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SEED SYSTEMS OF BHUTANESE-NEPALI REFUGEE GARDENERS:
MAKING PLACE IN CHITTENDEN COUNTY, VERMONT

A Thesis Presented

by

Junru Guo

to

The Faculty of the Graduate College

of

The University of Vermont

In Partial Fulfilment of the Requirements
For the Degree of Master of Science
Specializing in Community Development and Applied Economics

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ABSTRACT

War, political unrest, and climate disasters cause major disruptions to peoples' lives and livelihoods, and for subsistence farmers, who make up much of the world's population, this means their agricultural practices. Among the farming habits that are disrupted are seed systems, defined in this study as the market and nonmarket institutions that affect how farmers access, store, share, distribute, and learn about propagative materials. In particular, the local varieties and knowledge, also described as Traditional Ecological Knowledge, contained in farmer-managed informal seed systems may be vulnerable when a crisis disrupts the social ties that the seed systems are built upon. However, there is limited empirical evidence of how refugees enact choice and agency to rebuild their seed systems in new contexts after displacement. This study presents a case study of how Bhutanese-Nepali refugees actively create and navigate new seed systems in Vermont. I draw upon 30 semi-structured interviews with Bhutanese-Nepali gardeners, the largest ethnic group of refugees who have resettled in Vermont, at two community garden organizations in Chittenden County.

The first chapter describes the seed saving, sharing, and buying practices of Bhutanese-Nepali gardeners in Vermont. I describe (1) the transactions through which Bhutanese-Nepali gardeners obtain seeds and plant starts, (2) the social relations linked to the sharing and selection of seeds among family, friends, strangers, and community organizations, and (3) the flows of information and knowledge about seed saving, seed access, and seed selection. Interview data indicate that Bhutanese-Nepali gardeners in Vermont construct and negotiate a combination of formal and informal seed systems. Employing their existing Bhutanese-Nepali community (both local and global), gardeners demonstrate Traditional Ecological Knowledge- information about seed systems that is acquired through community and experiences.

The second chapter then draws upon placemaking theory to explore how Bhutanese-Nepali gardeners integrate familiarity into their new environments with known seed practices and preferences. Results show that access to seeds and seed systems provides refugees with opportunities to grow essential crops, which might be otherwise difficult to obtain, to produce tastes and styles of foods reminiscent of their homelands. Gardeners apply cultural taste preferences, consult community knowledge, and experiment with new techniques and varieties to connect to familiar foodways. Through these actions of negotiating familiarity with newness, Bhutanese-Nepali gardeners make connections to place.

The values and practices in these seed systems provide compelling evidence that Bhutanese-Nepali gardeners integrate familiar values and practices with new technologies and skills. I end the thesis with recommendations that organizations strengthen and utilize the strong material and communication chains that Bhutanese-Nepali gardeners already have. In addition, when considering aid and support for refugee gardeners, facilitating agency and choice rather than direct handouts and donations would be the most socially beneficial. Future studies should further explore if these results are similar for other groups of refugees and immigrants and in different agro-ecological zones as well.

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CHAPTER 1: INTRODUCTION

Newcomers to the United States have long planted crops for survival, food security, cost-saving, leisure, and cultural sustenance (Moffat et al., 2017; Oyangen, 2009; Strunk & Richardson, 2019). The agency and choice involved in cultivating culturally important food are especially poignant for refugees who have been stripped of choice in many parts of life—whether forcibly displaced from their homelands, subjected to trauma in refugee camps, or resettled in the United States involuntarily (Gerber et al., 2017). For refugees experiencing social, cultural, and environmental challenges, growing specific crops can foster belonging, comfort, and hope in their new homes (Brook, 2003; Hughes, 2019). The ability to grow culturally significant crops, many of which might be uncommon in local stores and gardens, depends on access to seed varieties. Physically, seeds are essential to producing crops. Symbolically, seeds can provide access to culturally relevant foodways, food security, and economic opportunity. While Richards and Sperling (1999) have suggested that conflict can cause loss of seed varieties and knowledge, we lack research on how refugee gardeners rebuild their seed systems in the US and elsewhere. This thesis examines the seed systems of Bhutanese-Nepali refugees resettled in Chittenden County, Vermont. Below, I offer two main justifications for this thesis.

First, this thesis fills a literature gap of a) seed systems research in the United States regarding both formal and informal channels and b) descriptions of the social components of seed systems. In the US, a place where commercial seeds predominate,

existing research fails to capture the diversity of seed systems, defined in this study as the market and nonmarket institutions that affect how farmers access, store, share, distribute, and learn about propagative materials (Lipper et al., 2010). In the context of Bhutanese-Nepali gardeners who come from Bhutan and Nepal, where informal seed systems prevail, their navigation of the formal seed system offers an opportunity to see how informal and formal seed systems collide. In this study, I find that rather than assimilating into existing seed systems of the US, refugees actively build new seed systems that best work for them.

Currently, much of existing seed systems research focuses on the Global South, where subsistence farmers have traditionally relied on informal seed systems, in which farmer-managed saved seeds can be traded, gifted, bartered, sold, and bought in local interactions (Aguirre et al., 1997; Gill et al., 2013; McGuire and Sperling, 2016; Song et al., 2019). This previous research suggests that seed systems are inherently social; family relations, community institutions, and stores can govern and facilitate seed saving, access, trade, sharing, and movement that is essential in agriculture (Seboka & Deressa, 1999). To better understand the diversity of social relations and interactions within farmers' seed systems, I focus on the transactions through which seed is acquired, the social relations that affect from whom seed is obtained, and the information and knowledge channels surrounding seeds and seed sources.

Second, this thesis operationalizes placemaking theory through the study of refugee seed systems, providing empirical evidence that seed systems are institutions

through which people cultivate feelings of belonging in foreign spaces. With the severe problems of displacement and a future of more displaced peoples, scholars and community workers are increasingly exploring how people re-empower themselves in new spaces (Hughes, 2019; Jean, 2015; Peña, 2006). Forced migration and displacement causes social, economic, cultural, and geographic challenges that persist even when people move to safer places (UNHCR, 2019). In the case of resettled refugees, research has shown that the myriad of linguistic, food, religious, and weather differences leads to isolation and cultural fragmentation (Bose, 2018). Thus, this study focuses on Bhutanese-Nepali refugees in Chittenden County, Vermont. In the 1970s and 1980s, over 100,000 Bhutanese-Nepali refugees were denationalized and took refuge in UN refugee camps in Nepal (Hutt, 2005; Meyerhoff & Rohan, 2019). Then starting in 2005, in one of its largest resettlement efforts, the United Nations coordinated the resettlement of more than 100,000 Bhutanese-Nepali refugees in six countries worldwide (Shrestha, 2015). The US resettled more than 84,800 Bhutanese-Nepali refugees (Shrestha, 2015). Bhutanese refugees resettled in the United States suffer from twice the rate of suicide as the average American, highlighting trauma, disconnection, and isolation (Meyerhoff & Rohan, 2019).

Placemaking, the act of transforming new spaces with personal and communal memories, knowledge, values, and skills, has been applied in studies of refugee community gardening (Brook, 2003). Research suggests that gardens can provide resources for displaced peoples to connect to their home communities and to have more agency over economics and ecological factors in their lives (Peña, 2006). Besides,

gardening can provide a collective identity that fosters social connectedness that is tied to placemaking (Gerber et al., 2017; Harris et al., 2014). For example, in Gerber et al. (2017)'s study, Bhutanese-Nepali gardeners reported more social support than former refugees who did not garden (Gerber et al., 2017). Many Bhutanese-Nepali refugees came from subsistence family farming backgrounds with long histories of self-saved seeds, and many chose to garden and farm in Vermont, either in their backyards or with community organizations. Understanding the social aspects of Bhutanese-Nepali seed systems in Vermont can tell us about access and barriers to placemaking. This thesis revolves around the active choices and decisions that Bhutanese-Nepali gardeners make regarding their seeds, emphasizing that the processes of displacement and emplacement are intertwined and negotiated (Peña, 2006).

Overall, this thesis is guided by the following research objectives:

- 1) describe the market and non-market transactions through which Bhutanese-Nepali gardeners obtain seeds and plant starts;
- 2) characterize how social relations structure seed buying, sharing, saving, and selecting among family, friends, strangers, and community organizations;
- 3) detail the flows of information and knowledge about seed saving, seed access, and seed selection;
- 4) understand how Bhutanese-Nepali refugees bring and adopt practices of their seed systems to Vermont; and

5) comprehend if and how people from refugee backgrounds engage in seed systems in ways that make place and create familiar foodways, defined as the cultural, social, and economic dimensions of their food cultivation, production, and consumption (Oyanger, 2009; Peña, 2006).

CHAPTER 2: COMPREHENSIVE LITERATURE REVIEW

Formal Seed Systems

The formal seed system includes breeding, managing, selling, and distributing uniform seeds (Louwaars, 2007; Thiele, 1999). Through the development of modern agriculture, definitions of the formal seed system have shifted, as the major players shifted from public entities into the private sector. At the beginning of modern agricultural development, formal seed systems mainly involved the state-sponsored research, breeding, distribution of improved seeds to farmers (Jones, 2014). A major product of this early state-supported system was the Green Revolution. In the 1970s, food security was mostly regarded as a production problem, and the Green Revolution, funded by Western governments and philanthropies like the Ford and Rockefeller foundations, successfully facilitated the increased yield and production of wheat, maize and rice (Evenson & Gollin, 2003; Fernandez-Cornejo, 2004). Unfortunately, the agricultural input intensification and top-down transfer of technology also led to increased social stratification in many regions in Latin America and South Asia and water and soil contamination (Chambers & Jiggins, 1987; Shiva, 2016). Also, the success of the modern varieties was uneven across geographic regions and crop varieties and left lasting environmental and social inequalities (Fernandez-Cornejo, 2004). In summary, the Green Revolution increased agricultural yields and both positively and negatively impacted the lives of many (Brainerd & Menon, 2014; Pingali, 2012).

Background in the United States

In the United States, the formal seed system is regulated by a) intellectual property rights (IPR) laws that privatize and patent genetic materials and b) laws requiring certification and registration of seeds for markets and transactions (Wattnem, 2016). The first US IPR legislation, the Patent Act of 1790, did not extend IPR to plant breeding because new plant varieties were determined to be products of nature (Fernandez-Cornejo, 2004). Today, there are three types of plant protections offered in the United States, and breeders may hold one or a combination of the instruments. First, when plant breeders could produce uniform and identifiable crops, the 1952 Patent Act (PA) patent products that are “new, distinct, and asexually reproduced” (p. 9). Second, the 1970 Plant Variety Protection Act (PVPA) guarantees breeders market rights for sexually and tuber-propagated varieties but allow buyers to save seed for replanting and breeders to use the varieties for research and breeding (Bence and Spiegel, 2019). Third, utility patents provide breeders expansive protection over “novel, useful, and non-obvious” inventions (Bence and Spiegel, 2019, p. 9).

Because different agencies provide plant patents (patent offices) and plant variety registrations (USDA), there is a fragmented regulatory framework that makes protecting intellectual property difficult and information that make regulation difficult (Bence and Spiegel, 2019). The US formal seed system, unlike its European counterpart, does not “require mandatory registration, certification, or quality testing” (Wattnem, 2016, p. 858). Wattnem (2016) argues that while informal seed systems and commercialization of non-

uniform varieties are legal in the United States, the overall focus on IPRs, “the political economy of agriculture is such that, as in Europe, they are not as widespread as they could- or perhaps should be, if the preservation of biodiversity were a serious objective” (p.859).

A consequence of the legal framework surrounding seeds in the United States is the privatization of agrochemical advancements (Kloppenburg, 2013). As investment for public agricultural research and development in developing countries decreased, the research, production, and diffusion of seeds became and stayed privatized and commercialized (Jones, 2014; Kloppenburg, 2010). In the 1970s, the formal seed system became more market-orientated. As international agricultural development focus shifted with the rise of neoliberalism, seeds became more commonly regarded as private, not public goods. The (now) three big agrochemical companies, Bayer (valued at \$66 billion), DowDuPont (\$130 billion), and ChemChina/Syngenta (\$43 billion), have shaped policies, research, and farmer choices. Many patents held by agrochemical and seed companies were set to expire in the 1990s and 2000s, so firms banded together to develop seed-chemical reliance combinations that would enable simultaneous sales of seed and chemicals (Bonny, 2017). Mergers allowed companies access to both genetic licenses and chemical formulas, a powerful duo (Clapp, 2018). In the past 40 years, monopolistic control and consolidation in the seed and agrochemical industry has been linked to increasing seed prices (Ciliberto, 2016; Howard, 2015), limiting legal power of farmers (Kloppenburg, 2010), narrowing research to hybrid and GMO varieties that have

potential market values (Welsh & Glenna, 2006), and directing public university agricultural research towards profits (Welsh et al., 2008).

Another consequence that is attributed to the homogenization of the seed system is the decrease in crop diversity. In the past century, the world has lost about 75% of its crop genetic diversity (Commission on Genetic Resources for Food and Agriculture, 2010). In the United States, crop diversity has been decreasing (Aguilar et al., 2015), representing a vulnerable food system dependent on pesticides, fertilizers, and proprietary hybrid seeds (Welsh & Glenna, 2006). Currently, the US food system's heavy reliance on 7-30 species for the majority of its produce increases the vulnerability of US agriculture to diseases, extreme weather, and other crop yield disasters (Sachs et al., 1997; Aguilar et al., 2015). Along with decreasing agricultural crop diversity, many wild relatives of cultivated crops are at risk of extinction (Clapp, 2018). Limitations of crop diversity increase the vulnerability of US agriculture to diseases, extreme weather, and other crop yield disasters (Aguilar et al., 2015; Sachs et al., 1997).

Scholars and activists have argued that these trends of the formal seed system have threatened seed sovereignty- the right and ability for farmers and gardeners to control and make decisions about seeds and other propagative materials- and global crop biodiversity (Kloppenburg, 2013). However, there are existing legal channels to preventing the patent of plant varieties. In their guide on defensive publication, Bence and Spiegel (2019) describe that if a plant breeder establishes their variety as a prior art, no one else can then patent that same plant variety. Defensive publication can be used to

keep a plant variety publicly available and free from use restrictions (Bence and Spiegel, 2019). With defensive publication, breeders can promote public access to affordable seeds (Bence and Spiegel, 2019).

International Formal Seed System

In 1986, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement mandated that members of the World Trade Organization (WTO) meet international IPR standards (Ciliberto, 2016). Thus, the protection of seed and plant varieties for countries in the WTO came to mirror the US's model of IPRs, resulting in a highly regulated and complex system of genetic protections (Fernandez-Cornejo, 2004). The Convention of the International Union for the Protection of New Plant Varieties (UPOV¹) has largely set the standards of how breeders can protect plant varieties (Wattnem, 2016). In 1991, the UPOV revoked farmer's privileges to save seeds of protected varieties without paying royalties or obtaining licenses. With this legislation, breeders had legal market control over the subsequent seeds of the varieties they developed. This came with international standards and qualifications for seeds while drawing away attention from the very entities controlling the system (Wattnem, 2016).

Recognizing the importance of international genetic resource and information sharing, a series of international treaties have sought to encourage worldwide biodiversity conservation. In 1992, the Convention on Biological Diversity (CBD) recognized genetic resources as part of nation-states' sovereign rights. Nations controlled their genetic

¹ French acronym that is commonly used

resources under their jurisdiction. In 2004, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) tried to institutionalize global access and sharing while still respecting the sovereignty of nation-states. These efforts to enhance global research, breeding, conservation, and learning efforts tried to provide a system of sharing and accessing genetic material that is resistant to and/or adapted to pests, crop diseases, and climate change. The Nagoya Protocol, established in 2010, with 193 contracting parties, provided an access and benefit-sharing (ABS) framework for genetic resources and indigenous knowledge (Buck & Hamilton, 2011; Fernandez-Cornejo, 2004). However, slow domestic implementation of the ABS demonstrated the financial limitations of the model (Hodges & Langford, 2018). In summary, the CBD, ITPGRFA, and Nagoya Protocol were different efforts to protect biodiversity, promote research for improved crop varieties, and ensure food security through international free sharing. However, incentivizing and enforcing this free sharing has proven difficult. In the Global South, government and NGO actors have largely acted as the ABS framework to support themselves. In most countries the benefits, particularly payments, do not directly flow to small-holder farmers but to favored ethnic groups or higher socioeconomic status with more access to education and power (Wattnem, 2016).

Seeds Across Borders and Phytosanitary Laws

The exchange of genetic materials around the world has expanded and developed agriculture all over the world. In fact, reliance on non-indigenous seeds for staple crops ranges from 67% to 84% for countries in central Africa and from 85% to 100% for

countries in South Asia (Ho, 2010). International genetic resource sharing has greatly benefited societies past and present. In fact, much of the United States' agricultural economy depends on the production of crops domesticated elsewhere- maize from Mexico, wheat from the fertile crescent, soybeans from China. The worldwide exchange of germplasm allowed US agricultural research and development to flourish, and the interdependence among countries for each other's seeds shows how crucial seed relations are for international relations and food security.

However, phytosanitary concerns and regulated global genetic sharing limit the global travel of seeds (van den Broek et al., 2020). Pests and agricultural diseases are major concerns in the introduction of foreign genetic and propagative material. Seed borne diseases can travel across natural and political boundaries with the worldwide trade of seeds (Singh et al., 2020). For example, seed-borne nematodes affect seedling and plant vigor, ultimately negatively impacting crop yields (Singh et al., 2020). The US, like other countries, has strict policies regarding propagative materials entering and exiting its borders. As part of agricultural protections, people are not allowed to ship or carry in seeds or anything intended as propagative material into the United States without a foreign phytosanitary certificate from the National Plant Protection Organization of the country of origin (US Customs and Border Protection, 2019). Or, people with fewer than 50 packets of seeds can apply for a Small Lot of Seed form from the USDA's Animal and Plant Health Inspection Service (APHIS) (US Customs and Border Protection, 2019). However, both these processes take time and resources that many people do not have,

especially in the hurried processes of refugee resettlement. Phytosanitary systems can also be disorganized or absent (van den Broek et al., 2020).

Description of Informal Seed Systems

Informal² seed systems are attracting research interest based on their ability to respond to local demands, disperse improved varieties of seeds, and promote agrobiodiversity (Maredia et al., 2019; L. Sperling & McGuire, 2010). Informal seed systems have been described as anything the formal system is not, such as seeds that are farmer-managed and organized, indigenous and local, flexible, and undocumented (Gill et al., 2013; FAO, 2018). Interactions in these seed systems can include but are not limited to gifting, trading, buying, selling, and storing farmer-saved seeds (Song et al., 2019). The informal nature results from farmer-based management and organization, indigenous and local existence, and typically flexible and undocumented exchanges (Gill et al., 2013).

Scholars and activists argue that these diverse seed systems can help address food and nutrition insecurity, adaptation and mitigation to climate change, and community and livelihood resilience (Bellon et al., 2011; Thiele, 1999). Informal seed systems can also be valuable in introducing new varieties of seeds that could provide better nutrition (Jones, 2017), as well as enhanced productivity, and system resilience (Hubbard & Zystro, 2016; McGuire & Sperling, 2016). Smallholders who often rely on traditional

² It is important to note that the inherent bias in the labels of formal and informal might obscure the fact that some aspects of informal systems are, indeed, highly sophisticated.

practices and knowledge maintain varietal diversity in their informal seed systems. Traditional knowledge about seeds is developed through teamwork, experimentation, and social endorsements, highlighting the social values of seeds (Buck & Hamilton, 2011; Richards et al., 2009). Even though there has been some recognition of their importance, farmer informal seed networks are understudied and misunderstood, especially in the Global North (Coomes et al., 2015).

However, even with benefits and usefulness, informal seed systems have limitations as well. Due to their structure and nature, informal seed systems can be disorganized, perpetuate social inequality, and circulate low-quality seeds. For instance, with potato tubers in Ethiopia, Tadesse et al. (2016) found that farmer exchanges are limited by religion, gender, kinship, and marriage relations, especially in indigenous cultures. Lacking the standardization of seeds in the formal system, seeds in local markets can also vary in variety, quality, and labeling (Maredia et al., 2019), making it difficult for farmers to access high-quality seeds (FAO, 2018). Also, in informal markets, seeds can also be regarded as either food or planting materials (Sperling & McGuire, 2010); implicit seed and food (grain, tubers) can be found side by side in informal markets (Sachs et al., 1997).

Social Structures in Informal Seed Systems

Scholars have highlighted how social and cultural norms govern the movement of seeds (Coomes et al., 2015). In a study of sorghum farmers in Ethiopia, most exchanges were between people in the same village (Rodier & Struik, 2018). Other studies have

found that nodal farmers (those who are tied to many other farmers through networks of seed exchanges) and non-nodal farmers (those on the outskirts of social networks) tended to have similar socioeconomic statuses but differed in the motivation to maintain friendships and relationships (Rodier & Struik, 2018). Besides, with organic farmers in Costa Rica, Aistara (2011) found that while seed networks can be similar to family and kin networks, they can also mediate new social relationships and extend networks. In Ethiopia, married Chenchu women can bring seeds across regional boundaries when they move to their husband's home village (Tadesse et al., 2016).

Without formal public sector certifications, farmers in informal systems manage sanitation, variety purity, and storage themselves. Like choosing between seed companies and stores, seed buyers in the informal system assess not only the physical seeds but also the sources of the seeds. Thus, social certifications of a seller's seed quality tend to be more useful than the formal certifications that commercial companies guarantee on their product labels (Sperling & McGuire, 2010). When selecting seeds, farmers will assess both the genetic and physical qualities of the seeds and the reputations and storage practices of the seed saver or seller (Song et al., 2019). In the informal seed system, seed traders and sellers who hold social certifications are shown to be possible disseminators of new seed varieties and seed information (Sperling & McGuire, 2010; Thiele, 1999). Social relations in the informal seed system are crucial, as trust is the main form of how people judge seed quality without certifications (Coomes et al., 2015).

In studying seed access and sourcing, researchers often investigate how women and men differ in their ability to access preferred seeds and the adoption of climate change response strategies. The intersections of gender, age, income, marital status, and religion can all affect how values, preferences, access, and roles are shaped in seed systems (Fisher & Carr, 2015). In Uganda, Fisher and Carr (2015) showed that land ownership practices, which are gendered, affect preference and access to seeds. Also, Beshir et al.'s (2019) surveys on cowpea in Ethiopia demonstrated that although men and women both participate in planting, weeding, hoeing, harvesting, and threshing, men were more likely to be responsible for seed selection and sourcing while women were responsible for processing, cooking, storing, and marketing the grains and seeds. Additionally, in Peru and the US, Sachs et al. (1997) found that women had a major role in seed saving, sharing seeds, and establishing and maintaining social connections. Ultimately, understanding how seed systems function and fulfill the needs of people requires consideration of social interactions.

Traditional Ecological Knowledge in Seed Systems

Along with the social nature of informal seed systems, knowledge that is contained within seed systems is often community based (Song et al., 2019) and culturally important (Thiele, 1999). While there are few studies on Traditional Ecological Knowledge (TEK) within seed systems in particular, I find that TEK accurately describes how a) information around seeds can be maintained, managed, exchanged, and transferred with a community and the social cultural happenings behind b) gardeners'

relationships to their seeds and each other (Nesheim et al., 2006). Nesheim et al. (2006) describe that “TEK may be defined as a cumulative body of knowledge, practice, and belief evolving by adaptive processes and handed down through generations by cultural transmission about the relationship of living beings (including humans) with one another and with the environment” (p. 100). Scholars emphasize that TEK is important because the social cultural value of environmental resources is only able to be realized with the knowledge of how to recognize, use, and protect these resources (Berkes et al., 2000).

With a focus on the TEK contained within seed systems, we are able to see how while named *Traditional Ecological Knowledge*, most examples of TEK are combinations of both local practice and Western science (Berkes et al., 2000). TEK is gathered over time, through trial and error, and with a collection of people. TEK is culturally internalized; it functions within local social mechanisms and reflects social institutions and guidelines (Berkes et al., 2000). Seeds, as sources of "wealth, pride and identity," (Coomes et al., 2015, p. 45) are inherently and symbolically tied to relationships with community and place. In an ethnography with organic farmers in Costa Rica, Aistara (2011) found that seeds inherited from parents or given by other farmers hold emotional ties for farmers; farmers also feel committed to planting and saving seeds inherited from older generations (Aistara, 2011). Knowledge about seeds holds memories- traditional knowledge about seeds is developed through family knowledge, experimentation, and social endorsement (Richards et al., 2009; Buck & Hamilton, 2011).

Informal seed systems also contain TEK about seed storage mechanisms, community seed banks (Sreenivasa & Sharifi, 2019), and local farming skills (Gill et al., 2013).

To date, most informal seed systems research has been centered in the Global South, where small shareholders make up a large proportion of the population (Bellon et al., 2011; McGuire & Sperling, 2016; Thiele, 1999). There is evidence that informal seed systems may be better adapted for some communities, especially in times of environmental, political, or economic stress (Sperling & McGuire, 2010). Community seed banks and other informal networks can help respond to food and nutrition insecurity, provide adaptation to and mitigation of climate change (Sreenivasa & Sharifi, 2019), and enhance community and livelihood resilience (Bellon et al., 2011; Thiele, 1999). For farmers in developing regions, informal seed systems are often the most convenient or affordable methods of obtaining seeds (Sperling & McGuire, 2010; Sreenivasa and Sharifi, 2019). In addition, informal systems offer barter payment options, so there is a lower financial barrier to entry than formal systems that require cash (Tadesse et al., 2016). It has been posited that strengthening existing informal seed systems can help promote diverse plant genetics and different cultural foodways (Sachs et al., 1997; Gill et al., 2013; Song et al., 2019). Studies show that informal seed systems could be valuable in introducing new varieties of seeds that could provide better nutrition (Jones, 2017), diversity (Aistara, 2011), and system resilience (Hubbard & Zystro, 2016; McGuire & Sperling, 2016), especially in the face of climate change (Bellon et al., 2011).

Even though the financial and political impacts of the big agrochemical companies are not lost on smallholder farmers, the Global South has a rich history and current practice of saving and sharing seeds outside the formal seed system (Kloppenburg, 2010). International treaties like the Nagoya Protocol recognize the importance of traditional seed and farming knowledge and free international genetic trade, but the lack of attention from research and funding show that farmer seed systems are overlooked in favor of corporatized models (Buck & Hamilton, 2011). Informal seed systems in the US have been overlooked due to the influence that private industry has on funding mechanisms and the cultural ethos that emphasizes modern agricultural practices in the country (Welsh & Glenna, 2006). However, the United States is a particularly important place to study because it holds important power over global agricultural systems.

With high rates of immigration and refugee resettlement, the United States is home to a diverse population with different food cultures and diets. Refugee farmers transition from communities where informal seed systems are the norm into a new place where formal seed systems predominate. These understudied seed systems could offer lessons in confronting growing food security and climate change challenges. With resettled refugees, displacement makes their seed systems particularly interesting to study as they move away from their homelands and social networks. In fact, studies of informal seed systems in the Global South show that geography is a key factor in seed access and exchange. Refugee seed systems can provide a unique case to explore if and how

informal seed systems are implemented in the US. Furthermore, this case study provides an opportunity to provide an example of the intersections of formal and informal systems, as studies have emphasized how farmers use both formal and informal channels depending on context and need (Sperling & McGuire, 2010; Thiele, 1999).

Displaced Peoples Worldwide and in the US

From 2009 to 2018, the number of forcibly displaced people in the world rose from 43.3 million to 70.8 million, meaning one out of every 113 people globally are seeking asylum, internally displaced, or a refugee (UNHCR, 2019). Refugees, asylum seekers, internally displaced persons, returnees to home country, stateless persons, and others who are offered humanitarian protection but do not fit in the previous categories are all considered displaced peoples (Devictor & Weltbankgruppe, 2017). The United Nations High Commissioner for Refugees (UNHCR) grants legal refugee status to people who are forced to leave their home country due to war, violence, or persecution. Even when refugees are classified as such, they have limited choice in the resettlement process; the UNHCR decides whether a case is vulnerable enough for resettlement. Vulnerability criteria can include medical needs, women and children at risk, and survivors of violence. While the UNHCR estimates that 8% of refugees require resettlement, less than 1% of the world's refugees are ever resettled (UNHCR, 2019). In the case of Bhutanese-Nepali refugees, who were forced to flee ethnic persecution in Bhutan in the 1970s and 80s, some stayed in UN refugee camps in Nepal for up to twenty years until resettlement opportunities were offered.

Bhutan's Citizenship Acts of 1977 and 1985 denationalized more than 100,000 ethnic Nepali Bhutanese citizens, most of whose families had immigrated to southern Bhutan in the early 1800s (Hutt, 2005). The Dzongkha speaking Buddhist government's "one nation, one people" policy created oppressive environments for the Nepali speaking Hindu population, about one-sixth of Bhutan's population (Hutt, 2005). In 1992, Bhutanese-Nepali families fled Bhutan through India, where they were not allowed to set up permanent camps, and then resettled in UN refugee camps in Nepal (Shrestha, 2011). About 107,000 Bhutanese-Nepali refugees lived in seven UN refugee camps for more than a decade. The governments of India and Nepal refused to grant civil rights to Bhutanese refugees; Nepal did not accord citizenship to children born in refugee camps. Then in 2005, the governments of the US, Australia, Canada, and Norway offered resettlement opportunities. By 2015, over 100,000 refugees were resettled in seven countries, with 84,800 resettled in the US (Shrestha, 2015).

For the last decade, Bhutanese-Nepali refugees were the top represented ethnic group who entered Vermont (Pew, 2017). From 1987 to 2017, close to 7,000 refugees have been resettled in Vermont, most of them in Chittenden County, where 26% of the state's population resides (Bose, 2018). Vermont has a population that is 95% Caucasian with almost zero recent population growth (Bose, 2018). In Vermont, employment, childcare, medical care, and transportation can all become challenges for refugees (Bose, 2013). While harsh climates, sparse population, and lack of infrastructure contribute to general transportation inadequacies, transportation issues lead to increased feelings of

precariousness and instability for immigrant communities (Bose, 2013). Since 2012, Vermont's community of about 2,500 Bhutanese-Nepali refugees has suffered four suicides, which have alarmed community organizations and the refugee community (Sari, 2018).

When refugees are referred to the US, case information is sent to one of nine Resettlement Support Centers (RSC), funded and managed by the US Department of State (DOS). In a process that can take up to two years, the US Department of State, RSCs, and non-US-based nonprofit agencies will screen cases and place refugees based on economic, social, political, and cultural resources. Upon arrival to the US, refugees have legal work authorization and are encouraged to start working as soon as possible. After one year of residency, refugees must apply for permanent residency, and after five years of residency, refugees are eligible to apply for citizenship or remain permanent residents. Refugees have to navigate employment, housing, education, healthcare, citizenship, social relationships, and cultural differences (Ager & Strang, 2008). Organizations working with refugee communities in the Chittenden County area include the Vermont State Refugee Coordinator, US Committee for Refugees and Immigrants (USCRI), Association for Africans Living in Vermont (AALV), Somali Bantu Community Association of Vermont, Vermont Bhutanese Association, and more. Studies of resettlement agencies show that while most organizations aim to provide holistic care, they have to choose which goals to focus on: transition burden, language and employment acquisition, and/or resilience training (Dubus, 2018). While governments

and nonprofits provide resettled refugees with some resources, most of the work of adapting to new spaces falls on the refugees themselves.

Refugees and Placemaking

While refugees are undoubtedly displaced, they can also be emplaced peoples who bring their historical sense of place to new spaces (Jean, 2015). In this thesis, I focus on an actor-oriented perspective of how Bhutanese-Nepali refugees enact agency and choice to make place in Vermont (Sen, 1999). People produce places through their social activities to make decisions on their identity, social networks, and cultural expression (Turton 2006; Jean, 2015). Displaced people intentionally and laboriously transform new spaces with their histories, experiences, knowledge, and values (Jean, 2015).

The binary distinction that is drawn between displacement and emplacement can mask the fact that these two processes are fluid and interconnected (Peña, 2006). Ethnographic evidence has shown that sense of place takes labor and commitment (Turton, 2006). Studies of place are limited by incommensurable evidence from anecdotes, ethnographies, or autobiographical narratives (Peña, 2006). To go beyond anecdotal evidence, this study seeks to provide empirical evidence of the interplay between displacement and emplacement in placemaking theory. Peña (2006) describes how people from farming backgrounds form material connections to land and water through irrigation, cultivating, and constructing landscapes, and seed saving. Gardening and farming can be an opportunity for refugees to apply skills and traditions from their backgrounds (Harris et al., 2014) and access nutritional and culturally relevant food

(Eggert et al., 2015; Hartwig & Mason, 2016). In addition, gardening can be a source of exercise and income (Jean, 2015). There are also psychological benefits such as links to former expertise and way of life and expression of culture (Jean, 2015). Being able to tend the soil and grow culturally relevant food can "promote psychological healing, self-sufficiency, community engagement, and a return of human dignity" (Gerber et al., 2017, p.19). Beavers et al. (2019) found that Bhutanese-Nepali gardeners felt pride and accomplishment in growing and preserving food for winter.

For displaced peoples, gardening with culturally relevant seeds can be a form of place attachment that connects new environments with symbols (plants) from home environments (Brook, 2003). Plants establish a living connection, making a more profound socio-cultural experience (Brook, 2003). This form of placemaking removes the foreignness of a new place by providing links with cultural activities from the past (Hughes, 2019). Placemaking is the labor of constructing a landscape to continue with a similar lifestyle and learn to be familiar with new aspects of an environment (Jean, 2015). Gardens can provide resources for displaced peoples to connect "biophysically and symbolically" to their home communities and to have more agency over economics and ecological factors in their lives (Peña, 2006). Symbolic and material bridges between ideas, experiences, and lands help turn spaces into places (Sampson and Gifford, 2010).

Gardening can provide a collective identity that fosters social connectedness that is tied to placemaking (Gerber et al., 2017; Harris et al., 2014). For example, Bhutanese-Nepali gardeners were found to report significantly more social support than refugees

who did not garden (Gerber et al., 2017). A cross-sectional study of African refugees in a community food garden in Australia showed that gardens provided opportunities for vulnerable and marginalized communities to build social connectedness (Harris et al., 2014). Sharing seeds, produce, knowledge, and labor provided opportunities for marginalized communities to build trust and reciprocity (Harris et al., 2014). In a case study in Virginia, a community garden became a community coalition project amongst resettlement agencies, master gardening associations, and urban homesteading organizations (Eggert et al., 2015), showing that community gardens can be as much about community as they are about gardening. Hughes (2019) notes that connections around food networks and support can create pathways for community formation and resiliency. Placemaking can be facilitated by "the capacity of networks to enhance community" (Hughes, 2019, p. 292). Placemaking is essential for group identity formation and community building. The social networks can also help distribute knowledge and materials critical for homeland symbols. Social networks can bond Bhutanese-Nepali farmers to others within their community but also create bridges to the wider community, perhaps connecting them to power and decision making centers (Elliot and Yusuf, 2014).

CHAPTER 3: METHODOLOGY

Researcher Positionality

My research design process followed an ongoing cycle of forming relationships, developing research questions, and conducting research that Creswell (1998) describes as key to qualitative research. In fall 2018, when introduced to Dan Tobin's seed systems in Vermont project, I was mostly concerned about what data collection methods that I wanted to use in my thesis: interviews, surveys, GIS, etc. I wanted to gather data in a way that was interesting to me and would hone the research skills that I would want to practice later in my career. However, as Creswell (2007) and my advisor Dan Tobin described, research design starts with a set of research questions. Now, it was hard for me to formulate research questions as a person unfamiliar with both Burlington, Vermont, and the refugee community there. To help formulate research questions, I sought to gather background information on the refugee community.

My advisor and I also met with Alisha Laramée, of New Farms for New Americans, to discuss the possibilities of non-extractive research that could produce something of relevance to the New American farming community. Alisha, being the only part-time employed staff member, was wary of what the project would add to her plate. As Stake (1995) suggests, hosting can be a tiresome burden, especially when the benefits of research seem removed from the present. There are many research groups, especially from the University of Vermont, that seek to research refugees. Thus, to provide reciprocity, during winter 2018-19, I helped design and facilitate a curriculum for

greenhouse workshops with NFNA. I developed relationships with New American Farmers and interpreters, attended community garden meetings, and had conversations about seeds with the participants of the workshops.

Then, the population focus of my study shifted from Bhutanese, Nepali, and Burundian farmers to only Bhutanese farmers. This shift reflects my learning process concerning refugees from Bhutan who are ethnically Nepali. I knew very little about the historic and cultural factors behind refugee resettlement. At first, I mainly focused on my knowledge of seed systems and common Asian and African vegetables. However, I realized that I need to have an understanding of what the people I was interviewing went through. Conversations with the interpreters I worked with were essential in conducting sensitive research, even if it meant removing some questions from my research guide. Brook's (2003) article on refugees and their urge to garden was among the first that I read, and I found it particularly compelling. However, I did not use it for my theoretical framework until after conducting interviews and realizing that the trends in the data strongly fit into the placemaking framework. I had trouble with the practice of ascribing a theory to peoples' lives and practices. Do gardeners feel like they have choice and power themselves?

Integral to the research design was my relationship with NFNA projects and interpreters. Through conversations with AALV interpreters, I gained a better understanding of the Bhutanese-Nepali farming community. Involvement in the NFNA community allowed me to be both reflexive and transparent regarding my intentions,

identity, and actions. Since quality control on reflexivity is hard to manage (Boyce & Chouinard, 2017), I sought to ensure researcher responsibility with Trainor & Bal's (2014) culturally responsive research rubric. I participated in a dynamic and dialogical analysis of participants' backgrounds and cultures, which led me to focus on former Bhutanese refugees (as opposed to Burundian and Nepali refugees as well). I also wrote descriptions of my time spent in the gardens, AALV offices, and greenhouses. Stark (1995) writes that expertise in gathering qualitative data and recognizing valuable sources and performing robust interpretations comes from continued self-reflexivity.

Lastly, I recognize that academia has voluntarily and involuntarily suppressed, displaced, and eliminated diverse ways of knowledge making (Gone, 2018). This research hopes to promote humble, respectful, long-term knowledge sharing in forms outside of academia. In presenting this research in its current state as a master's thesis, I hope to not devalue or marginalize other forms of knowledge not represented in academia (Gone, 2018).

Research design: Case study

This research project was designed as a case study of Bhutanese-Nepali farmers in Vermont, using semi-structured interviews to understand values and priorities in seed access and sharing (Stake, 2003). Ontologically, this study sees data not as a representation of some external reality but as providing insight into individual experiences of the world. Thus, a case study allows me to focus on one specific case that is a bounded, integrated system with patterned behaviors (Stake, 2003). I bounded my

case study by focusing on Bhutanese-Nepali refugees who garden through Winooski Community Gardens and NFNA. A case study is a methodological approach that seeks to gather detailed and in-depth information (Berg, 1998). Both qualitative and quantitative methods are used in case studies, ranging from participant observations, interviews, life histories, diaries, to photographs. The case study approach makes it possible to explore new ideas and hypotheses that can be further researched.

Stake (2003) writes that case studies are useful for refining theories and identifying other areas of interesting research. If we take Berg's (1998) view that few human behaviors are "unique, idiosyncratic, and spontaneous," then case studies can provide explanations for why other similar communities are involved in certain behaviors (Berg, 1998, p. 218). Since there is no previous research that combines placemaking theory, seed systems, and Bhutanese-Nepali farmers, this case study design will further explore those areas. However, I recognize that one case study can contain a myriad of different answers and offer many and perhaps conflicting directions for future research (Stake, 2003).

Site Selection

Vermont's community of about 2,500 Bhutanese-Nepali refugees mostly live in Chittenden County (VPR, 2018; Bose, 2018). I focused on two community garden programs: New Farms for New Americans (NFNA) in Burlington and Winooski Community Gardens in Winooski. NFNA was started in 2008 and works to connect refugees with the means to produce culturally relevant food. NFNA was chosen because

it provides services to refugees and immigrants specifically. NFNA operates a small plot of land at the Ethan Allen Homestead in Burlington that provides garden plots to 250 refugee and immigrant farmers. NFNA also offers greenhouse space and free education workshops and supplies. On the other side of the Winooski River, Winooski Community Gardens includes five locations in Winooski, including the O'Brien Community Center gardens which are located down the hill from a popular Nepali corner store in Winooski. Other locations in Winooski include the O'Brien Community Center Greenhouse, Landry Park, West Street, and Winooski Senior Center. Winooski Community Gardens were chosen because many Bhutanese-Nepali refugees reside in Winooski and garden in those sites.

Population and sample

This study focuses on the population of Bhutanese-Nepali gardeners who participate in New Farms for New Americans (NFNA) in Burlington and Winooski Community Gardens. As the largest refugee group resettled in Vermont, Bhutanese-Nepali refugees make up the majority of refugee gardeners who farm through NFNA, a program specifically for refugees and immigrants, and Winooski Community Gardens, a city program open to any resident of Winooski, were chosen to facilitate comparisons across the experiences based on program structure. Because NFNA and Winooski Community Gardens share similar social, environmental, and cultural conditions, we predict this sampling will illuminate the differences in seed practices. Because this study seeks to apply placemaking theory, it is beneficial to study two different spaces to

compare the relationship between seed saving and placemaking. I used purposeful sampling, relying on the community knowledge of interpreters (Creswell, 1998). A random sampling frame was not used in this study because it is not standard for use in case studies and it would have posed difficulties in accessing interviewees in refugee populations (Temple and Moran, 2006). I sought a purposeful sample based on engagement in gardens and seed saving. Because interpreters were longtime community members, they knew people who had interesting and rich perspectives regarding seed saving, meaning they selected key informants (Ritchie et al., 2013).

The sample for this study includes 15 Bhutanese farmers from NFNA and 15 Bhutanese farmers from Winooski Community Gardens. My sample size of 30 interviewees was chosen to help reach saturation in a small population. Creswell (1998) recommends between five and twenty-five interviews for a case study. Guest et al. (2006) documents that in-depth interview saturation occurs between six to 12 interviews for non-probabilistic and purposive sample sizes. However, saturation depends on the complexity of data, researcher experience, and timing, and the number of data analysts available for the study (Ryan and Bernard, 2004). Also, Guest et al. (2006) remind readers that sample size and number of different subgroups are dependent on what we want to do with our research. Sampling, instead of a census, was used because it was not within the scope of this master's project to access and conduct in-depth interviews with all the members of the population (Ritchie et al., 2013). There are an estimated 2,500

Bhutanese-Nepali refugees in Chittenden County (Sari, 2018) and community leaders estimate that upwards of 10 percent of them participate in some kind of gardening.

Participants needed to be Bhutanese-Nepali refugees, older than 18 years of age, and US citizens or permanent residents. While legal status was not a sampling criterion due to methodology, the choice was made because the University of Vermont interview reimbursements process would require additional documentation from respondents with other legal statuses. However, most former Bhutanese refugees in Vermont are either US citizens or permanent residents regardless.

Instrumentation

Semi-structured interviews based on an interview guide with input from academics, community members, and key informants were conducted. A panel of experts (a rural sociologist, anthropologist, network analyst, and plant geneticist) helped shape the interview questions to reflect the research questions. The final interview guide consisted of 15 open-ended main questions, ten sub-questions, and multiple prompts. The major themes covered seed practices, seed access, and seed values in Bhutan, Nepal, and the US. Questions focused on identifying similarities and differences in growing, saving, and accessing seeds in different places. Seven demographic questions were asked at the end.

The interview guide (Appendix B) was revised several times after three rounds of pilot interviews in English, Mandarin, and Kiswahili, with ten pilots in total. In February 2019, I conducted three pilot interviews with gardeners who were engaged in seed saving

and sharing in Hawai`i and Maine. I transcribed, coded, and analyzed them as part of EDFS Foundations: Writing, and Evaluating Qualitative Research. In April 2019, I conducted three pilot phone interviews in Mandarin and English. My interviewees were family friends who had immigrated from China, Taiwan, and Hong Kong and participate in seed sharing, saving, and planting. In July 2019, I translated my interview guide into Kiswahili and conducted four more pilot interviews in Kiswahili as part of a language program at MS-TCDC, a school in Tanzania.

I had opportunities to pilot my interview guide in different contexts. I wanted to make sure I was comfortable with the content, organization, and flow of my questions. This round of pilot interviews in Mandarin showed how meanings are lost in translation. To navigate challenges with translation, I rethought ways to ask about values in particular. After this, I sharpened the language and shortened the length of the interview guide considerably. Additionally, I was curious to understand more about seed systems in different contexts and practice my language skills. There were preliminary findings of seed access and source and value, which led to the revision of research questions and interview guide. Based on pilot interviews and continued engagement with the refugee community, I edited my interview guide to reflect the topics that farmers seemed interested in discussing, such as home practices.

As people told me stories of what they grew, I realized that these stories were more meaningful than the list of vegetables and fruits they plant. Thus, I made a conscious effort to ask people about the cycle of planting, harvesting, processing, and

saving seeds. I found myself trying to understand the wider implications of what it means for people to value certain seeds and have access to them. While seeds are vital inputs in agriculture, I am more interested in studying the roles that seeds can play in people's lives. Respondents liked picking a particular plant to talk about--they did not think about all the crops and seeds in their garden in the same way. Thus, my interview guide shifted to begin each interview by asking respondents about favorite plants for home consumption or the crop they grew first.

Data collection

The Office for Research Protections approved the research instruments (IRB #STUDY00000144: New American Farmers) on March 22, 2019.

Professional AALV interpreters were key informants and participant recruiters (Berryman et al., 2013). Interpreters with existing relationships with farmers at New Farms for New Americans helped served as bridges, not only for language but for differences in cultural values between me and the interviewees. One of the benefits of working with interpreters who are close members of a small community was that it allowed me to enter into a research space as an outsider with a trusted liaison. However, the limitations of working within a small community are that people might feel pressured to participate in interviews, because a leader in their community is asking them to do so. I attempted to mitigate this risk by communicating to my interpreters to only pursue interviewees who seemed interested in participating and by communicating to interview subjects that they could stop the interview at anytime. I worked with two different

interpreters, both of who were trusted women with families in the community.

Interpreters recruited participants through purposive sampling.

In Summer 2019, I conducted five interviews in the home of one interpreter in Winooski. She helped recruit participants in Winooski, a community in which she had many family ties. In Fall 2019, I worked with a case manager who is a trusted leader in the Bhutanese community of Chittenden County. This case manager has worked with the community for ten years and says that everyone knows her. In Fall 2019, we conducted interviews at the NFNA gardens and in peoples' homes in Winooski and Burlington. All interviewees were informed of study contents, signed informed consent, received \$30 cash as incentives, and filled out payment forms. Interviews ranged from 30 to 70 minutes long. Interviews were recorded and transcribed verbatim through Speech Pad transcription service. I also received peoples' permissions to take pictures of their crops, harvests, and seeds. These pictures were shared with NFNA, AALV, and Winooski Community Gardens.

Data Analysis

Data analysis relied on my insight and impression regarding the Bhutanese community and their seed saving and sharing practices through community engagement and the interview process (Dey, 1995). After organizing the interview transcripts with NVivo v. 12, I read through each transcript in their entirety to reintegrate myself back into the interviews (Agar, 1980). I began by highlighting key findings and quotes on

printed transcripts was particularly helpful. To further summarize my ideas, I wrote questions in the margins of the transcripts (Creswell, 2007).

I also read over my analytic memos that I wrote after each data collection period. I journaled after each interview session, describing emergent themes that I noticed. I also noted questions that people did not seem to understand and inconsistencies within interviews. I also commented on my concerns regarding community partnerships and the questions that people asked me about my research after interviews. I also noted how personal relationships with interpreters evolved throughout the interview sessions and how research respondents acted around the interpreters. These notes on data collection ultimately helped guide me through data analysis by reintegrating me back into the data.

Then to identify codes, I followed Madison's (2005) method of concrete coding in which I open coded transcripts in Nvivo. Saldana's (2017) coding guidebook helped guide my values coding seeking to reflect participants' values, beliefs, and feelings. Reflecting on the collective interpretation of these coded units, I used categories to identify general themes. From this preliminary analysis, I developed a shortlist that contained nine codes. I then added codes as they emerged in the data. While reading the transcript portions highlighted under the codes, I combined codes and organized sub-codes. I found that through this organization, I could find different perspectives on each research question (Creswell, 2007).

Furthermore, I assessed the frequencies of code occurrence to see if some codes with only a few data points could be explained differently or combined as a subgroup in

different codes (Saldana, 2017). I also used the process of coding emergent categories (Saldana, 2017), in which descriptive labels represented information I expected to find and information I was surprised to find.

After developing codes, I classified codes to form general themes by noting patterns (Miles et al., 1994) and identifying patterned regularities (Wolcott, 1994). I looked for experiences, actions, and cultural themes, along with contradictions and exclusions (Creswell, 2007). Before I finalize a coding framework, my adviser separately coded five interviews using my current coding to compare results and ensure consistency. The comparison of coding frameworks using intercoder reliability suggested the coding was consistent between researchers. Throughout this process of data analysis, I presented the progress and findings of this research at student and professional research conferences in sociology, development, and agriculture fields. I also presented and introduced this research at community events in Vermont, such as the Greensboro Free Library Community Talks, Fletcher Free Library Seed Swap, and Vermont Community Garden Network Garden Coordinator Meeting. Communicating preliminary research findings with refugee communities helped encouraged reflexivity on the physical, sociocultural, and historical relations of the research context (Trainor & Bal, 2014).

Limitations

The limitations of a case study are that the findings are "indeterminate, relative and time and context-bound" (Lincoln & Guba, 2002, p.32). The ability to generalize findings from a case study would depend on additional research. Furthermore, a case

study cannot provide causal explanations for events, nor does it negate other explanations of the same phenomenon. In this case study, predictions and theories might only be appropriate in context-dependent situations (VanWynsberghe & Khan, 2007).

The sample of this study is a limitation in its ability to cover variations in ethnic groups, age, education, and income. The data do not provide adequate reason for how these demographics and socioeconomic factors affect peoples' ability, willingness, and pathways for placemaking. For example, I am not able to compare how ethnicity affects seed access, values, and norms. Rather, I am only able to explain what happens among this purposeful sample in the Bhutanese-Nepali refugee gardening population. Research shows ethnicity is related to customs of sharing seeds and information and food and crop values, which affect what specific crop needs that farmers face (Ritchie et al., 2013). Furthermore, NFNA educational workshops recruit based on language due to efficiency regarding interpretation and that crop and culinary preferences are highly cultural. This research is not able to specifically understand how well community partners address the needs of different ethnicities. Future research may conduct various case studies of other ethnicities of refugee gardeners to see if the findings from this study are widely shared within refugee groups.

With data analysis, I believe there could have been a more in-depth view of the differences between genders. Although the sample purposefully had an equal distribution of genders, data analysis did not uncover patterned differences between the seed system practices of men and women. Since literature shows that women and men often have

different values, access, and norms related to seeds, I expected to find some difference between men and women. However, during data analysis, no obvious pattern or trend was evident to me; i.e., from the interview data available, I did not gather enough evidence to form a conclusion (Fisher & Carr, 2015). Further studies using larger sample sizes might identify more general trends amongst refugee women gardeners.

**CHAPTER 4: THE SOCIAL LIFE OF SEEDS:
A CASE STUDY OF BHUTANESE-NEPALI SEED SYSTEMS**

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Conflicts of Interest

The authors declare no conflicts of interest.

Data availability

Interview data were shared with AALV.

Abstract

The COVID-19 pandemic has highlighted the importance of seeds as many Americans sought to grow home gardens for food security. However, in the United States, the presumed dominance of commercially produced seeds has limited research on the diversity of all the seed systems in existence, especially informal systems and their social and emergent natures. In this article, we present a case study of Bhutanese-Nepali gardeners in Chittenden County, Vermont. Bhutanese-Nepali gardeners construct seed systems that engage both informal and formal channels, engaging in placemaking. Seed systems are emergent and diverse and understanding the social components that bring seed systems that link the formal and informal are needed. This study seeks to describe the social components of the seed systems that Bhutanese-Nepali refugee gardeners use, with a specific focus on 1) the transactions through which Bhutanese-Nepali gardeners obtain seeds and plant starts, 2) the sharing and selection of seeds among family, friends, strangers, and community organizations, and 3) the flows of information and knowledge about seed saving, seed access, and seed selection. To provide context, we first describe key components of formal and informal seed systems: seed access, knowledge and information channels, decision making, preferences, and values. Then we briefly describe the background of the Bhutanese-Nepali refugee crisis and the seed systems prominent in Bhutan, Nepal, and the US, before presenting findings from 30 semi-structured interviews with Bhutanese-Nepali gardeners. We find that Bhutanese-Nepali gardeners take the parts of the formal seed system that work for them and incorporate the informal seed practices that were common in their homelands. The trends observed underscore that seed systems are social and emergent, and incorporate both formal and informal aspects.

Keywords: seed systems, social relations, networks, refugee gardeners

Introduction

During the COVID-19 pandemic, seed companies reported remarkable increases in sales of vegetable seeds as Americans sought to grow home gardens for food security (Robinson, 2020). Horticulturally-focused seed companies, like Renee's Seeds, Johnny's Selected Seeds, High Mowing Seeds, and Burpee, experienced increased customer interest in easy to grow, nutritious garden crops, such as beans and dark leafy greens (Yu, 2020). This trend of panic buying seeds during economic stress is not isolated; in the US, seed companies saw rises in demand with fears of food shortages during the 1987 stock market crash, the dotcom bubble burst in 1990, and the 2008 recession (Higgins, 2020; Pierre-Louis, 2020; Yu, 2020). The ability to grow preferred crops, many of which might be uncommon in local stores and gardens, depends on access to seed varieties. Physically, seeds are essential to producing crops, but symbolically, seeds can provide access to culturally relevant foods, food security, and economic opportunity (FAO, 2018).

While news outlets like the New York Times, BBC, NPR, and Washington Post covered the increase in seed sales during the pandemic, little attention has been paid to the non-market interactions that happen around seeds, especially in the US. This lack of attention holds outside the COVID-19 context and within scholarship as well. In the US, a place where commercial seeds occupy a strong market, existing research has yet to capture the diversity of seed systems, which includes the host of market and non-market practices “that govern farmers’ access to and use of seeds, and of the genetic resources held therein” (Lipper et al., 2010, p. 5). In this study, we define informal seed systems as

institutions that are unregulated by formal entities and include farmer-saved seeds, seed sharing, and bartering, and informal market sales. On the other hand, the formal seed system revolves around seeds with uniform physical, physiological, and sanitary traits.

With high rates of immigration and refugee resettlement, the US is a country with an influx of different food cultures and agricultural backgrounds. Many refugee farmers transition from communities where informal seed systems are the norm into a new place where formal seed systems predominate (cite). With resettled refugees, displacement makes their seed systems particularly interesting to study as they move away from their homelands and social networks; geography and social relations are key factors in seed access and exchange (Tadesse et al., 2016; Thiele, 1999). Thus, refugee gardeners provide an opportunity to explore if and how informal seed systems exist in the US and interact with formal seed systems. There is evidence that rather than assimilating into existing agricultural systems of the US, refugees enact agency and choice to build practices that best work for them (Brook, 2003). The seed systems they form may reveal important lessons in agricultural resilience, especially after crisis and displacement.

In this article, we present a case study of the seed systems of Bhutanese-Nepali gardeners in Chittenden County, Vermont. Bhutanese-Nepali refugees are the largest group of refugees resettled in Vermont (about 2,500 people). They have been forcibly displaced from their homelands, subjected to trauma in refugee camps, and resettled in the US involuntarily (Gerber et al., 2017). Moving to Vermont, with its long winters, rocky soils, and different culture was a major form of culture shock for Bhutanese-Nepali

refugees. Many Bhutanese-Nepali refugees come from subsistence family farming backgrounds with long histories of self-saved seeds, and many garden and farm in Vermont, either in their backyards or with community organizations. Bhutanese-Nepali gardeners come from predominately informal seed systems in Bhutan and engage formal seed systems while introducing informal components to build new seed systems. Below we describe two research gaps that this study seeks to address.

First, most seed systems research has focused on the Global South, where subsistence farmers have traditionally relied on informal seed systems (Thiele, 1999). Informal systems, involving farmer-managed saved seeds that are traded, gifted, bartered, sold, and bought in local interactions, also exist in the United States, a place where the formal system is thought to predominate (Gill et al., 2013; McGuire & Sperling, 2016; Song et al., 2019). However, conceptual knowledge of informal seed systems in the US has not been operationalized. Thus, this study seeks to understand if informal seed systems exist in the US and how these systems function. To do so, we must understand that seed systems are social, and socioeconomic factors affect seed access, use, preferences, and networks (Sperling & Cooper, 2003). Therefore, we pay special attention to the social elements that govern peoples' interactions in forming their seed systems.

Second, a more in-depth understanding of the interplay between the formal and informal seed systems is needed to strengthen seed systems, especially during and after a crisis. Research shows that farmers who primarily rely on informal seed systems

commonly engage in formal systems to replenish their supply, replace seeds, and experiment with new varieties (Thiele, 1999). Despite the evidence that leveraging the respective strengths of both systems can better serve farmers (Almekinders et al., 1994; Gill et al., 2013; Thiele, 1999), development initiatives still heavily focus on formal seed systems, which breeds, manages, sells, and distributes seeds with uniform physical, physiological, and sanitary traits. Research often misses the interplay between formal and informal seed systems to describe the hybrid nature of transactions and relationships within the buying, selling, trading, sharing, and saving of seeds (Sperling & Cooper, 2003).

In this paper, we seek to address both of these gaps through a case study of Bhutanese-Nepali refugees in Vermont and the social components of their seed systems. We explore how Bhutanese-Nepali refugees interact with seeds and seed systems. This study seeks to describe the social components of the seed systems that Bhutanese-Nepali refugee gardeners use, with a specific focus on (1) the transactions through which Bhutanese-Nepali gardeners obtain seeds and plant starts, (2) the sharing and selection of seeds among family, friends, strangers, and community organizations, and (3) the flows of information and knowledge about seed saving, seed access, and seed selection. The following literature review highlights the background of formal and informal seed systems with a special focus on social interactions.

Literature Review of Social Interactions Within Seed Systems

Formal Seed Systems

The formal seed system revolves around institutions that provide seeds with uniform physical, physiological, and sanitary traits. In the formal system, seed research, breeding, and distribution is performed by a diverse range of entities, including billion-dollar agrochemical companies, organic seed companies, land-grant universities, and international and national agricultural research centers (Bonny, 2017). For example, Bayer houses the seed powerhouse Monsanto, which produces a vast amount of the world's Genetic Modified (GM) seeds. High Mowing Seeds, in comparison, is a Vermont company that focuses on organic, non-GM varieties, some sourced from regional seed farmers (Helicke, 2015). Although both companies treat seeds as commodities, Monsanto enacts stringent IPR and patent rights while High Mowing supports the Open Seed Source Initiative, in which breeders openly share their new varieties (Kloppenborg, 2010).

Prior to the 1980s, major players in the formal seed system were land grant universities and International Agricultural Research Centers and National Agricultural Research Center that were encouraged to develop improved varieties for the public. They were public entities part of a centralized process that focused on genetic uniformity. A major product of the public entity supported formal seed system was the Green Revolution (Fernandez-Cornejo, 2004). As this model focused on agricultural input intensification and top-down transfer of technology, the Green Revolution successfully facilitated the increased yield and production of maize and rice (Evenson & Gollin,

2003). However, it also intensified social stratification in many regions in Latin America and South Asia (Chambers & Jiggins, 1987). The success of the modern varieties was uneven across geographic regions and crop varieties (Shiva, 2016). These breeding efforts did not reach resource-poor farmers and left environmental and social consequences that have yet to be addressed (Brainerd & Menon, 2014; Pingali, 2012).

When US federal regulations protected breeders' research costs and enacted intellectual property rights (IPR), the institutional framework was established to encourage private companies to invest in agricultural research and development (Fernandez-Cornejo, 2004). As investment for public agricultural research and development in developing countries decreased, the research, production, and diffusion of seeds became and stayed privatized and commercialized (Jones, 2014). International agricultural development followed the rise of neoliberalism; seeds were regarded as private, not public goods (Kloppenborg, 2010). The (now) three big agrochemical companies, Bayer (\$66 billion), DowDuPont (\$130 billion), and ChemChina/Syngenta (\$43 billion), have shaped agricultural paths. In the past 40 years, monopolistic control and consolidation in the seed and agrochemical industry has been linked to increasing seed prices (Ciliberto, 2016; Howard, 2015), limiting legal power of farmers (Kloppenborg, 2010), narrowing research to hybrid and GMO varieties that have the highest potential market value (Welsh & Glenna, 2006), and directing public universities' universities' agricultural research towards profits (Welsh et al., 2008).

The modern formal seed system expanded with the success of hybrid breeding and then genetic modification of uniform and identifiable crops and the enforcement of plant patents (Ciliberto, 2016). Researchers and activists have argued that the regulations and patents surrounding seeds in the formal system represent the financial interests of breeders, corporations, and commercial farmers, not smallholder farmers or home gardeners (Deppe, 2000; Shiva, 2016). Social relations are dictated by legal institutions and market transactions, including non-profit research organizations and for-profit agrochemical companies. Transactions in the formal system require cash payments and knowledge of stores, merchants, or government distributors. In the formal seed system, socioeconomic factors, such as access to cash and agricultural inputs, greatly affect how farmers engage. In addition, the type, price, location, and availability of seed all affects who participates in the formal seed system and why. In Rwanda, studies showed that poorer farmers source their bean seeds from markets out of necessity while richer farmers accessed market seeds for occasional varietal experimentation (CIAT, 1991). Sperling and McGuire (2010) write that farmers engage in markets for seeds either for specific instances or habitually and those times can be driven by reactive or proactive choices.

The formal seed system is constructed by legal institutions, market transactions, non-profit research organizations, for-profit agrochemical companies, governments, and research institutions. How these different entities govern both the market and non-market institutions around seeds determines the social impact. For example, the Indonesian government regulates and provides certified and uniform rice paddy seeds to farmers

through businesses. However, the lack of cooperation between the contracted businesses and insufficient government supervision has limited the ability of the formal seed system to provide quality paddy seeds that best suit farmers' needs (Firdaus et al., 2020). As a result, quality paddy seeds are not available for all farmers in this state-run system (Firdaus et al., 2020). Firdaus et al. (2020) suggested that the supply of quality paddy seeds needs to utilize that strengths of farmers' existing informal seed channels, which include preferred local seed and social capital.

Informal Seed Systems

Informal seed systems have been defined as anything the formal system is not (Richards et al., 2009). These farmer-managed systems can involve gifting, trading, buying, selling, and storing farmer-saved seeds (Aguirre et al., 1997; Gill et al., 2013; Song et al., 2019). Farmers manage sanitation, variety purity, and storage of seeds themselves, resulting in variable seed quality (Maredia et al., 2019). Without regulatory standards, informal seed systems may also circulate low quality seeds (Thiele, 1999). However, there is also evidence that informal systems contain important knowledge and genetic diversity, especially in regard to locally preferred varieties (Otieno et al., 2017). In Kenya, Croft et al. (2017) found that the informal system of seeds provided higher quality African Leafy Vegetables and thus better served the needs of farmers (Croft et al., 2017).

Research has shown that the intersections of gender, age, income, marital status, and religion can affect who participates and the type of transactions in seed systems

(Fisher & Carr, 2015). In Peru and the US, Sachs et al. (1997) found that women had a major role in seed saving, sharing seeds, and establishing and maintaining social connections. Also, gendered differences in seed practices were observed in Ethiopia; Beshir et al. (2019) reported that seed selection and sourcing were mainly done by men while the processing, cooking, storing, and marketing of grains and seeds was performed by women. In addition, seed networks have been shown to stay within ethnic community circles and also extend those social connections. In Southwest China, the Yi ethnic minority group tended to share seeds within the Yi community (Song et al., 2019). In the Southern U.S, Vietnamese gardeners also tended to share seeds and plant cuttings within the Vietnamese community, but these networks also reached across states and countries (Rhoades, 2013). Also in Ethiopia, Tadesse et al. (2016) found that the flow of seeds between communities can be facilitated by new brides bringing seeds as gifts to their new communities. Likewise, in Costa Rica, Aistara (2011) found that organic farmers often shared seeds within family and kin networks but sometimes mediated new social relationships to extend their seed networks.

Without standardization and labeling requirements, people who source seeds from the informal seed system rely on visual assessment of seeds and the reputation of seed sources. When selecting seeds, farmers will assess both the genetic and physical qualities of the seeds and the reputations and storage practices of the seed source (Song et al., 2019). Thiele (1999) found that farmers in Bolivia sell seeds on farms or in local fairs to demonstrate quality and maintain “community certification” as personal interactions are

the ways that farmers ensure they are receiving quality seeds (p. 87). With seed potatoes from farther regions, farmers relied on well-known traders with trusted reputations (Thiele, 1999). In the informal seed system, seed traders and sellers who hold social certifications, trusted people in the community, are possible disseminators of new seed varieties and seed information (Sperling & McGuire, 2010). Informal systems which rely on social alliances and family networks are based on mutual interdependence and trust (Badstue et al., 2007).

Much of the information about seeds is contained within these social networks. Information and knowledge about seeds is developed through teamwork, experimentation, and social endorsements (Buck & Hamilton, 2011; Coomes et al., 2015; Richards et al., 2009). Even in the United States, where formal seed systems dominate, there is evidence that informal systems are active. Farmers in the American South have been reported to pass down cultural heritage through heirloom seeds, preserving memories, tastes, and identity of past times (Best, 2013; Rhoades, 2013). Best (2013, p.128) writes that the seed saving and sharing practices can build and maintain important familial connections: “seeds are seen as a unifying and even uplifting force within a family, a way of keeping in touch with dispersed family members and honoring one’s lineage.” Studies of heritage seed saving organizations agree that seed saving can protect identity, territory, historical memory, and cultures (Carolan, 2007). Securing access to seed of the desired varieties and of good quality is important for farmers and concern for

society to achieve food security, and information channels are a main way of securing this access (Badstue et al., 2007).

Informal and formal systems do not operate in isolation but rather interact with one another (Thiele, 1999). Many studies have noted the possible benefits of the integration of formal and informal seed systems. Louwaars et al. (2012) argued an Integrated Seed Sector Development (ISSD) could integrate local knowledge and genetic diversity with agricultural advancements. For example, while the informal seed systems might lack advancements in seed technology like new, improved varieties, the formal seed system might also lack the knowledge about local growing conditions that the informal seed system holds (Almekinders, 2001). In the US, a place where commercial seeds have a strong market and account for a far greater percentage of seed use than informal sources, existing research fails to capture the diversity of the different market and nonmarket institutions that affect how farmers access, store, share, distribute, and learn about propagative materials (Lipper et al., 2010).

From previous research, we understand that seed systems are inherently social-family relations, community institutions, stores govern and facilitate the seed saving, access, trade, sharing, and movement that is essential in agriculture (Seboka & Deressa, 1999). In the formal and informal seed systems, there are mechanisms that can perpetuate social inequalities (Tadesse et al., 2016; Thiele, 1999). Since seed systems are socially constructed, they also carry the inequalities inherent in social structures. However, neither the intersection of formal and informal seed systems nor the social aspects

governing seed systems have not been well understood in the United States. In this paper, we present a case study of refugee seed systems, which shows a compelling story of gardeners who incorporate both formal and informal channels into their seed practices. We examine the richness of social interactions within seed systems. In particular, this study focuses on Bhutanese-Nepali refugees, the most populous group of refugees resettled in Vermont, and the seed systems they form.

Background on Bhutanese-Nepali Refugees

Bhutan's Citizenship Acts of 1977 and 1985 denationalized more than 100,000 ethnic Nepali Bhutanese citizens, most of whom were subsistence farmers whose families had immigrated to southern Bhutan in the early 1800s (Carolan, 2007). As Bhutanese-Nepali refugees fled violence and persecution, they took shelter in UN refugee camps in Nepal. Camp conditions were harsh- mental health, food security, nutrition, and sexual abuse were challenges (Mills et al., 2008). Over 100,000 refugees stayed in the camps for ten to twenty years, until the United Nations conducted one of its largest resettlement efforts with the help of eight resettlement countries (Shrestha, 2015). By 2015, 84,800 refugees resettled in the US and the others in seven other countries (Shrestha, 2015).

Trauma, migration, acculturation challenges has manifested in major mental health concerns; Bhutanese-Nepali refugees suffer from twice the suicide rate than the average in the US (Meyerhoff & Rohan, 2019). Although resettlement agencies aim to offer social, economic, and cultural opportunities, these resources cannot replace disrupted social networks. Older Bhutanese-Nepali refugees, including many in their

fifties, noted trouble with English language barriers, isolation and loneliness, and family separation (Gautam et al., 2018). Cultural shocks were experienced when refugees in their fifties were forced to rely on their children for help with English and other culture shock issues (Gautam et al., 2018). Some research has noted that the situation has also provided opportunities for mutual support. Research suggests that foreign environments can help facilitate social ties, as Bhutanese-Nepali women, who are particularly vulnerable to the effects of loss of social ties, provide informal care to each other and newly arrived refugees. These relationships can also facilitate knowledge sharing about resources and other support (Chase and Sapkota, 2017).

Bhutanese-Nepali refugees, like all refugees, navigate a loss, negotiation, and gain of social capital during and after resettlement. Different seed systems are among one of the many differences that Bhutanese-Nepali refugees may encounter during resettlement in the US. Although there is no specific information on the seed systems of Bhutanese-Nepali refugee communities in the US, people flee their homelands and so their seed systems are inevitably disrupted. As communities face violence and have no guarantee for peace, mutual seed support between people (sharing, credit, knowledge sharing) is disrupted (Richards and Sperling, 1999). While the formal seed system's distribution processes can regain their efficacy post crisis times, war torn areas can lose local varieties and knowledge of seeds (Richards and Sperling, 1999). Currently, there is limited research documenting how seed systems are built or rebuilt when crisis displaces people into new lands. To fill this gap, we examine the seed systems of Bhutanese-Nepali

refugees who have resettled in Chittenden County, Vermont. We focus particularly on the social elements of the seed systems Bhutanese-Nepali gardeners form.

Methods

Sample, Data Collection, and Analysis

This case study is based on 30 in-depth interviews with Bhutanese-Nepali gardeners in Chittenden County, VT. The majority of Vermont's community of about 2,500 Bhutanese-Nepali refugees live in Chittenden County, which is home to more than 163,000 residents and 25% of Vermont's population (Sari, 2020.; *US Census Bureau QuickFacts*, n.d.). In addition, Chittenden County houses the majority of Vermont's resettled refugee population, and about 9% of Chittenden's population is foreign-born, the highest percentage in Vermont (US Census Bureau QuickFacts, n.d.). We sampled participants from two community gardening organizations in Chittenden County: New Farms for New Americans (NFNA) in Burlington and Winooski Community Garden Network in Winooski. Burlington, the largest city in VT (population 40,000), and Winooski (population 7,000), a bordering town, are the first relocation sites for many refugees.

The first research site, NFNA, operates five acres at the Ethan Allen Homestead in Burlington. NFNA provides subsidized garden plots and greenhouse tables to an average of 250 farmers yearly, of whom over 86% are Bhutanese-Nepali. NFNA also hosts educational workshops, supplies, and informal farmer support. NFNA is housed within the Association of Africans Living in Vermont (AALV), a nonprofit refugee

service that provides social services, interpreter and translator services, legal services, and health and behavior programs to all resettled refugees and immigrants to Vermont. The second garden organization, Winooski Community Gardens, is located about four miles east of the NFNA's garden and is open to any Winooski resident. The Parks and Recreation Department of Winooski manages the five different garden sites, which offers garden beds ranging from 40 to 225 square feet each (*Catalog - City of Winooski, 2020*).

Purposeful sampling proceeded until saturation was achieved and interview data started to become repetitive with limited new information (Creswell, 2007). With the help of interpreters and AALV staff members, the first author conducted purposeful and convenience sampling, making interview appointments with interested gardeners. Participants were Bhutanese-Nepali refugees, older than 18 years old, and a US citizen or permanent resident. The semi-structured interviews were guided by a set of 15 open-ended main questions, ten sub-questions, and multiple prompts. Demographic questions were asked at the end (Table 1). A panel of experts (a rural sociologist, anthropologist, applied economist, plant geneticist, and NFNA program director) helped shape the interview questions for academic rigor and community cultural competence. The first author piloted interviews with seven individuals of a similar population to enhance credibility (Van Teijlingen & Hundley, 2001). The Office for Research Protections at the University of Vermont approved the study on March 22, 2019.

Table 1. Interview Demographics

Variable	Frequency	Percent
Age (n=30)		
18-24 years old	0	0.0
25-34 years old	5	16.7
35-44 years old	12	40.0
45-54 years old	8	36.7
55-64 years old	3	10
65-74 years old	0	0.0
75-84 years old	2	6.7
Gender (n=30)		
Women	15	50.0
Men	15	50.0
Year moved to the US (n=30)		
2008-2011	14	46.7
2012-2015	15	50.0
2016-2019	1	3.3

The interviews were recorded and transcribed verbatim through Speech Pad transcription service. Open codes were developed, combined, and organized in NVivo v. 12 (Saldaña, 2016). The codes were labeled, focusing on different parts of seed systems: access, saving, sharing, and knowledge. We also identified patterned regularities within those codes to develop into sub-nodes. We sought to answer our research questions from the different perspectives that surfaced from the data (Creswell, 2007).

In this paper, we use the term Bhutanese- Nepali refugee to refer to those who have Nepali heritage and identify with Nepali culture but had citizenship in Bhutan. The interviewees referred to themselves as Nepali; some consider Bhutan to be home and some consider Nepal their home. In the presentation of findings, interviewees are referred to in the way they self-identified.

Findings and Discussion

Bhutanese-Nepali seed systems are composed of 1) formal channels (Gardener's Supply, Lowe's, local grocery stores, farm stores, Walmart, Home Depot, and various Asian grocery stores) and 2) informal channels, such as self-saved seeds, family members, neighbors, community garden programs, seed swaps, and donations. In both formal and informal channels, social interactions proved essential in informing seed saving, sharing, and buying.

Formal Seed Sourcing

In this section, we first describe the motivations, processes, and limitations in formal seed system engagement. Bhutanese-Nepali gardeners engaged in the formal seed systems to access seeds for the first time, to replace seeds of plants that they were unable to save, and to experiment with different varieties. A young woman described finding a different variety of long bean: *"And we went to Intervale, Gardener's Supply... and we saw seeds there, the outside label. [And we said,] "Oh, okay. This is something that we grew in Nepal." And then we tried one time. At the time it was a red one. Purple or red long ones and that was really good. It was this long [motions 3 feet with hands], then next year we thought this will grow well here in this environment and then we started doing it every year. And then that has been really good."* While this interviewee utilized the formal seed system to find a desirable bean variety, other gardeners turn to the formal system to replenish their seed stock. The most common seeds that gardeners reported needing to purchase were onions, radishes, eggplants, cucumbers, and okra. A gardener

reflected on why he chose to buy seeds from stores after experiencing difficulties saving his own seeds: *“Radish and okra, so some home seeds like those do not grow well when you plant next time. So, we prefer not to save those and get them from the store. Okra, we tried once after having it in our own home so it didn't grow that well, and we stopped doing that. We decided not to save those, better get it from the store. We didn't even ask other gardeners, because [other people] are like us. And that might be the same product they have from their own garden. We prefer stores for those stuff.”* In this instance, the gardener relies on store bought seeds when self-saved seeds are not reliable and also when he suspects that it is probably not available in informal channels.

In stores, most Bhutanese-Nepali gardeners relied on pictures on seed packets and plant start labels to judge if the crop was suitable for them. For example, to find a suitable tomato variety, a gardener relied on the pictures on the seed packets: *“By looking at the picture in the packet, we'll see if they are small tomatoes or big tomatoes. We read if it's sour or sweet. And then we buy”*. Those who are able to read English also read the labels and descriptions for more information. During interviews, gardeners mentioned finding the days to maturity, temperature requirements, and sowing instructions on seed packets helpful. As gardeners searched for specific cultivars with certain flavors, textures, and appearance, gardeners go to multiple stores. A gardener reported going to multiple garden supply stores and farms: *“I shop around. If I don't find a good seed in one place, I go to another place and then another.”* In another example, a gardener tried bean varieties from both Gardener's Supply and Mazza Farm (a local farm store) until he found beans

with soft pods that were suitable for stir frying: *“I don’t like some of these beans because the skin is too tough after I cook it. But these beans, the one I grew by itself, turned out really well. We didn’t eat too many of them because we saved them for seed.”* He then saved the seeds from the variety that he preferred. The process of vetting seeds focuses on trying to grow the plant first and then seeing if it grows well and if the crop tastes good. Only the seeds that gardeners select and approve of remain in circulation in their seed systems.

Gardeners did not report any brand preference, but most gardeners had a few stores from which they would buy seeds and seedlings. Gardeners consider themselves amateur seed savers but still prefer to use their own saved seeds before turning to stores or other gardeners. The stores are regarded as a reliable source of seeds. For example, one gardener believed that at Home Depot, *“they will keep only the seeds that grow here.”* When seeds don’t work, gardeners do not blame the source of their seeds; they try different methods or reflect on possible mistakes they made during gardening.

The limitations experienced in accessing seeds in the formal system included lack of variety choice, inability to communicate, and cost. Some gardeners were unable to find multiple choices of South Asian crop seeds in stores: *“I don’t find many options for things that I grow, for example, green mustard, I don’t find in other stores here.”* In Bhutan and Nepal, gardeners were used to growing many different types of mustard greens, corn, and squash, but in stores like Lowes or Gardener’s Supply, they are only able to find a few options. In addition, many older gardeners with mobility issues and limited English

language ability rely on younger generations to communicate their needs or desires. A fifty-year-old woman in Winooski with limited English and mobility described her experience: *“And I don't know how to buy. I don't know how to speak and ask, you know, which plants should I ask. I don't know. My daughter will help me. I will ask her, she will bring.”* More specifically, regarding buckwheat, *“so when we go there and ask, we call it Phapar, you know. The seed's name is Phapar in Nepali. If I go and talk, say, they will not understand. So I asked my daughter, ‘go bring Phapar seeds,’ and she went and bought them.”* When asked what she would do without her daughter’s help, the woman shook her head. Older generations come to rely on younger generations especially in accessing seeds from stores.

Furthermore, while some gardeners reported that buying seeds and starts did not pose a financial burden, because they were only buying seeds for a small plot of land, other gardeners found the prices too high. One gardener reported that while she can find the seeds that she wants, she prefers not to buy because *“it's so costly. I don't want to spend a lot of money”* To navigate choice, communication, and cost that Bhutanese-Nepali gardeners experience in the formal seed system, gardeners turn to informal channels: family, friends, strangers, and community organizations.

Informal Seed Sourcing

Informal channels of seed sourcing include self-saved seeds, family, friends, acquaintances, seed swaps, and donations from organizations. Self-saved seed is a major component of Bhutanese-Nepali seed systems. All gardeners we interviewed reported

saving their own seeds, and most preferred to use their saved seeds first before turning to other sources. Saved seeds are free, familiar, and easily accessible for gardeners.

Although people did not view themselves as professional gardeners or plant breeders, they considered their self-saved seeds to be the best because they know what variety they saved and they already have experience growing it . A gardener explained that he spent time finding specific varieties of cucumbers, beans, and okra and that saving his own seeds preserves his access to these varieties next growing season: “*So American cucumber and our cucumber is [sic] different, beans also different varieties. Okra also, different varieties.*” The specific methods of saving seeds vary from gardener to gardener, but most save the seeds of the first plant that matures. Some wrap their seeds in cloth, others in paper. A gardener described the process and the advantages of saving seed: “*So, plant like this and then first fruit, leave it for ripe and then dry it, and bring home, and save it. And then next year, I don't have to buy. I use the same seeds.*”

Gardeners stored seeds in ovens, cabinets, and other household places.

The seed varieties saved are driven by family dietary preferences. When choosing which seeds to keep in circulation in their seed systems, gardeners consider their families’ food preferences. When talking with gardeners who had other family members who were involved in the garden, parents or grandparents tended to be the ones responsible for choosing which plant and which varieties to save. When interviewing an elderly man, he stated that his role is to keep the seeds and provide the vegetables his family eats: “*So I preserve, keep seeds, bring to the garden, grow vegetables. That's my*

job. Usually in our culture, men don't cook... [but] I know what we are eating here and then I [grow] these vegetables, which we are using regularly in the house." Other households showed family cooperation and decisions that are jointly made about seeds. Another gardener described how his family chooses among different varieties of tomatoes that they plant and try: *"Some are very sour. And some are very big, and like it's too much [for one recipe]. And we save the stuff that looks and tastes good. We decide, "Hey, let's save this for next time and grow more of this one."* Seed saving provides seed security for future plantings and also the ability to share seeds with other gardeners. A gardener expresses that the act of saving his own seed could benefit the people around him: *"everybody gets happy when you save some seeds... Sometimes it's very happy to share with each other, even with friends and relatives and everyone."*

The social practice of sharing self-saved seeds benefits gardeners who need seeds and also gardeners looking for different varieties. Especially when someone is new to Vermont, their social networks can provide them with their starter seeds. Respondents noted that when they first started gardening, they didn't have seeds nor knowledge of growing. By asking around, newly resettled refugees received seeds, plants, and advice from relatives. Also, the flow of saved seeds among gardeners is an important part of introducing new varieties into peoples' seed systems. A gardener described that sharing seeds is a way of obtaining different varieties of crops: *"if I have [a] new type, we just share it to others, and if they do have some different types, they will share with us."* For example, another farmer received three varieties of maize seeds from their in-laws and

now plants three different varieties of corn similar to the ones they had back home: *I have two to three different kinds- [some] they're very tall, some are very short, some have two maize on one stem and some have a very long [ear of corn], some have a very short [ear of corn].*” Seeds of Bhutanese-Nepali crops like *tukruke*, snake gourd, maize, and eggplant are mostly shared through social networks, because they are hard to find in stores. In this way, the informal seed system facilitates access to specialty crops. A gardener who grew enough *tukruke* that he was able to sell it to a local Asian market obtained his first *tukruke* starts from an elder gardener in Winooski, who has since moved to Pennsylvania. *“In Winooski there is one old man who do the greenhouse from our community, I bought from him... So he said, "I don't know, you know. I have plant that grow in the greenhouse, try this and check it out whether it will work or not” ... So he's from the Nepali community and I'm looking for really nice seeds and plants. So people told me.*” Respondents have also reported getting specific cultivars from relatives and friends in other states including Missouri, Pennsylvania, Ohio, and other countries: Nepal and India.

Information and Communication Channels

Knowledge about seed access is distributed through information channels. Bhutanese-Nepali gardeners reported learning about stores like Gardener’s Supply, Lowe’s, a local farm store, and co-op grocery store through word of mouth from other Bhutanese-Nepali gardeners. For example, a gardener learned about Mazza Farm when she experienced difficulties in navigating the climate differences of Vermont. Her friend

told her that she could buy plant starts to make sure her crops mature early on in the season: *“So next year, I learned from a friend and then we went to Colchester Garden, the Mazza farm.”* Many gardeners at NFNA purchased seeds from the nearby Gardener’s Supply; they were offered discount cards. One gardener describes how she first heard of Gardener’s Supply: *“I go to Gardener’s Supply, I first heard about it through AALV, I got some free plants from there. I think the people at the Gardener’s Supply have more knowledge about plants, and then I go there. Sometimes I [get them] from Walmart.”* In stores, pictures of crops on seed packets and plant markers provide valuable preliminary information, especially for older gardeners who do not speak or read English. This trend of visual learning comes back to how many gardeners reported learning to seed save by watching their parents do so in Bhutan. One gardener adamantly insisted that all flyers from refugee services should use visuals and pictures to communicate to clients who do not read English.

Gardeners learn about the seed saving process from their relatives and friends. Younger gardeners turn to older generations, who spent much of their life farming in Bhutan, for advice and help. Parents, because they have more knowledge, are relied upon to choose the seed and plants to save for seeds. When multiple generations help out in one garden plot, elder family members will tell the other family members which plant or fruit is to be saved for seed and not harvested for eating. Specifically, a farmer would tell his kids: *“You don't touch that one. Don't touch that plant or don't tear out anything from that, pluck up anything from that plant because we are keeping that for the seeds: This*

type of plant gives good fruit." Failure to communicate might result in family members harvesting the vegetables meant for seed saving. For example, *"I am trying to save eggplant- the ones in the field now are too late, they will not mature before the frost. My wife, she harvested the eggplant I was saving for seeds."*

In regard to information and communication channels within Bhutanese-Nepali seed systems, all gardeners reported that talking about gardening and sharing seeds are practices within their existing social networks. Communication regarding seeds and gardening knowledge can be *"part of the family talk"* or everyday communications with the family. A gardener described that asking about different crops and seeking gardening advice are common in everyday conversation: *"and we sometimes talk about, 'Hey, did you do this stuff? Do you have these?' I said, 'I did this.' Because it's not [a] month or we don't have a long gap communicating with families. It could be every day, sometime[s] we might talk and sometime[s] we don't. It's like we put this seeding itself in a conversation."* In this case, exchanges about seeds do not create relationships, they are an extension of them. This communication can happen across states and across countries.

In addition, the communal nature of the garden programs at NFNA and Winooski Community Gardens allow nonverbal information and communication channels. By walking around, gardeners can visually assess the planting methods of other gardeners. This informal transfer of knowledge helps gardeners learn about what is able to be grown without the need for conversations. When we asked gardeners how they learned to grow vegetables in Vermont, many replied that they looked around them. A gardener said he

got chili seeds from his brother-in-law, after he saw that his chilis were growing well in a neighboring plot. This visual learning also helps bypass language barriers.

Discussion

This study uses physical entities – seeds in gardening – within their socially constructed institutions – seed systems - to examine how the theory of placemaking can apply to everyday acts. We found that Bhutanese-Nepali refugee gardeners use market and non-market institutions to access, store, share, distribute, and learn about propagative materials. Additionally, actions within market institutions and non-market institutions were mediated by social relations.

There are also clear interactions between the formal and informal seed systems for Bhutanese-Nepali gardeners. Gardeners sourced seeds from the formal system when they found a void in their informal networks. The informal seed system may also lack information about and seeds of particular varieties, and thus farmers turn to the formal seed system to supplement their informal systems. The formal system entities that Bhutanese-Nepali gardeners have access to in Vermont are mostly stores, local farms, or donations. They did not learn about these companies through advertisements but rather through recommendations from their family, friends, and neighbor, i.e. social endorsements (Sperling and McGuire, 2010). In general, gardeners turned to the formal seed system if they lacked seeds or if they were looking to experiment with different varieties. Like other farmers, Bhutanese-Nepali gardeners searched for preferred varieties and crop preference in the formal system (Langyintuo and Setimela, 2009). When formal

channels of seed sourcing failed, like when there were not enough varieties of mustard green seeds in stores, gardeners looked to informal channels. While some gardeners found the cost of seeds and starts expensive, others felt that buying seeds for their small plot of land was manageable. Many gardeners then incorporated the seeds from the formal system into their informal seed systems. The formal seed system may be inadequate for the specific needs of gardeners is also repeated in seed systems research across the world (Almekinders and Louwaars, 1999; Thiele, 1999).

Describing Bhutanese-Nepali seed systems allows us to see the social dimensions embedded within seed systems. We confirm that seed systems are social in nature, and socioeconomic factors affect seed access, use, preferences, and networks (Sperling & Cooper, 2003). Institutions are socially constructed, and seed systems are embedded in how people interact with one another and those institutions. In the Bhutanese-Nepali community, we find that seed systems are, in part, formed by existing social relationships but do not necessarily form the relationships themselves. Gardeners were not part of seed sharing organizations; rather, gardeners relied on existing social networks for seed related issues (Badstue et al., 2006). Bhutanese-Nepali refugees used their family and social networks to share seeds across state and country lines. Similar to Rhoades's (2013) study with Vietnamese gardeners, the seed networks of Bhutanese-Nepali gardeners extended as family members and friends move and relocate.

Seeds are part of frequent social interactions between Bhutanese-Nepali gardeners, making the informal seed system strong and trusted because the sources of

seeds and information are familiar family members and friends. Similar to other studies of informal seed systems, we also found that there are specific gardeners in the Bhutanese-Nepali community who serve as “nodal farmers.” For example, an elderly man who used the greenhouse in Winooski was a trusted source of plant starts (Almekinders and Louwaars, 1994). He shared and sold *tukruke* starts widely among the Bhutanese-Nepali community. This elderly man had social certification. Gardeners in the community saw and heard of his gardening success (Sperling and McGuire, 2010).

Within social interactions, age was an interesting factor that emerged. These findings of age differences are consistent with studies of how socioeconomic factors cause changes in TEK (Turner et al., 2011). Younger generations can lose certain TEK, and social patterns can also indicate that a past tradition is now past (Turner et al., 2011). Older Bhutanese-Nepali gardeners (>50 years of age) tended to know less English and relied on their adult children to help with the formal seed system. Then, when younger gardeners sought advice on seed saving and growing, they would turn towards their parents or other elders to rely on their expertise. In the seed systems of Bhutanese-Nepali gardeners, we find that older and younger generations share knowledge and abilities. While older generations offer advice, instructions, and knowledge in the garden, they also rely on their children to go to the store to buy seeds or to sign up for the community gardening plot.

Similar to farmers in informal seed systems in the Global South, Bhutanese-Nepali gardeners reported most often asking for or sharing advice from their established

social networks (Aistara, 2011; Song et al., 2019).). The flows of information and knowledge about seed saving, seed access, and seed selection occurred within gardeners' existing social networks. We also found that information and knowledge about seeds is developed through social endorsements from friends, family, and community organizations and household decision making (Buck & Hamilton, 2011; Coomes et al., 2015; Richards et al., 2009). Essential in their access to seed is also their access to information through their social networks. The social network that Bhutanese-Nepali refugees already have is the main place that gardeners will turn to for advice and from trusted sources in the formal system such as stores that have social certifications from the community (Sperling and McGuire, 2010). These information channels are particularly important for newly arrived refugees to learn how to access seeds for the first time.

In particular, we found that communication pathways can be visual and social in nature in Bhutanese-Nepali gardener seed systems. Interview data suggested that the community garden layout facilitates nonverbal information and knowledge sharing. Gardeners reported learning about seed varieties by looking around at other peoples' plots and seeing what grows well for other people. Family members may ask each other for seeds if they see that someone has particularly healthy and productive looking plants. Being able to see someone's crops in their garden plots also provides a form of social accreditation- that this gardener is successful. In addition, the nature of the community gardens means that gardeners can visually see what their neighbors are planting and what methods they use. Because people are in the same community and growing conditions,

gardeners believe that the seeds will also succeed in their nearby plots. Gardeners also see their fellow gardeners' planting results in the communal gardens. This visual assessment of seeds and plants is similar to what McGuire and Sperling (2010) described among farmers in both informal and formal seed systems in the Global South.

However, in both formal and informal seed systems, there are mechanisms that can perpetuate social inequalities (Tadesse et al., 2016; Thiele, 1999). In this study, we saw that English language ability and mobility can affect someone's participation in seed systems and in other parts of life in Vermont (Bose, 2013). The challenges held within seed systems are important to study because not only do they reflect larger social issues, they also offer real opportunities to preserve the diversity of cultural heritage in the US (Best, 2013; Carolan, 2007). In addition, access to desired varieties of quality seed is vital for farmer livelihoods but also the larger issue of food system resilience and sustainability. Ultimately, this study suggests that informal systems contain resources that would be useful in formal systems- and many of these important resources are embedded in social relationships and networks.

We noted above that TEK and seed system actions were different across younger and older generations. Further research should build upon these findings with in-depth sampling and analysis based on socioeconomic variables like age, income, and gender. In addition, future research should also sample other ethnic groups of refugees and immigrants to find if these seed systems findings are generalizable.

Conclusion

Studies such as this one indicate that diversity and important information and knowledge often flow in informal seed systems- and this is an asset that formal seed systems can and should recognize and leverage (Otieno et al., 2017). Studies in the Global South have shown that the social components of seed systems can affect the preference, access, knowledge, and usage of seeds. To truly understand the workings of seed systems, we need to recognize that seed systems are inherently social and composed of both formal and informal channels. Understanding how formal and informal seed systems interact allows us to see a realistic glimpse of what farmers actually use in their daily lives. This case study of Bhutanese-Nepali refugee gardeners in the US provides evidence that seed systems are more complex than the formal nature assumed to predominate in the US. Even though the United States hosts a diversity of gardeners and farmers, especially from refugee and immigrant backgrounds, we know little about their seed systems. There is some evidence that refugee gardeners build seed systems that combine formal and informal components. During the spring 2020 outbreak of Covid-19, we saw that the stress on seed systems is real and so is the need, therefore, to enhance seed access in times of disruption. This case study hopes to add to the knowledge of seed systems in the United States. To continue building upon this knowledge, future research should further evaluate if similar phenomena occur in other ethnic groups and the extent to which these findings are applicable across other agro-ecological zones.

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CHAPTER 5: BHUTANESE-NEPALI REFUGEE GARDENERS AND THEIR SEED SYSTEMS: PLACEMAKING AND FOODWAYS IN VERMONT

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Key Words: seed system, foodways, placemaking, refugee gardeners

Abstract:

With over 70.8 million forcibly displaced people in the world (UNHCR, 2019), disconnection and isolation from home cultures occur at high rates. Research indicates that creating foodways through gardening can provide cultural connections for refugees. However, few studies have been dedicated to how needed inputs, such as seeds, affect refugees' abilities to create culturally significant foodways. Drawing upon placemaking theory, this chapter explores if and how access to seeds and seed systems enables refugees the opportunities to grow essential crops that might be otherwise difficult to obtain to produce tastes and styles of foods reminiscent of their homelands. Focused on Bhutanese-Nepali refugee gardeners in Chittenden County, Vermont, we present findings from 30 semi-structured interviews demonstrating how the gardeners draw upon known practices and preferences to make a new land less foreign. In particular, seed systems offer people the opportunity to transfer culture and experiment with new techniques and varieties. This study indicates that seed systems are indeed an important way that people make place. Future studies should build on these findings to explore how different agroecological factors affect the ways people make place and connect to their culturally significant foodways.

Introduction

In 2018 alone, 92,400 refugees¹, escaping violence, political unrest, and human rights violations, were resettled, but their journeys were anything but easy (UNHCR, 2019). Resettlement in a third country is meant to provide refugees with permanent homes with safety and dignity. However, differences in language, food, religion, and climate can contribute to food security and mental health challenges for resettled refugees (Brown et al., 2019; Moffat et al., 2017). Among the most pressing differences that refugees confront are new ways of accessing, growing, cooking, and eating foods (Oyangen, 2009). Past studies have found that refugees can rebuild some of their disrupted foodways while forming new connections to new lands through gardening (Oyangen, 2009; Peña, 2006). Foodways consist of the cultural, social, and economic dimensions of food cultivation, production, and consumption (Oyangen, 2009). Studies suggest that refugees can control and shape their new foodways by growing desired crops. Thus, the act of gardening and its products become a provider of nutritional and cultural sustenance (Strunk & Richardson, 2019).

¹ In this study, the term refugee is used to refer to the participants' legal status with which they immigrated to the United States. We recognize that legal statuses such as 'refugee' do not capture the intersectionality and complexity of identity. The term is used in this study for literature review, sampling, and descriptive purposes. While we would rather use the term 'people from refugee backgrounds' to highlight how having a refugee status is but only one portion of someone's identity, we use the term 'refugee' for succinctness.

Growing culturally relevant crops, refugees who were farmers in their homelands can connect to their agrarian practices and past foodways (Beavers et al., 2019; Jean, 2015). Through the labor of growing significant crops, gardeners incorporate familiar skills, knowledge, and preferences into their new foodways (Hughes, 2019; Jean, 2015; Peña, 2006). Scholars have described this connection to past ways of life in new locations as placemaking. Through placemaking theory, researchers have found that community gardening can facilitate social, emotional, and physical ties to cultural heritage that can increase senses of pride, happiness, and security (Flagg & Painter, 2019). Growing specific crops allow refugees to 'correct' their new environments with foods that were important in their past foodways, fostering feelings of belonging, comfort, and hope in a new land (Brook, 2003; Hughes, 2019).

While scholars have documented how gardening provides opportunities to create place and restore disrupted foodways (Jean, 2015; Peña, 2006), research on the access and management of crucial inputs, like seeds, is limited. This study seeks to advance understandings of how refugee communities make place through seed systems. In this study, we describe the different ways refugee gardeners access, use, and save seeds within seed systems. These systems include transactions like sales, trades, and gifts, and the social relations, customs, and practices surrounding them. Materially, seeds are essential to growing and preserving culturally appropriate foods with the desired taste and cooking qualities (Beavers et al., 2019). Symbolically, seeds can facilitate connections to

meaning, access, and opportunity that tie a person to place even in a foreign physical space (Carolan, 2007).

To examine the seed practices and values that refugees bring to the US and adopt once they settle there, this study explores the seed systems of Bhutanese-Nepali refugees, the largest ethnic group of refugees who have resettled in Vermont. The displacement that resettled refugees have undergone makes their seed systems particularly interesting as they move away from their homelands and their social networks. Guided by the following objectives, this study seeks to understand: a) how gardeners bring and adapt practices of their seed systems to Vermont, and b) if and how people from refugee backgrounds engage in seed systems in ways that make place and create familiar foodways.

To address our objectives, this chapter first discusses the theoretical framing of placemaking and foodways. Thereafter we describe the background of the Bhutanese-Nepali refugee crisis and the seed systems prominent in Bhutan, Nepal, and the US. We then present the methods of this qualitative case study, before presenting the findings from 30 semi-structured interviews with Bhutanese refugee farmers that explored gardening, seed access, and seed sharing. We suggest that rather than assimilating into existing seed systems of the US, refugees enact agency and choice to build their seed systems that make meanings of place.

Placemaking Through Foodways and Seed Systems

While refugees suffer from forced displacement and involuntary resettlement, studies suggest that refugees also actively shape their surroundings through actions, histories, experiences, knowledge, and values (Jean, 2015). These practices of placemaking can include social, political, and ecological actions and reactions. Derrien and Stokowski (2014) emphasized that placemaking is neither an outcome or goal: “senses of place should be seen as a learning process, developed over time within an array of social and cultural contexts” (p. 119). These processes are not unidirectional towards goals or endpoints but a series of negotiations between people and their surroundings. Consequently, our study uses a placemaking framework to understand how Bhutanese-Nepali refugees take action to bridge home and sites of relocation through their seed systems (Jean, 2015; Strunk & Richardson, 2019).

Relocated refugees encounter vastly different foodways: signs and labels in a different language, unfamiliar foods in the grocery stores, and new payment processes such as the Supplementary Nutritional Nutrition Program (SNAP). Thus, interacting with foreign foodways provides opportunities for or perhaps necessitates placemaking - navigating the new by importing the known (Bridle et al., 2020; Pierce et al., 2011). In a study of Vietnamese gardeners in the American South, Rhoades (2013) found that the ability to garden and the social networks of sharing seeds facilitated access to fresh herbs, fruits, and vegetables needed for Vietnamese cuisine. Gardening provides a way for refugees to connect back to their known foodways, ones based on growing fresh, organic produce for home consumption (Rhoades, 2013).

Additionally, the act of gardening draws upon Traditional Ecological Knowledge (TEK), described by Nesheim et al. (2006) “as a cumulative body of knowledge, practice, and belief evolving by adaptive processes and handed down through generations by cultural transmission about the relationship of living beings (including humans) with one another and with the environment” (p. 100). In many cases, farming knowledge and skills formed the backbone of many refugees’ lives and livelihoods (Jean, 2015). Thus, because TEK is culturally internalized and manifested through rituals and traditions, the ability to draw upon one’s TEK can help connect refugees and immigrants to their new environments (Berkes et al., 2000). In a narrative analysis of Bosnian immigrants in Vermont, Derrien and Stokowski (2014) found that gardening reconstructed and reinforced poignant past experiences. For example, when describing gardening in Vermont’s climate, Bosnian immigrant drew upon memories of planting potatoes with family members in Croatia. Similarly, the interviews that Harris et al. (2014) conducted with refugees from Congo, Burundi, Somalia, and Sudan in Queensland, Australia indicated that farmers apply skills and traditions from their backgrounds to develop and maintain belonging and identity. While incorporating accustomed habits, refugees also adapt to their new environments (Oyangen, 2009). For example, Jean (2015) found that refugee farmers with agrarian backgrounds adapt to their new climates and seasons in Utah through new methods such as row measuring and irrigation. Thus, placemaking is a complex process, combining memories of homelands with newly learned TEK.

Socially, too, gardening and engaging in seed systems provides opportunities for people from refugee backgrounds to form new networks and maintain existing ones to exchange information, share propagative material and build relationships. Sharing seeds, produce, knowledge, and labor can provide opportunities for refugees to build trust, reciprocity, and social connections in the gardens (Harris et al., 2014). These networks can be local and also reach long distances; in the Southern U.S, Vietnamese gardeners share plants, seeds, and cuttings within their zip codes and also across states (Rhoades, 2013). Furthermore, these social networks can enhance community formation, attachment, and support, providing connections to knowledge, materials, and decision-making centers (Hughes, 2019). In Vermont, Bhutanese-Nepali refugee gardeners reported feeling significantly more social support compared to other refugees who did not garden (Gerber et al., 2017).

With studies of Vietnamese gardeners in the South, Rhoades (2013) provides evidence that seed systems promote opportunities for immigrants to connect back to their homelands. This study seeks to build upon that work to investigate how refugee gardeners in particular utilize seed systems to mix home and host cultures in their foodways. For people who have had their livelihoods disrupted, citizenship questioned, and homes uprooted, the urge to save seeds might be particularly important as it provides decision making power over what is available in their foodways. This case study thereby illustrates how Bhutanese-Nepali refugees leverage traditional seed saving techniques in Chittenden County, Vermont. The following section provides a brief background on the

displacement of Bhutanese-Nepali refugees, with special emphasis on disrupted foodways and seed systems.

Disrupted Seed Systems

Following the Anglo-Bhutanese war of 1865 and encouraged by the British Indian government, Nepali peasant farmers and contract workers emigrated to southern Bhutan for agricultural opportunities (Giri, 2005; Hutt, 1996). In the late 20th century Bhutan, most ethnic Nepali families owned and practiced subsistence farming on about one hectare of land with livestock and draught power (Young, 1991). Their foodways were sustained by the food they grew themselves and traded for in local markets (Hutt, 2005). Bhutanese-Nepali farmers, like many other smallholders in the Global South, saved, shared, and managed seeds themselves (Gill et al., 2013; Kobayashi et al., 2017). Agricultural extension agents provided rural farmers with samples of improved, open-pollinated varieties that farmers could then save for future plantings (Kobayashi et al., 2017). During this time, Bhutan's farmers maintained impressive genetic diversity of rice, maize, cereals, grains, vegetables, and fruits (Young, 1991). To date, most seeds used in Bhutan are still sourced from informal seed systems² (Kobayashi et al., 2017), which are typically farmer-managed and organized, local, and involve flexible and undocumented exchanges (Gill et al., 2013). More generally, in informal seed systems in

² Scholars have historically characterized seed systems as formal and informal while still recognizing that there is an interplay between the dichotomy (Bonny, 2017). In contrast to informal systems, formal seed systems involve intensive breeding and commercial enterprises (Gill et al., 2013).

the Global South, traditional knowledge about seeds has been shown to be developed through family knowledge, experimentation, and social endorsement (Buck & Hamilton, 2011; Richards et al., 2009).

Persecution from the Bhutanese government resulted in human rights violations, forced relocation, and drastic changes for Bhutanese-Nepali families. Bhutan's Citizenship Acts of 1977 and 1985 intended to assimilate minority ethnic groups into the ruling class' Dzongkha culture (Hutt, 2005). Bhutanese-Nepali citizens were persecuted for their Nepali language and Hindu religion (Giri, 2005). During this time, about one-sixth of Bhutan's population was denationalized (Hutt, 2005). Subsequently, in 1992, over 107,000 Bhutanese-Nepali refugees fled violence and persecution to UN refugee camps in Nepal (Shrestha, 2011). As Bhutanese-Nepali families took refuge in UN refugee camps in Nepal, their previous foodways were significantly disrupted. Without farmland to cultivate, people relied on UN food rations (Blanck et al., 2002). Some refugees had opportunities to grow crops in camp gardens and nearby lands (Blanck et al., 2002). In these circumstances, families that had well-stocked supplies of seeds in Bhutan had to enter new seed networks to access seeds. Although Bhutan and Nepal had similar seed systems, as 95% of Nepal's food crop seeds came from the informal seed system, relocation to Nepal altered refugee foodways by creating barriers to farm (Dev Joshi, 2000).

Since 2015, over 100,000 Bhutanese-Nepali refugees have resettled in the US, Canada, Norway, and Australia, as neither Bhutan nor Nepal granted civil rights to

Bhutanese-Nepali refugees (Shrestha, 2011). Many could not legally bring seeds across international borders during their journeys from refugee camps to resettlement countries. For refugees headed to the US, the USDA's Small Lot of Seed form to legally bring seeds into the country is a significant barrier (USDA, 2019). The US, like other countries, has strict policies regarding propagative materials entering and exiting its borders. Arriving in the US, Bhutanese-Nepali refugees find a different dominant seed system than what they were used to in Bhutan and Nepal. The seeds that are sold in most US grocery, garden, and specialty shops come from formal seed systems that breed and commercially manage, sell, and distribute uniform, certified seeds. These seeds were developed and selected with the desired physical, physiological, and sanitary traits (Aguilar et al., 2015; Almekinders et al., 1994). However, since the seed market for gardeners is relatively small, many seed companies focus on developing seeds for large scale producers who are likely to buy large amounts of seeds every year (Deppe, 2000). The selection of seeds in the formal markets may not reflect the diversity of varieties that existed in Bhutan and Nepal, especially for South Asian specific crops like mustard greens, leaving gardeners wanting for different cultivars.

Research Setting

This study was conducted in Chittenden County, home to more than 163,000 residents and 25% of Vermont's population (*US Census Bureau QuickFacts*, n.d.). The majority of Vermont's community of about 2,500 Bhutanese-Nepali refugees live in Chittenden County (Sari, 2018). Given the shift of refugee resettlement towards smaller

cities with economic, social, and political support systems for refugees, Chittenden County houses the majority of Vermont's resettled refugee population. About 9% of Chittenden's population is foreign-born, the highest percentage in Vermont (*US Census Bureau QuickFacts*, n.d.). Burlington, the largest city in VT (population 40,000), and Winooski (population 7,000), a bordering town, are the first relocation sites for many refugees. In each town, one community gardening organization was chosen: New Farms for New Americans (NFNA) in Burlington and Winooski Community Gardens in Winooski.

Started in 2008, NFNA operates five acres at the Ethan Allen Homestead, a historic house and park in the city of Burlington. NFNA provides subsidized garden plots and greenhouse tables to an average of 250 farmers yearly, of whom over 86% are Bhutanese-Nepali. NFNA also hosts educational workshops, supplies, and informal farmer support. NFNA is housed within the Association of Africans Living in Vermont³ (AALV), a nonprofit refugee service that provides social services, interpreter and translator services, legal services, and health and behavior programs. The second garden organization, the Winooski Community Garden Network, is located about four miles east of the NFNA's garden. The site is managed by the Parks and Recreation Department of Winooski and is open to any city resident. In the garden network, five different garden

³ AALV started as a community organization serving African refugees and immigrants in Vermont but has since expanded to serve all refugees and immigrants resettled in Vermont. The name AALV has been retained.

sites offer garden beds ranging from 225 to 40 square feet each (*Catalog - City of Winooski*, 2020). These separate sites are within one mile from each other.

Research Methods

This case study is based on 30 in-depth interviews with Bhutanese-Nepali gardeners. With the help of interpreters with in-depth knowledge of the Bhutanese-Nepali gardening community, the first author conducted convenience sampling, making interview appointments with interested gardeners. The sample for this study includes 15 Bhutanese farmers from NFNA and 15 Bhutanese farmers from Winooski community gardens. Participants needed to be Bhutanese-Nepali refugees, older than 18 years old, and a US citizen or permanent resident. The semi-structured interviews were guided by a set of 15 open-ended main questions, ten sub-questions, and multiple prompts. The interview guide sought to understand if and how gardeners: access seeds in the US, adapt to new growing conditions, and either accept or reject certain crops through the seed saving process. Questions focused on identifying similarities and differences in growing, saving, and accessing seeds in Bhutan/Nepal and the United States. Demographic questions were asked at the end (Table 1). A panel of experts (a rural sociologist, anthropologist, applied economist, plant geneticist, and NFNA program director) helped shape the interview questions for academic rigor and community cultural competence. The first author piloted interviews with seven individuals of a similar population to enhance credibility (Van Teijlingen & Hundley, 2001). The Office for Research Protections at the University of Vermont approved the study on March 22, 2019.

Table 1. Interview Demographics (n=30)

Variable	Frequency	Percent
Age		
18-34 years old	5	16.6%
35-54 years old	20	66.6%
55+ years old	5	16.6%
Gender		
Women	15	50%
Men	15	50%
Year moved to the US		
2008-2011	14	46.7%
2012-2015	15	50%
2016-2019	1	3.3%

Interviews were conducted at the NFNA gardens and in participants' and interpreters' homes in Winooski and Burlington. The sampling proceeded until saturation was achieved and interview data started to become repetitive with limited new information (Creswell, 2007).

The interviews were recorded and transcribed verbatim through Speech Pad transcription service. Open codes were developed, combined, and organized in NVivo v. 12 (Saldaña, 2016). The codes were labeled with descriptions beginning with gerunds focused on seed system activities and placemaking. Codes were then grouped into themes by noting similar patterns (Miles et al., 1994) and identifying patterned regularities. The following themes were found: saving seeds as a part of culture, difference between accessing seeds in Bhutan/Nepal and VT, similar gardening practices in Bhutan/Nepal and VT, and experimenting with new varieties and techniques in VT. We sought to answer our research questions from the different perspectives that surfaced from the data (Creswell, 2007).

Results

Through 30 in-depth interviews, our findings suggest that gardeners merge their traditions and skills with new approaches to adjust their foodways, thereby performing placemaking. With existing knowledge and new techniques, farmers plant and harvest various cultivars of tomatoes, Asian mustard greens, spinach, daikon, beans, cilantro, okra, dill, chili peppers, potatoes, onions, garlic, *tukruke*⁴, snake gourd, squash, pumpkins, and corn. While Vermont's climate, soils, and landscapes differ drastically from those of Bhutan and Nepal, Bhutanese-Nepali gardens make their new surroundings more familiar by growing culturally meaningful crops, learning new farming skills, and

⁴ *Tukruke* is a member of the cucurbits or gourd family.

experimenting with different varieties. Through actions that revolve around seed systems, gardeners create foodways that connect their cultural history from Bhutan and Nepal to their new homes in the US.

Seed Saving Practices of Bhutanese-Nepali Gardeners in Vermont

All thirty gardeners reported that they saved seeds in Vermont and planned to continue. When asked why they saved seeds, gardeners talked about how their previous experiences with seed saving influenced them. The older respondents were taught seed saving in their childhoods in Bhutan. A gardener in her forties recalled:

When I see that something grows really healthy and big, my automatic thought is to save the seed. That is what my parents taught me in Bhutan, so that is now in my brain. The first one, like with okra and peppers, I will keep on the plant to save for next year. All these seeds are the ones that I saved from before - some seeds I get from people in these gardens. In Bhutan, back then, there were no stores for seeds, you have to save your own or ask from other people.

Another gardener in her fifties emphasized the importance of saving seeds as subsistence farmers in Bhutan: “*So we keep the seeds in Bhutan like corn, [rice] paddy, wheat- because that's how we survive. And then we have to keep the seeds, just keep on keeping... That's what I learned there, that's what I'm using here... I don't know the system here. I am bringing my knowledge from there.*” With limited ability to communicate in English and to leave the house, this gardener is unaware of the seed

systems found in Vermont. However, her knowledge is sufficient as she saves seeds in an identical way, without much engagement in new seed systems.

Even though some interviewees were too young to farm in Bhutan, they learned from elders. To save Asian mustard green seeds, a woman in her twenties explained that she follows the same seed saving processes that her mom used in Nepal: *“That process is still the same in Nepal and here. Back in Nepal, I didn't save seed but my mom did.”* As younger generations learn the tasks that were previously performed by their elders, familial and cultural traditions are passed down, though in a much different context: gardening and seed saving in Vermont. A man in his forties goes to older people in the community to ask for advice: *“So if I have some doubt I talk to older people. They know it. For sure they know it, because they have gone through all their lives, they have done that all their lives because they were brought up on the farm and they left Bhutan when they were 40, or 45, or 50... I left my country when I was 18. I still know a lot, but they know much more. So, I trust their wisdom. They teach me a lot.”* Continuing foodways by saving seeds allows younger generations to recreate and learn traditions from older generations. The transfer of seed and gardening knowledge is facilitated by the social networks that are maintained between the older and younger generations and extended family networks in the Bhutanese-Nepali community.

Seeking Home: Experimenting with Different Varieties

Gardeners tried various cultivars in search of particular flavors and textures, and ultimately, the taste of home. When they find a variety that suits their palate, they save

the seeds to plant them in the future. For example, gardeners reported looking for very spicy chilies, beans with tender pods, and corn with low sugar content. When asked why she wanted to plant specific vegetables like daikon, mustard greens, and potatoes, a gardener in her fifties responded: “*We were born in Bhutan, we grew up in Bhutan and then used to the vegetables of the taste of Bhutan. That's why.*” For her and many of the Bhutanese-Nepali gardeners, the taste of Bhutan represents the taste of home. In another example, a father in his thirties described how his family chooses among different varieties of tomatoes that they plant: “*Some are very sour. And some are very big, and like it's too much [for one recipe]. And we didn't save the stuff with [no taste]. The good ones, we save the one that looks and tastes good. We decide, "Hey, let's save this for next time and grow more of this one.*” Likewise, another gardener detailed how her family decides which types of pumpkin varieties they will save and grow again next year: “*We plant different kinds of pumpkins, and then we'll bring home. We taste them. So, if they taste good then we'll save that kind. But if they taste like it's not good, we [won't].*” To find the taste, texture, and size they are looking for, farmers experiment with different varieties, and then they save the seed of the ones that best suit their palates and culinary uses.

In the search for certain cultivars, several of the interviewees asked relatives and friends for seeds and information. A man in his forties described his mission to grow specific types of pumpkins and cucumbers. He asked his relatives for a specific variety of cucumber from the hills of Nepal because “*that's the best variety we have there. We have*

always loved them. We have always liked them and we want to experiment. But we have tried and they have worked to some extent. We have not been able to make them as big as they used to be because, I think, slower season, and also the nutrients, or I don't know, for some reason even though they were smaller they still have the same taste..." Here, social networks and community help gardeners access different cultivars.

Another strategy that gardeners employ is eating different parts of crops like onions and pumpkins. A man in his fifties described that in the climate of Bhutan and Nepal, green onions can be grown and eaten year-round. However, in his garden here, he *"can have the green part only for springtime, not for long... two to three months. But for other months we have to eat the bottom part."* In Vermont, Bhutanese-Nepali gardeners eat the greens of the onions during spring and summer and store onion bulbs for the winter. In other efforts to navigate shorter growing seasons, gardeners eat the shoots and leaves of the pumpkin plants they would have grown to maturity back home, even if there is not time for the pumpkin itself to mature.

However, not all gardeners are successful in their efforts to find the taste of home. A young woman stated that she plants vegetables which *"remind me of my childhood and things that I ate in childhood."* The inability to access this kind of Asian mustard greens in stores and gardens causes a certain homesickness as she describes her desire for the taste of home: *"I do mustard greens here but not the type... that I had in my childhood. So, I feel like going back to Nepal ... and have that flavor, that taste."* This

homesickness recognizes that although access to specific seeds can represent some aspects of home, it cannot replicate their foodways in Bhutan or Nepal.

Incorporating New Strategies: Greenhouse, Transplanting, Buying Plant Starts

Though refugee gardeners draw on previous experiences or familial knowledge as they construct new seed systems, they also try novel strategies to respond to new difficulties that arise in seed saving. The early frosts common in Vermont prevented some farmers from saving seeds that they were used to saving in Bhutan or Nepal. For example, an older man reported, *“so there are a lot of seeds that we save in Bhutan that we cannot save here because of the weather and there's frost.”* Another gardener reflected on the different methods he uses to grow in Vermont: *“it's a little bit different because some plants, some seeds need to grow inside before putting in the ground. That's the difference I saw.”* This gardener learned that he could not directly sow seeds into the ground and thus started seedlings inside before transferring to his garden plot. By starting seedlings in the greenhouse or inside their homes, gardeners make the short growing season of Vermont work for them. They grow the long-season vegetables that they want and watch them mature in time to harvest seeds.

Some gardeners use the greenhouses offered by NFNA and Winooski Community Gardens. While talking to a gardener in the fields of NFNA, a gardener exclaimed that *“all of this would not be possible without the greenhouse. I start everything in the greenhouse: eggplant, tukruke, beans.”* Other farmers strategically buy starts from local stores to guarantee their access to matured fruit for eating and seed saving. A middle-

aged woman said that “*so next year, I learned from the friend.... So quickly, weather changes here. The fall season comes, so if we buy plants and put it, it's easy, quicker to grow, and give produce. [I did it] this year also.*” To prepare for the frost and snow that can come in early October in Vermont, farmers will harvest fruits early for preservation, transfer plants indoors, and reserve the earliest ripened fruits for seed saving.

At the tail end of the season, some gardeners bring plants inside in late fall. A man in his fifties keeps habanero pepper plants growing in his house, harvesting peppers inside even as winter comes:

We call it *Dalle Khursani*. It's a round chili. It's like a ghost [pepper]. Really, really, really hot pepper. I have that at home. I save the seeds also, but I save the plant because when I put a plant in the ground, ... the cold comes fast and then the plant will die without giving fruit... So, keeping the plant inside the house all the time, every year the plant will produce more and more. I have two or three plants and that is enough.

By extending the growing season in Vermont through new gardening techniques, Bhutanese-Nepali gardeners amend their environment to their needs.

The example of tukruke is particularly poignant for understanding how Bhutanese-Nepali gardeners experiment in order to grow Nepali vegetables in Vermont. Tukruke, a small gourd-like vegetable that grows on vines, started appearing in NFNA and Winooski gardens eight years ago. One middle-aged woman received seeds from her son and took a chance on whether tukruke would grow in Vermont: “*So when I arrived*

and resettled here, and then I wanted to try whether it will grow here or not. And then my son sent it here and then I tried, and it grows.” She then shared seeds with her neighbors and an older Bhutanese-Nepali gardener sold starts from seedlings he grew in the greenhouse. According to this proud gardener, the tukruke variety spread so quickly because *“all the communities love tukruke. So they buy one seedling. And then they put it, they take care of it, they grow it. And then others grow it. That's why they spread everywhere.”* Now tukruke can be seen in almost all Bhutanese-Nepali garden plots, snaking up trellises.

The case of tukruke is not atypical. Bhutanese-Nepali gardeners often experiment growing the plants of Bhutan and Nepal in Vermont. Sometimes it works; sometimes it doesn't. However, the trial is part of how Bhutanese-Nepali refugees navigate their place in a new land. As one man in his forties puts it, *“there is a dignity of risk.”* “Dignity of risk” is a phrase that this gardener uses in his workplace, a nonprofit for mental health and disability services. For him, the confidence to try new things without the fear of failing is important for both his clients at work and his children. It is a lesson that started in his childhood in Bhutan that encouraged him to experiment with different methods and crops in the garden.

Discussion

This case study discusses how the seed systems of Bhutanese-Nepali gardeners contribute to the continuation of culturally significant foodways and thereby construct and make meanings of new places. We find that first, gardeners bring existing farming

knowledge, practices, and tastes to their seed systems in Vermont. By employing their TEK in Vermont, Bhutanese-Nepali gardeners connect to cultural traditions of subsistence farming and past foodways. Second, to adapt to a different climate, gardeners create new seed systems and experiment with crop varieties and techniques. By learning different growing methods and developing new seed networks into their TEK, gardeners construct senses of place and culturally significant foodways.

Although Bhutanese-Nepali refugees could not bring their seeds with them during resettlement, they incorporate crops and techniques from Bhutan and Nepal to connect to accustomed foodways and make place in lands far away from home (Brook, 2003; Jean, 2015). Consistent with Jean (2015), our findings indicating that Bhutanese-Nepali gardeners learn new techniques while adapting seed saving practices for Vermont climates. By starting seedlings in the greenhouse or inside their homes, gardeners can grow long season vegetables like snake gourd and tukruke even in the short growing season of Vermont. Bhutanese-Nepali gardeners construct their environments by planting crops they prefer and omitting crops they find distasteful. As gardeners plant, select, and save seeds, they also breed plants from Bhutan and Nepali that grow in Vermont's climate and soils, changing the garden landscape of Chittenden County.

Seed practices allow Bhutanese-Nepali gardeners to connect to their new lands while retaining some parts of their traditional foodways. As food is a key part of cultural disruptions during the displacement of refugees, the ability to grow crops that are important in Nepali cuisine but uncommon in American grocery stores, like mustard

greens, tukruke, and snake gourd, allows refugees to recreate similar food culture in new places. With the ability to garden, refugees emplace themselves with these symbols from the homeland.

To garden, gardeners draw upon their TEK. The act of seed saving and the seeds themselves are symbolic and material bridges between experiences and lands (Sampson and Gifford, 2010). The act of seed saving is a symbolic bridge that ties respondents to activities they participated in or they learned from older generations. Respondents, young and old, those with previous gardening experience and those without, reported that seed saving was part of their culture that they wanted to continue in Vermont. Similar to Sampson and Gifford (2010), our findings indicate that meaningful activities – seed saving in this case - help form connections between past and present, old and new.

Consistent with past research, our study finds that refugee gardeners exchange gardening information, materials, and support through family and community networks (Jean, 2015). The gardeners in this study shared seeds and knowledge surrounding seeds with their families and the larger Bhutanese-Nepali community. For instance, without the practice of sharing seeds and other propagative materials, the much loved tukruke would not have spread across the Bhutanese-Nepali community in Chittenden County. Additionally, the advice of the older generations helped younger, less experienced gardeners learn to save seeds or grow various plants. In other studies, passing down information also helped foster social relationships (Gerber et al., 2017) and refugees make homes in foreign lands (Hughes, 2019). Similar to Rhoades' (2013) studies on

Vietnamese gardeners in the South, we also found that social relations in the seed system can span the US, connecting Bhutanese-Nepali gardeners to each other, different varieties of crops, and advice about gardening in new climates. Social relationships can be both embedded in and created by the seed systems of Bhutanese-Nepali gardeners.

While Bhutanese-Nepali refugees actively emplace themselves in Vermont, placemaking cannot solve all the problems caused by displacement nor erase the foreignness of their new homes. The climate and culture of Vermont are drastically different from Bhutan and Nepal. Instead of a year-round growing season, Bhutanese-Nepali gardeners squeeze their planting into four, maybe five short months. In Vermont, the average last frost date begins in May and the first frost date can come as early as October. Without the long growing seasons of Bhutan, gardeners had a difficult time getting slow growing crops to ripen in time. In addition to the differences in climate, gardeners also found difficulties in searching for the taste of particular cultivars. While some gardeners harvested their preferred varieties of cucumbers and tomatoes, other gardeners found that their Vermont grown mustard greens were inferior in comparison to those they had in Bhutan and Nepal. As Bhutanese-Nepali gardeners navigated differences and challenges in new environments, they inevitably built new systems that incorporated, but did not totally replicate, past foodways.

Home is not replaceable, especially for those who have been forcibly displaced and involuntarily relocated. However, places of meaning and comfort can be created and negotiated. In building new and adapting old seed systems, Bhutanese-Nepali gardeners

form physical, social, and cultural connections to their new homes in Vermont. Through these choices and acts of agency, refugee gardeners access culturally significant foodways, preserving memories of home and continuing cultural practices. The importance of placemaking lies in how people are able to build connections between the known and the unknown rather than assimilate into the host culture or replicate traditional cultures. In this study, we limited our focus to the Bhutanese-Nepali refugee community. Future research should investigate whether these findings about the Bhutanese-Nepali community are relevant to other ethnic groups of refugee gardeners. In addition, other studies should look across different agroecological zones to see gardeners navigate different growing conditions. Lastly, the gendered and age-related differences in seed systems may reveal interesting social dynamics embedded in foodways and decision making.

Conclusion

This study has shown how seed systems are a path for the Bhutanese-Nepali gardening community to infuse cultural meanings and foodways in new places. It describes how although disrupted foodways can be traumatic, resettled refugees reclaim traditional ways and knowledge of seed saving and experiment with greenhouses and transplants, in the hopes of recreating the taste of home in a new land. This study highlights actions in seed systems and gardening to show how the processes involved in placemaking and foodways are intricately connected. In the actions that people take to ensure they have access to culturally significant foods, placemaking happens. Better

understanding strategies that people take to connect to their new lands and reestablish their traditional foodways can show new, bottom-up pathways for refugees to make meaning in their new lands with safety, dignity, and familiarity. This work broadens understandings of the different pathways that displaced peoples use to create senses of home in new lands and hopefully provides more avenues in seed systems research.

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CHAPTER 6: CONCLUSIONS AND FURTHER RESEARCH

Discussion

In the above chapters, I operationalize definitions of seed systems that Bhutanese-Nepali gardeners formed in Chittenden County, Vermont, exploring the market and non-market institutions that affect how farmers access, store, share, distribute, and learn about propagative materials (Lipper et al., 2010). In the US, a place where commercial seeds occupy a strong market, existing research fails to capture the diversity of seed systems. The United States hosts a plethora of food cultures and agricultural backgrounds. In their seed systems and other parts of their lives, resettled refugees must navigate the displacement from homelands and social networks. As research shows that geography and social relations are key factors in seed access and exchange, the seed systems that refugee gardeners form may reveal important lessons in agricultural resilience, especially after crisis and displacement. (Tadesse et al., 2016; Thiele, 1999). Besides, especially because refugee farmers might transition from communities where informal seed systems are the norm to a new place where formal seed systems predominate, this case study can shed light into how formal and informal seed systems work together in the best interests of smallholder farmers in the context of the United States. With data from 30 in-depth interviews, this thesis provided partial responses to and invites further research for the following research questions:

First, Bhutanese-Nepali gardeners obtain seeds and plant starts through market and non-market transactions in which we see a merging of both formal and informal seed systems (Lipper et al., 2010; Sperling and McGuire, 2010). In Chittenden County, Bhutanese-Nepali gardeners come from predominately informal seed systems in Bhutan and construct seed systems in Vermont with formal and informal components. The interview data showed that Bhutanese-Nepali gardeners obtain seeds and plant starts by buying from stores and farms, sharing amongst friends and acquaintances (both near and far), and saving seeds themselves. The important link between the formal and informal seed systems is highlighted in Bhutanese-Nepali seed systems. In this case, they appear to work best when they are intertwined (Thiele, 1999). The descriptions expand scholarly and public understanding of the importance of social interactions within both formal and informal seed systems and the interplay between the two.

Second, interview data show that the Bhutanese-Nepali gardeners' seed systems are socially constructed (Seboka & Deressa, 1999). The processes of seed buying, sharing, saving, and selecting are influenced by family, friends, strangers, and community organizations. Existing seed systems are formed and influenced by the gardeners and social institutions around them, as people are simultaneously influenced by these systems. Social relations among family, friends, strangers, and community organizations affect seed saving, seed access, and seed selection for Bhutanese-Nepali gardeners (Tadesse et al., 2016; Thiele, 1999). This thesis provides compelling evidence that there

are important social and non-documented transactions involving seeds that make it possible for home gardeners to save, share, and access the seeds they prefer.

Third, consistent with past research (Buck & Hamilton, 2011; Richards et al., 2009), flows of information and knowledge about seed saving, seed access, and seed selection exist within the existing social networks of Bhutanese-Nepali gardeners. The knowledge that is shared is specialized in accessing and growing specific Bhutanese-Nepali crops in the climate of Vermont. As Bhutanese-Nepali gardeners incorporate seed and garden topics into everyday conversations, information about stores, or advice on growing a certain crop is passed along. However, there are also gaps in knowledge, especially in regard to saving the seeds of particular crops, that exist in these information networks (Maredia et al., 2019).

Fourth, Bhutanese-Nepali refugees bring and adopt practices of their seed systems to Vermont by experimenting with new but similar varieties of crops they used to eat in Bhutan and Nepal and learning season-extending techniques to grow longer season vegetables they were able to grow in Bhutan year-round. Although Bhutanese-Nepali refugees have suffered traumatic displacement, they also reclaim traditional ways and knowledge of seed saving, and experiment with greenhouses and transplants, in the hopes of recreating the taste of home in a new land (Brook, 2003; Jean, 2015). This study highlights new skills and strategies that Bhutanese-Nepali draw upon to make their gardens in Vermont suit their needs.

Fifth, in the actions that Bhutanese-Nepali refugee gardeners take to ensure they have access to culturally significant foods, placemaking happens. Engagement in seed systems make place and create familiar cultural, social, and economic dimensions of food cultivation, production, and consumption (Oyangen, 2009). The processes in seed systems and gardening show how placemaking and foodways are intricately connected. However, placemaking cannot solve all the problems caused by displacement nor erase the foreignness of new environments (Klindienst, 2007). While some gardeners could grow preferred crop cultivars, other gardeners found that certain Vermont grown crops were inferior in comparison to those in Bhutan and Nepal. Bhutanese-Nepali gardeners build new seed systems that incorporate but do not completely replicate past foodways.

Theoretical Contributions: Placemaking in the context of seed systems

This thesis both supports and complicates how we understand placemaking can happen. This study uses physical entities – seeds in gardening – within their socially constructed institutions – seed systems - to examine how the theory of placemaking can apply to everyday acts. In this study, I found that as Bhutanese-Nepali gardeners navigated differences and challenges in new environments, they inevitably built new systems that incorporated memories and values from their home cultures. Especially for refugees who have been forcibly displaced and involuntarily relocated, home is not replaceable. However, in building new and adapting old seed systems, Bhutanese-Nepali gardeners form physical, social, and cultural connections to their new homes in Vermont. The importance of placemaking lies in how people can build connections between the

known and the unknown rather than assimilate into the host culture or replicate traditional cultures. The use of placemaking in this thesis does not focus on a binary goal of acculturation or a return to a homeland but rather looking at the choice and agency people enact to navigate to emplace familiarity within the unfamiliar while accepting parts of the unfamiliar. In the interview data, there were examples of when gardeners felt like they made significant strides of realizing important parts of their foodways, such as being the first person to bring tukruke to the Bhutanese-Nepali community in Vermont or growing enough produce to store for the entire winter. There were also experiences that gardeners shared regarding making compromises, like when a gardener grew a certain cucumber cultivar to find that he could replicate the taste he wanted but he could not grow the cucumbers as big as what he remembered in Bhutan. In other circumstances, gardeners were reminded of their displacement and isolation from home, like when a gardener described how not being able to grow Asian mustard greens like her mom made her miss her homeland. Overall, I can conclude that seed systems and gardening can offer opportunities to infuse new lands with familiar practices and preferences, but it cannot replace peoples' memories of and desire for home.

Specifically, in seed systems, we see that people incorporate new varieties, technologies, and knowledge to make places of familiarity that offer access to culturally appropriate foods and traditions in foreign spaces. Bhutanese-Nepali gardeners in this study both accepted and rejected parts of the new lands and home systems through their discriminatory use of informal and formal seed systems channels. For example, gardeners

turned to stores when they lacked the varieties that can only be attained from formal seed systems, to then use those same seeds and incorporate them into their informal seed systems. The goal for research moving forward should not be to analyze how refugees assimilate into a new place (which is a skewed perspective); placemaking is helpful as it emphasizes how the old is incorporated into the new. The making of place is not a linear pathway. Indeed, Pena (2006) reminded us that displacement and emplacement can occur simultaneously.

Placemaking theory has been applied in craft making, community gardening, urban design, and now in seed system studies (Breger et al., 2019; Lindemann, 2019; Maidment et al., 2019). This thesis provides an application of placemaking theory to a physical and symbolic context -seed systems. Like Strunk and Richardson (2019), with this application of placemaking theory, we add new avenues into thinking about how displaced peoples can emplace themselves into new surroundings. Especially with the increase in displacement of people around the world, more research is needed to see how people relate and react to the spaces around them. In this study, I emphasize the importance of agency and choice in navigating new spaces and cultures. I hope placemaking literature can provide evidence to support community driven city design projects.

Practical Implications

One general trend that I saw in this study was the importance of social networks within seed systems. However, it is important to note that in the case of Bhutanese-Nepali

gardeners, seed systems are still very much individually based, not formed from collective action. However, there also seems to be a context of care woven throughout these social relationships. This means that for practical implications, helping individual farmers access the seeds they need or providing education to a few well-known gardeners may reverberate benefits through that person's network.

Specifically related to seed systems, gardeners reported looking for different ways to make their crops taste more like home. The taste of home is highly subjective, but there is garden literature on how amending soil with certain nutrients can affect the taste qualities of crops. Besides, there were certain crop seeds that some gardeners had trouble saving: onions, broccoli, radish, potatoes, etc. Workshops or visual instructional posters geared towards troubleshooting these crops might interest many, even some very experienced, gardeners.

Also, it would be worthwhile to consider how community programs like NFNA and Winooski Community Gardens can better help support those with limited English and mobility. Older gardeners tended to ask their adult children for help accessing the formal seed system either for language support or transportation. Language barriers are a major obstacle for immigrants and refugees of any age, but older generations may feel these difficulties particularly as they are unable to navigate stores on their own. Given the importance of choice and agency in placemaking processes, I would also recommend that garden spaces aim to create handicap accessible garden spaces with access to nearby restrooms or composting toilets.

Stores that are frequently accessed by refugee communities can also provide more support for their limited English clientele. For example, Gardener's Supply a sort of social certification among Bhutanese-Nepali gardeners, as gardeners and gardening organizations recommend and have had positive interactions with these stores (McGuire and Sterling, 2016). The welcoming and supportiveness of stores could be improved by more visual aids, wider varieties of Asian and African crops, continued discounts for community gardeners, and delivery of heavy materials to garden sites. Other garden stores that receive many clientele who do not speak much English can also take these suggestions into account.

Finally, organizations that want to donate seeds, starts, and other materials to refugee gardeners should aim to do so in a way that maximizes the agency and choice of the aid recipients. Instead of direct seed aid (like passing out free packets of seeds), organizations with the means to do so should allow gardeners to choose and to share freely the seeds of their choice and through processes and pathways already familiar and acceptable to them.

Limitations and Additional Research

This thesis provides evidence that there is a diversity of interactions regarding seeds in the United States. Additional research should look at if other groups in the US construct seed systems with a broad array of seed preferences and values and seed saving, sharing, and sowing strategies. With existing literature on community gardening, I would expect that other refugee and immigrant groups whose garden would have similar

experiences with placemaking and social interactions with their seed systems. Future research should investigate whether these findings of the Bhutanese-Nepali community are relevant to other ethnic groups of refugee and immigrant gardeners. It is important to note that all interviewees in this study were US citizens. Future studies should further explore the impact of someone's legal status on how willing they are to speak candidly about their seed practices, especially if international seed transport is involved. In addition, research in different agroecological zones can reveal different ways of gardeners navigating different growing conditions. The goal of expanded research would help us better understand the diversity of seed systems in the United States, a place where such research is lacking.

At the time when I conducted my interviews, many gardeners were in the process of preparing their garden beds for the long Vermont winter ahead. This brings about questions regarding how this thesis speaks to the population of interest in the eight or so months when they cannot garden outside in the field. Indoor greenhouses offered by AALV and Winooski Community Gardens only start in March. Other authors have also asked similar questions: while the garden can be a place of reprieve, what do refugee gardeners do when winter comes (Klindienst, 2007)? I hope additional research continues to complicate these issues and prompt discussions and actions about the effects of seasonality on peoples' abilities to create home in new spaces and climates.

Although gender and affiliation with either NFNA or Winooski Community Gardens were sampling criteria, I did not identify patterns based on gender and

community garden affiliation. The interview data brought up important considerations for the future. Age differences may reveal interesting social dynamics embedded in foodways and decision making. In chapter four, I demonstrated how social support roles are reversed as middle-aged refugees need to rely on their children in the US. There were questions about if people can continue this practice in the future if children will want to garden or save seeds. The gardeners in this study reported that younger generations don't seem to have the same interest in gardening as the older generations. While this thesis looked at seed systems to see how refugees make a sense of home, it would also be interesting to use seed systems as a lens to see how different generations of refugees incorporate their or their family's farming background into their lives in the US. Future research should investigate whether these findings of the Bhutanese-Nepali community are relevant to other ethnic groups of refugee gardeners. Besides, other studies should look across different agroecological zones to see gardeners navigate different growing conditions. Lastly, the gendered and age differences in seed systems may reveal interesting social dynamics embedded in foodways and decision making.

Conclusion

Seed systems offer pathways in confronting growing food security and climate change challenges. In the US, a place where commercial seeds occupy a strong market, this research contributes to the understanding of different seed systems, with both market and nonmarket interactions (Lipper et al., 2010). The panic buying of seeds during the

COVID-19 pandemic highlights how in times of economic crisis, people turn to seeds and home gardens for food security (Robinson, 2020). However, unlike what is represented in the media and academic literature, there is a diversity of seed systems in the US. There is a great deal of social activity that goes into building a seed system, from learning about seeds to acquiring the seeds themselves. The importance of the choices in seed systems isn't only about being able to plant chosen foods, it is also actively having a choice in what they are willing to accept as new parts of life. Bhutanese-Nepali refugees had a range of freedoms taken away, and this thesis suggests that seed systems are one relatively accessible approach for them to reclaim some agency. However, these seed systems are also a continuous negotiation of the values, taste, preferences, and practices displaced people can bring from home and what they can adapt here. I recognize seed systems as a way to see how people use these physical materials to facilitate their access to physical and cultural sustenance. Ultimately, this study examined one avenue of adjustment Bhutanese-Nepali refugees use for placemaking while shedding light on the diversity of seed systems in the United States.

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APPENDICES

Appendix A: Research Information Sheet (English)

Consent to Participate in Research

Title: New American Farmers: Seed System Resiliency and Diversity
Principal Investigator: Dan Tobin
Sponsor: USDA Hatch Grant and Gund Institute for the Environment
Translator:

You are being asked to participate in a research study. You are asked to participate in an interview and/or survey on the seeds you save, share, plant, and select.

Before you agree, the investigator must tell you about (i) the purposes, procedures, and duration of the research; (ii) any procedures which are experimental; (iii) any reasonably foreseeable risks, discomforts, and benefits of the research; (iv) any potentially beneficial alternative procedures or treatments; and (v) how confidentiality will be maintained.

Where applicable, the investigator must also tell you about (i) any available compensation or medical treatment if injury occurs; (ii) the possibility of unforeseeable risks; (iii) circumstances when the investigator may halt your participation; (iv) any added costs to you; (v) what happens if you decide to stop participating; (vi) when you will be told about new findings which may affect your willingness to participate; and (vii) how many people will be in the study.

If you agree to participate, you must be given a signed copy of this document and a written summary of the research.

You may contact Dan Tobin at 802-656-4374 any time you have questions about the research. You may contact the Director of the Research Protections Office at 802-656-5040 if you have questions about your rights as a research subject or what to do if you are injured.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to stop.

Signing this document means that the research study, including the above information, has been described to you orally, and that you voluntarily agree to participate.

Signature of Participant

Date

Printed Name of Participant

Signature of Witness

Date

Printed Name of Witness

Appendix B: Interview Protocol

Thank you for agreeing to be interviewed. This interview will last about an hour long. I will ask questions about the seeds you grow, save, and share. There are no right or wrong answers, I am just interested in your experiences and knowledge. You may choose to not answer any question at any time. Thank you for your time. Do you mind if I record this?

1. Background of gardening practices

- Can you tell me how you first started gardening in Burlington? Where do you garden? How large is your plot?
- How much time do you spend gardening or farming per week?

2. Description of crops

- Will you tell me about the types of plants you grew in the past 3 years (what vegetables, fruits, varieties)? Why do you pick these plants to grow? What do you use these plants for? Did you grow these plants in your homeland?
- What is the most important crop for you to grow? Why? (Nutrition, storage, hardiness, easy to manage)
- What crops grow the best for you here in Vermont?

3. Seed Access

- Where do you source your seeds from? (grocery store, neighbor, home country)
- What has been the most successful ways of obtaining seeds for plants you want to grow here?
- Do you save your own seeds? What seeds do you save? Why do you save those particular seeds?

4. Seed Network

- Do you share your seeds? With whom? Why do or don't you share seeds? (To maintain social relations, to help new farmers, to protect your own special varieties?)
- Who do you receive seeds from? How 'good' are those seeds?
- This, like the other questions, is optional,

5. Similarities and differences in practices

- Did you save and share seeds in your home country?
- In what ways are your seed saving and sharing practices here similar to your practices in your home country?
- In what ways are your seed saving and sharing practices here different to your practices in your home country?

- What challenges and what successes can you tell me about your seed saving and sharing?

Thank you for answering my questions- I just have a few more.

6. Advice for other farmers

- What advice do you have for other refugee farmers who are trying to grow plants in Vermont? (Do you have advice for accessing seeds? Materials? Land? Education?)
- What would a system that could help people save and share seeds in Burlington look like? What would be the challenges? What would help make it successful?
- How can community organizations like NFNA or Winooski Community Gardens better support your needs?

7. Lastly, would you answer some demographic questions for me?

Gender

Marital Status

DOB, Location

Moved to Nepal (year)

Moved to US (year)

Primary Work

Appendix C: Educational Materials Created for AALV

Greenhouse Winter 2019 Curriculum

#	Date/Topic	Overview	Core Skills and Knowledge	Activities/Evaluation	Materials
1	Greenhouse Orientation	-Introduction to growing in the greenhouse	-Greenhouse systems and rules. Emergency phone numbers. Reasons to call. -Why and how greenhouses are used -Understand how a greenhouse works (light, heat, air, water)	-Thumbs up/thumbs down: gauging greenhouse knowledge -tour greenhouse -demonstrate starting seeds	-Images of the greenhouse with direct planting vs. planting in pots -Potting Soil -Pots -Seeds
2	The W's of growing crops in a greenhouse	-Seed starting: which, when, where & why	-Identify which crops are best started in a Vermont greenhouse -Calculate # of days from sow to harvest and plan when to sow seeds in a greenhouse	-Choose a plant to calculate when to harvest and sow seeds inside or outside -Sow in greenhouse or outside	-Vegetable ID cards -Seed Packets -Potting soil, pots, planting flats
3	Ongoing Plant Maintenance	- Troubleshooting greenhouse plant maintenance	-Identify what a plant needs: water, fertilizer, potting up, protection from pest/disease -How/when to harden off	-Plant health ID game -Hardening off exercise -Potting up plants, adding fertilizer	-larger pots -potting soil -fertilizer -pictures of pests and diseased plants

The W's Of Growing Plants In A Greenhouse

DATE: _____

of Participants: _____

Instructors: _____

Languages: _____

OVERVIEW & PURPOSE: Participants will learn the which, when, where & why of seed starting in a greenhouse versus direct planting in a field. Use the culturally significant crops, amaranth, African corn, African eggplant, daikon, mustard greens, as reference points, farmers categorize crops based on climate needs.

CORE SKILLS & KNOWLEDGE:

1. Understanding a seed packet with low English literacy.
2. Memorize the number of outdoor growing days in Vermont. (120?)
3. Identify **which crops** are best started **and where** (greenhouse or field).
4. Identify **when** each of these crops should be planted.

MATERIALS NEEDED

1. Vegetable ID cards
2. Seed packets (Red Peppers, Tomatoes, Eggplants)
3. Potting soil, pots, fertilizer
4. Calendar

PRE-ASSESSMENT

Pretest activity #1

With small groups, specific language groups, or the entire class, explain that you are trying to decide which plants to start inside the greenhouse and which plants to directly sow outside.

Students will sort vegetable ID cards into correct planting location using their best guess or past experiences.

Observations:

ACTIVITY

Distribute seed packets with images and clearly marked days to maturity to students. In small groups, students determine which seeds to plant outside and which to plant inside, written on them. Teacher reviews activity with students explaining why they put which vegetables in which location.

Explain the economics of which seeds to start in the greenhouse and which seeds to sow in the ground directly. Which plants are more expensive to buy in stores? Which plants are more vulnerable to cold? Which plants do not like being transplanted? Use vegetable ID cards to demonstrate.

Using Tulsi basil demonstration trays, show the difference between planting seeds with garden soil and potting soil. Talk about the difference among planting materials: compost, potting soil, peat moss, etc. Demonstrate how to plant seeds in starting trays.

Hands-on activity: Plant seeds in egg cartons and starting trays.

-Note- encourage farmers to bring in milk jugs for watering

ADVANCED SKILL: Students will arrange seed packets on a timeline (March 20th-May 1) based on when they would plant each crop.

LEARNING ASSESSMENT

Assessment #1

Repeat *Pretest activity #1*

With small groups, specific language groups, or the entire class, students will sort vegetable ID cards into correct planting location.

Post-test Observations:

My group seemed to understand the basics and we started going into more nuanced reasons of greenhouse vs. direct planting. It was really helpful to have the tulsi demonstration trays. This is a good chance to have a conversation about what people want to plant

HELPFUL HINTS FOR LESSON 2:

- Sometimes it is really helpful to have a single language speaking group
- Farmer understanding of hybrid seeds= high chemical inputs
- Some participants might be more advanced, and already have a good grasp on which crops to start in the greenhouse vs. the field. The teacher can skip the Activity and move directly on to the Advanced Skill with these groups.



3x/week



2x/week



1x/day



2x/week

SOIL HEALTH



NITROGEN DEFICIENCY



PHOSPHORUS DEFICIENCY



POTASSIUM DEFICIENCY



CALCIUM DEFICIENCY



LONG TERM SOIL HEALTH: COVER CROPS



BUCKWHEAT RYE

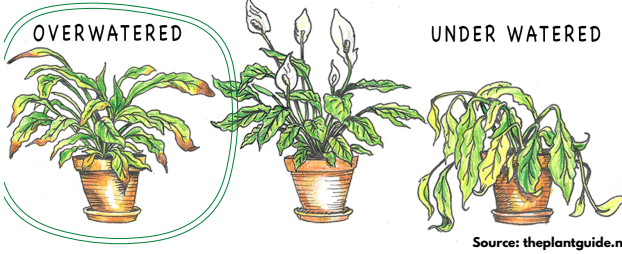
SHORT TERM SOIL HEALTH: FERTILIZER



- N** Nitrogen
• for plant color and growth
- P** Phosphorous
• for fruit & flowers
- K** Potassium
• for strong roots



Tips for overwatered plants



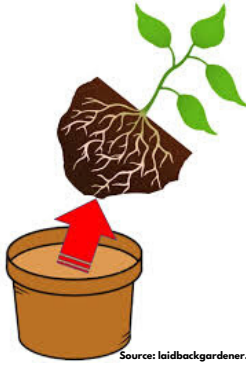
Move to shade



Check drainage holes



**Tap sides of pot to
create air space**



**Check and remove
rotten roots**



Improve drainage

