humans have provisioning relationship – plants provide food and seeds and claims space to grow so they can do so. Humans provide space and good growing conditions, and claim food and seeds; Is there evidence of vegetal politics – “something that plants as a collective carry out in coordination” (p.108); can influence in the group of watermelons and humans be seen?</p>
<p>What I observed</p>	
<p>Stories</p>	<p>Ask questions that encourage folks to tell stories about their relationships and experiences with</p>

Stories give voice/witness to non-humans	watermelons vs just asking them about their watermelons. Find where experiences intersect
What I observed	

Date and Time:

Location:

Photo checklist:

- **Overall site photo showing watermelons in relation to the rest of the garden (context/participating with plants/scaling up)**
- **Close up shot of watermelon (context/plant time/scaling up)**
- **Grower with melons (participating with plants/stories)**
- **Melon patch as a whole (context/scaling up)**
- **Others (reflecting elements of stories shared by grower or melons)**