Free seeds and food sovereignty: anthropology and grassroots agrobiodiversity conservation strategies in the US South

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Abstract

Neoliberal economic frameworks threaten the ability of marginalized people worldwide to grow, harvest, and access sufficient healthy food because they deny traditional collective seed ownership and preclude subsistence as a viable livelihood. Many internationally-oriented counter-responses work to reframe intellectual property law in favor of traditional farmers. In the United States, various grassroots agricultural biodiversity conservation projects designed to re-establish the control of open-pollinated seeds within communities have emerged with similar intent. This article situates and explores the role of open-pollinated seeds and agricultural biodiversity conservation strategies in local food sovereignty. The authors direct applied research projects that collaboratively document and disseminate open-pollinated seed varieties throughout the Southeastern United States with a specific focus on the Ozark Highlands and Appalachian Mountains. The research methods represent an activist anthropology—participant observation and ethnographic interviewing while collaboratively growing and sharing seed varieties with local farmers, gardeners, seed-savers, and activists—with the explicit purpose of forging more sustainable, integrated, and sovereign local food systems.

Keywords: agricultural anthropology, agrobiodiversity, grassroots strategies, *in situ* conservation, seed saving

Résumé

Les cadres économiques néolibérales menacent la capacité des personnes marginalisées dans la culture, la récolte, et l'accès à des aliments sains de l'autosuffisance, parce qu'ils nient la propriété collective des semences et empêchent de subsistance comme moyen de subsistance viables. Beaucoup d'efforts internationaux ont tenté de résister à cette tendance en recadrant le droit de la propriété intellectuelle en faveur des agriculteurs traditionnels. Aux États-Unis, il y a nombreux projets communautaires de conservation de la biodiversité agricole. Ils sont conçus pour rétablir le contrôle des semences à pollinisation libre au sein des communautés. Cet article situe et explore le rôle des semences à pollinisation libre, et les stratégies de conservation de la biodiversité agricole, dans la souveraineté alimentaire locale. Les auteurs mènent des projets de recherche qui documentent les variétés de semences à pollinisation libre dans tout le sud-est des États-Unis, avec un accent particulier sur les Monts Ozark et les Appalaches. Les méthodes de recherche représentent une anthropologie activiste, impliquant l'observation participante et entretiens ethnographiques. Au même temps, nous cultivons et partageons des variétés de semences avec les agriculteurs locaux, les jardiniers, es gens qui épargnent les graines, et des militants. Un but explicite est de créer des systèmes alimentaires locaux qui sont plus durable, intégrée et souverain.

Mots-clés: anthropologie agricole, la biodiversité agricole, les stratégies de base, la conservation in situ, la conservation des semences

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Resumen

Mientras que los marcos económicos neoliberales amenazan la capacidad de las personas marginadas de todo el mundo para cultivar, cosechar y acceder a suficiente comida sana porque niegan la propiedad tradicional de semillas colectiva y se oponen a la subsistencia como medio de vida viable. Muchas contra-respuestas de orientación internacional replantean la ley de propiedad intelectual a favor de los agricultores tradicionales. Con una intención parecida, en los Estados Unidos han surgido varios proyectos de conservación de la biodiversidad agrícola diseñados para restablecer el control de las semillas de polinización abierta dentro de ciertas comunidades. Este trabajo explora el papel de las semillas de polinización abierta y estrategias de conservación de la biodiversidad agrícola en la soberanía alimentaria local. Ambos autores han dirigido proyectos de investigación aplicada que documentan y difunden las variedades de semillas de polinización abierta en todo el sureste de Estados Unidos con un enfoque específico en las Tierras Altas de Ozark y los Montes Apalaches. Los métodos de investigación representan una antropología activista - la observación participante, las entrevistas etnográficas y, a la vez, el compartir de semillas con los agricultores locales, jardineros, y activistas - con el propósito explícito de forjar sistemas alimentarios locales más sostenibles e integrados.

Palabras clave: Antropología Agrícola, Agrobiodiversidad, Estrategias de Base, La Conservación In Situ, Guardar Semillas

1. Introduction

At the beginning of the 21st century, the conventional food system in the United States engages in unsustainable practices: an over-reliance on non-renewable fossil fuels and irrigation water, over-application of biocides that poison drinking water and destroy the natural fertility of agricultural lands, dependence on monoculture production of a small number of crop varieties, and the long-distance travel of most foods—all of which make the system volatile and precarious (Bomford 2010; Magdoff *et al.* 2000; Pretty 2008). Despite record production of crops subsidized by the federal government, approximately 15% of US households experience food insecurity (Coleman-Jensen, Gregory and Singh 2013). Conventional strategies to ameliorate food insecurity place band-aids on gaping wounds and do little to resolve fundamental problems which stem from increasingly concentrated control of the food supply (Allen 1999). Multinational agrochemical corporations purchase and patent extant seed sources and make them unviable without chemical applications, thereby ensuring that farmers must buy seeds and inputs from them. Multinationals tout their biotechnology as a solution for food insecurity and poverty throughout the world (Shiva 2000). Yet, rates of poverty and malnutrition in the US remain as high as or higher than ever (Coleman-Jensen, Gregory and Singh 2013) and alienation from the food system makes the general public even more vulnerable to market whims and catastrophe. US settlements and communities have approximately three-to-five days' worth of total food for local populations; if transportation halts, chaos will likely ensue (Martenson 2010). Volunteer food bank systems and food stamp programs distribute industrial food to the hungry, but both strategies facilitate dependency and encourage diets that contribute to obesity and diabetes (Rikoon *et al.* 2010).

Instability comes from vertical integration whereby one corporation owns each step in the food system—from production through packaging and distribution—including monopoly seed control (Howard 2009). Multinational corporations have purchased and absorbed small seed companies and "disappeared" the myriad seed varieties they offered, resulting in a limited selection of genetically-modified or hybrid varieties commercially available to farmers (Howard 2009). Traditional farmers and their predecessors developed the seed stock (genetics) that contemporary agriculture's lab technicians need to create new commercial varieties through *in situ* and *in vivo* farmer-breeding. Farmer-breeding comes about when farmers work their fields and adjoining wildlands, tinkering with plants and selecting unique individuals and re-planting seeds for consecutive years to isolate and develop new varieties (Nazarea 2005; Rhoades 1989). Pockets of farmer-breeders persist in Indigenous communities in the Global South and on marginal lands scattered throughout the Global North, but compared to just a few generations ago, farmer-breeding has become an endangered phenomenon (Brush 2000; Shand 1997).

Yet, the farmer-breeder process remains integral to human subsistence. If we no longer have farmer-breeders managing and developing open-pollinated landrace varieties, no source for new germplasm exists (Brush 2000). As "weed" species, pests, diseases, and extreme droughts ravage industrial monocultures

despite numerous chemical and biotechnological applications, new sources of adaptive genetics become necessary. In light of such knowledge and concern about future food security and its interconnections with open-pollinated seed availability, agricultural anthropologists—and many other seedsavers, ranging from permaculturists and organic farmers to backyard gardeners and Indigenous community leaders—have stopped waiting for politicians to create solutions and have embraced grassroots strategies toward agrobiodiversity conservation and food sovereignty.

Applied work by agricultural anthropologists on collaborative and grassroots agrobiodiversity conservation projects is an important trajectory in recent approaches. With the general acknowledgement that *ex situ* conservation efforts by plant scientists were not comprehensive enough for a variety of reasons and in diverse contexts, *in situ* (Brush 1995) or *in vivo* (Nazarea 2005) approaches have been developed and championed by anthropologists as ways to do better conservation and be more sensitive to the needs of individual farmers and local communitites. Although many agree that *in situ* conservation should be used to complement, or in lieu of, *ex situ* collections (Veteto and Skarbø 2009). There are a variety of ways these approaches have been implemented. Such efforts include the raising of awareness in the form of education or diversity fairs (Tapia 2000), community seed banks (Nazarea 2006a), participatory crop improvement (Bellon *et al.* 2003), repatriation of diversity from *ex situ* collections into local contexts (Nazarea *et al.* 2013; Nazarea 2006b), the support and promotion of "eater-based conservation" (Nabhan 2008; Veteto *et al.* 2011), and the hosting and networking of seed swaps as illustrated by the case study below (see also Campbell 2012). Because of our unique ethnographic skills working with local farmers and communities utilizing a grassroots approach, anthropologists will likely continue to play an important role in efforts to ensure the continued maintenance and availability of agrobiodiversity in diverse world contexts.

In this article, we examine the relationship between recent increases in food insecurity and malnourishment and the precipitous decline in agricultural biodiversity. We present the historical trajectory toward contemporary seed consolidation and the current state of federal-level food security measures in the US. Drawing on personal and research engagements in food production and seed saving, we highlight grassroots strategies for agrobiodiversity conservation and food sovereignty, specifically discussing ways in which particular seed varieties and research projects have connected us to diverse actors and methods involved in grassroots agrobiodiversity conservation.

2. Agricultural biodiversity and traditional agroecology

Agricultural biodiversity (agrobiodiversity) refers to biological components that relate to sustenance and agriculture—including not only domesticated plants and animals, but also soil micro-organisms (rhizobia, fungi, pathogens) and macro-organisms (earthworms), arthropods (pollinating, soil-building, pest and predator insects), and wild species that contribute genetics to species and ecosystems that support human food production (Shand 1997; Thurston *et al.* 1999). Agrobiodiversity is essential because it ensures the ability of the planet to produce healthy food sustainably, maintain viable soil structure, and protect air and water quality (Shand 1997). Traditional knowledge constitutes another fundamental aspect of agrobiodiversity because of human engagement with diverse species over time that generated biodiversity in the first place (Orlove and Brush 1996). Humans are a key variable; without human intervention, domesticated species cannot self-propagate and out-compete other species (Shand 1997; Thurston *et al.* 1999).

As humans modify environments to support crop varieties and select desired characteristics, the process of distinctive varietal seed development ensures and facilitates community food security. Infra- (within a species) and inter-specific (between species) genetic diversity results in agroecosystem resiliency and sustained agricultural production in the face of continual environmental change (Altieri 2012, Altieri and Merrick 1987). Diversity of plant resources helps farmers respond to the threats climate change creates for agriculture (Altieri 2012; Veteto and Carlson 2014; Veteto and Skarbø 2009; Wolverton *et al.* 2014). Seeds constitute a key variable in sustainable food production in the context of global hunger and food insecurity. As Pretty (2009:2) explains:

> …solving the persistent hunger problem is not simply a matter of developing new agricultural technologies and practices. Most poor producers cannot afford expensive technologies. They will have to find new types of solutions based on locally available and/or cheap technologies…and inputs (best genotype and best ecological management) that minimize or eliminate harm to the environment…

In agrobiodiversity conservation, "activist anthropology" documents and conserves these "best genotypes" (varieties) for diverse eco-regions and disseminates locally-adapted genetic material. Such an approach follows the ecological reality that no uniform process or template exists for an agroecological system (Pretty 2009). Just as genetics and technologies "must be locally adapted and fitted to place" (Pretty 2009:3) to achieve sustainable agriculture, human networks focused on such production must also emerge organically. The food sovereignty concept emphasizes regional and local control of food systems, including but not limited to, "... farmers' access to land, seeds, and water while focusing on local autonomy, local markets, local production-consumption cycles, energy and technological sovereignty, and farmer-to-farmer networks (Altieri 2012:255). "Free Seeds" strategies are a grassroots approach to food sovereignty, as locally adapted crop varieties weave together networks of farmer-breeders and associated community partners (plant nursery-owners, church groups, extension agents, restaurant-owners and employees, consumers, related agricultural practitioners/developers, farm implement designers, beekeepers, farmers' market organizers, etc.) through seed dissemination and related educational outreach at community seed swaps (Coomes *et al*. 2015). As activist anthropologists, we integrate the social science of human-environment relationships (locally adapted seed varieties and their human communities) and the activism of growing out, organizing distribution and sharing, and promoting and publicizing the importance of heirloom seed varieties, which generates social capital and community networks that promote food sovereignty.

Traditional agroecology, where farmers grow food in diverse ways that mimic and adapt to local ecologies, provides a template for food security and sustainability because it creates resiliency and protection against crop failure (Altieri 2012; Altieri and Merrick 1987). Traditional farming populations have always managed fields and adjacent wild-lands through methods that maintain, conserve, and even enhance biodiversity (Altieri 1995; Brush 2000; Nabhan 1989). In marginal landscapes worldwide, subsistence farmers maintain suites of cultural adaptation that include their agroecological knowledge, technology, and plant genetics that provide enhanced adaptability and efficiency in their respective locales; but local knowledge and crop biodiversity increasingly disappear as farmers take on debt or enter the market and abandon traditional subsistence (Aistara 2012; Thurston *et al.* 1999). In response to agrobiodiversity loss, researchers have used two central approaches to agrobiodiversity conservation: *ex situ* ("out of place") and *in situ* ("in place"). *Ex situ* methods include agricultural research stations, arboretums, botanical gardens and seed/gene banks, while *in situ* agrobiodiversity conservation is an attempt to maintain biodiverse food production systems in places where co-evolution between humans and crop species continues (Nabhan 1989). Most conservationists now advocate a combination of approaches, but *in situ* remains preferable for sustainable development projects because it facilitates the farmer-breeding process and local adaptation to climate, pathogens, and pests; whereas with *ex situ* approaches, if seeds are not grown out regularly, they lose adaptability (Brush 2000). *In situ* conservation promotes the maintenance or rejuvenation of biodiverse agroecosystems through continued human engagement and provides a greater foundation for food security.

3. Food insecurity and food sovereignty

From the late 19th to mid-20th century, small-scale, family-owned seed businesses competed throughout the US commercial landscape. None of these seed companies were especially profitable, because while many other agricultural inputs (e.g. fertilizers, biocides and oil) must be purchased regularly, seeds self-reproduce. If farmers save seeds for planting the next year, they reduce expenses on that particular input, and reduce opportunities for corporate profit (Kloppenburg 2005; Mooney 1979). Therefore, seed companies were not an attractive investment until biological and legal strategies—hybridization and patenting—forced farmers into the purchase of seeds as an annual input (Kloppenburg 2005). The offspring of hybrid plants do not "grow true" or express the characteristics of parent plants and therefore are not conducive to seed saving.

The emergence of the hybrid seed-corn industry in the 1930s, which produced higher yields in optimal conditions, encouraged an abandonment of seed-saving. Hybridization alone did not warrant industry investment in seed companies. Rather, it was the "enforcement of patent-like protections, which attracted the entrance of chemical and oil companies to add to their portfolio of agricultural inputs" (Howard 2009:1271). When agrichemical corporations released transgenic seeds with full patent protection in the 1990s, a competition ensued whereby they absorbed as many small family-owned seed companies as possible (for an alternative viewpoint see Heald and Chapman 2011). Agrichemical companies wanted into the seed business because they could bundle sale of seeds with other requisite inputs such as proprietary glyphosate herbicide (Hayenga 1998).

The consolidation of the food supply occurs through horizontal and vertical integration and has increased as a result of international trade agreements (Srinivisan 2003). The World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), along with extravagant research and development expenses, virtually ensures that only a handful of corporations control the majority of the industrial food supply. As Howard (2009:1271) explains:

> The top three seed firms currently control 85% of transgenic corn patents, and 70% of non-corn transgenic plant patents in the US…Although the Global South is the locus of the majority of the world's agricultural biodiversity, the seed industry is dominated by firms from North America and Europe that utilize intellectual property protections to exploit this wealth.

Such consolidation in the seed industry exacerbates unsustainable land management practices and food insecurity because agronomic research focuses on the development and improvement of proprietary varieties that generate profits rather than locally adapted open-source varieties that grow well without external inputs. Despite corporate lip-service on the importance of biotechnology research in poverty and food insecurity alleviation, seed industry consolidation demonstrates that their interest lies in profits, prominently through the creation of farmer dependency on seed purchase and agrichemicals. During the latter half of the 20th century, nutrient content of commercial crop varieties decreased as varietal research focused on uniformity suitable for mechanical harvest, good response to chemical fertilizers, resistance to agrichemical applications, and long shelf-life after long-distance travel (Davis *et al.* 2004). These foci illustrate corporate disinterest in nutritional values, human and environmental health, and availability of food to insecure populations.

Globally, many farmers continue to save seeds, yet this vital agricultural tradition has declined significantly throughout the 20th century (Shand 1997), particularly in industrialized nations. We have documented seed saving decline in our respective field sites as well as reductions in domesticated diversity—the range of crop varieties used in food production (Campbell 2009; Veteto 2012, 2008, 2005; Veteto and Welch 2013). While the exact numbers on genetic erosion remain unclear, the trend is downward, with losses estimated at 1-2% annually (FAO 1993), or approximately 75% of all agrobiodiversity during the 20th century (Shand 1997). The rapid spread of modern industrial agriculture and reduction of the farm population, with attendant replacement of traditional varieties and systems, causes erosion of crop and livestock diversity (Shand 1997; Thurston *et al.* 1999).

For food systems to achieve sustainability, producers must be able to source their needs locally, without unnecessary expenditures on external inputs. Seeds represent the most fundamental of inputs; locally-adapted, open-pollinated seeds allow for sustainable food production in a post-carbon future. Corporate strategies that preclude seed saving and replanting create significant obstacles to local food security (Shiva *et al.* 2012). Additionally, modern industrial agriculture's dependence on fossil fuels and biocides prevent sustainability. The use of biocides (herbicides, pesticides, fungicides) to kill all non-crop species reduces farmers' ability to utilize on-site biological inputs, such as animal manure for fertility, beneficial insects and soil micro-organisms to increase fertility and prevent pest infestation, and insects as pollinators (Altieri 1995). The ubiquity and non-renewable characteristic of fossil fuels in modern agriculture presents an important reason to preserve local agroecosystems that are not petroleum-dependent (Bomford 2010). The industrial food system cannot function without oil; every step in the modern agricultural process

requires it. As fossil fuels become prohibitively expensive because of diminishing reserves, modern agriculture will likely falter, and local communities will again need to grow a majority of their own food (Bomford 2010). Global climate change also necessitates that local communities have a range of crop varieties to ensure that food systems can adapt to weather variability and shifts in growing seasons (Parker and Schwartz 2010; Veteto and Carlson 2014; Veteto and Skarbø 2009).

Food insecurity

Despite efforts to establish a safety net, poor diet quality and food insecurity have increased significantly throughout the US over the last decade, especially among vulnerable populations such as ethnic minorities and rural, low-income women with children (Kropf *et al.* 2007; Rikoon *et al.* 2010). Recent US Department of Agriculture (USDA) surveys indicate a sudden spike in food insecurity from 2007 to 2008 during the global economic downturn (Barrett 2010; Coleman-Jensen, Gregory and Singh 2013). Approximately fifteen percent of US households (17.9 million) experienced food insecurity during 2011. These households "...were uncertain of having, or unable to acquire, enough food to meet the needs of all their members because they had insufficient money or other resources for food" (Coleman-Jensen, Gregory and Singh 2013: 1). To combat hunger in the late 2000s households attempt a "...variety of coping strategies, such as eating less varied diets, participating in Federal food assistance programs, or getting emergency food from community food pantries" (Nord *et al.* 2008:iii). One in every fifteen US citizens utilizes some part of the "National Nutrition Safety Net" managed by state and local governments, including the "Special Supplemental Nutrition Program for Women, Infants and Children" (WIC), school lunch and breakfast programs, and private-sector emergency food programs such as food banks (Coleman-Jensen, Gregory and Singh 2013).

US food assistance programs placate hunger, but "...do so by providing poor Americans with a minimally adequate diet, codified in the thrifty food plan (TFP)" (Dickinson 2013:7). The USDA employs four distinct food budgets depending on socio-economic status; the plan for the poorest US citizens, the TFP, "serves as a national standard for a nutritious diet at a minimal cost and is used as the basis for maximum food stamp allotments" (Carlson *et al.* 2007:1). This plan for the poorest citizens removes concerns with food production methods and health implications, focusing strictly on cost. The least expensive foods available in the US derive from commercial crops that receive the highest percentage of subsidy payments (EWG 2013). The design of the food stamp program predetermines that processed, subsidized foods constitute the only option for families who cannot afford to purchase their own food (Dickinson 2013). As a result, food-scarce households have higher rates of obesity compared to those with sufficient food and obesity increases as levels of food security worsen (Holben and Pheley 2006). While precise explanations remain elusive, researchers suggest that food insecure individuals may overeat when food is available; but the more likely explanation is that unhealthy, low-cost, high-fat foods—"proletarian hunger killers" (Mintz 1995)—are all they can access.

The connections between hunger relief food options and health risks, such as obesity and diabetes, reveal inherent problems with current relief strategies (Allen 1999). Problems stem from a collusive relationship between government and industry—the foods made available to hunger relief recipients are "...doubly subsidized, once in the form of direct subsidies to the industrial farmers who grow them and once again through the structure of the food stamp program, which essentially forces poor consumers to rely on these products" (Dickinson 2013:7).

Historically, US federal hunger alleviation programs were not exclusively focused on helping the poor; rather they engaged in crop-surplus purchase and redistribution to the poor to support farmer incomes, and such funds were unavailable when the government perceived they negatively affected agricultural markets (Lipsky and Thibodeau 1990). After social programs came into existence with the intent of assisting low-income people, subsidization of the food industry remained a key reason for the existence of such programs (Allen 1999). As studies continue to demonstrate the negative health implications associated with the modern industrial diet and government programs aimed at food insecurity continue to work for industry rather than citizens, developing grassroots options for access to healthy foods is an increasingly attractive option for local communities.

Agrobiodiversity and the critique of "food security"

The United Nations Food and Agriculture Organization (FAO 1999:5) defines agricultural biodiversity as: "the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security." Importantly, the FAO recognizes the interconnection between agrobiodiversity and food security. Yet, the FAO's definition and concept of "food security" has been debated, politicized, and rejected by farmers' groups because it has failed to promote local food supply and control. The FAO's first official definition of food security was "the availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices" (FAO 2003:27). Critics point out that this definition reflected a top-down, market-oriented perspective that focused on distribution and price stabilization (Patel 2009). By 2001, the FAO had changed the definition to: "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO 2003:28). The broader definition and inclusion of health considerations reflects the critique and growing resistance of food and farmer activist groups and policy-oriented NGOs (Patel 2009). Despite this revamped definition, critique persisted because of the omission of the social control aspect, as noted by Patel (2009:665):

> As far as the terms of food security go, it is entirely possible for people to be food secure in prison or under a dictatorship. From a state perspective, the absence of specification about how food security should come about was diplomatic good sense—to introduce language that committed member states to particular internal political arrangements would have made the task of agreeing on a definition considerably more difficult.

Critics argue that if governments use food security as their primary policy objective, they ignore social processes that create inequality and cause hunger (Patel 2012). Farmer rights groups advocate the replacement of "food security" with "food sovereignty", which has a range of interpretations, but at its core means that people should control their food systems. This concept tends to stress a more populist determination of food and agricultural policies. Schiavoni (2009:682) explains that food sovereignty emphasizes "...restoring control over food access and food production from large corporations and international financial institutions back to individual nations/tribes/peoples—and ultimately to those who produce the food and those who eat it…Contrary to the one-size-fits-all mentality, food sovereignty, by its very definition, is locally adaptable."

Food sovereignty and seed libraries in the US

Most food sovereignty-related discussion and activism focuses on policy reform. We support such engagement, but also recognize that food sovereignty depends on agrobiodiversity conservation and dissemination. The revolving door between government and the agricultural industry in the US results in policies that favor subsidization of commodity crops rather than prioritize peoples' access to healthy food. This political collusion is not likely to change any time soon, regardless of the citizen majority's will. Political lobbying and advocacy alone will not achieve food sovereignty. We have no illusions about regional seed activism serving as a viable substitute for programs that provide continuous food access, especially for vulnerable populations. The grassroots development of self-reliant food systems complements political efforts to achieve justice and equity—which is the heart of the food sovereignty concept. Everyday forms of resistance, like growing vegetables and medicinal plants, saving seeds, opting for local foods and those grown without biocides, may seem inconsequential considering the scale of agroindustry, but en masse, can have significant effects (e.g. Scott 1990).

The growing "Seed Library" movement in the United States (see seedlibraries.org) represents a grassroots response to genetic erosion and food insecurity. Seed libraries utilize existing infrastructure, such

as community museums or county libraries. These public spaces have community visitors looking to check out books, DVDs, and magazines; the movement poses the question 'why not seeds for their gardens also'? A seed library serves as a depository of seeds that are held in trust for the library members. Just like books, members check out seeds, grow them, let some "go to seed", and then return approximately the same amount (or more) to replenish the libraries' seed stocks. Members may borrow seeds, like books, for free. This addresses a key impediment to seed banks—the expense of growing out germplasm—because community members grow out seeds for the library, they become locally adapted, and it creates a community of gardeners who share knowledge and genetics. The library is also an ideal location to host workshops on seed-saving. New gardeners can check out seeds that are the easiest to grow and save seeds from—varieties that do not cross-pollinate readily. Seed library content can be organized according to varietal difficulty and student/members can take exams to graduate to the next level of complexity in seed-saving.

The impetus for starting a seed library can easily stem from a seed swap, where community members express interest, share contact information and then establish an open-pollinated seed supply to check out to members. With some coordination, a seed library can maintain the viability of a wider variety of seeds because different people grow out varieties in different locations, preventing chances for cross-pollination and removing the need for cumbersome isolation techniques. Yet, it also complicates things because the skill sets of the gardeners also vary (hence, the need for workshops). Having a central location with free locally-adapted open-pollinated seeds and a network of educated growers enhances food sovereignty and the ability to "reskill" local populations with farmer-breeder techniques and abilities that have largely disappeared in US society. Seed librarians have dedicated themselves to this "re-skilling" through online videos and a "Create A Library" website that "includes … brochures, organizational material, orientation material and an outline of our process to support other communities in starting seed lending libraries" (Transition 2015).

4. Anthropology and agrobiodiversity conservation in the US South

Campbell (2014) intensively researched cowpeas (*Vigna unguiculata*), also known as southern peas and field peas, along with many other unique varietal names such as Holstein, Lady, Mississippi Silver, Polecat, and Red Ripper; because they are such a versatile, ubiquitous species in subsistence food systems. Cowpea seeds are easy to save, so they remain quite popular among gardeners and seed-savers in the southeastern US (Campbell 2010, 2014; Veteto 2010, 2014). The vines provide nutritious fodder for livestock, the peas are highly nutritious for humans and animals, and they fix nitrogen for other companion plants for soil enrichment (Campbell 2014). Cowpeas come in a wide range of color patterns and produce well in poor soils; a combination that makes sharing them with other seed-savers or aspiring gardeners especially viable because regardless of individual skill level, the chance of success is good. The practicality of the cowpea stands out when doing research on crop species and varieties desirable for programs in food sovereignty. Yet, cowpeas have fallen out of favor with mainstream US cooking because they are not ideal for processed foods—their preparation is more time-consuming (Campbell 2014).

The marginalization of the cowpea epitomizes the relationship between agricultural biodiversity and delocalization: as people and systems opt for uniform, quick and easy approaches, they abandon long-standing food traditions based in:

1) productivity of local biophysical constraints (agricultural biodiversity, climate, energy, hydrogeology),
2) flavor,
3) cultural history, and
4) nutritional and/or medicinal value.

How do we re-establish local food traditions that conserve agricultural biodiversity? How do we reinvigorate the palate and reorient ourselves toward healthy foods? Most humans love to eat, drink, dance, and acquire new things—so a community seed exchange with music and food addresses those human predilections. Human societies commonly build-in leveling mechanisms such as parties and public events where resources

are re-distributed from the wealthiest to ensure all members have necessary resources (Boas 1966). Seed swaps follow this political pattern because those with the best and the most seeds gain prestige through dissemination and they renew local subsistence traditions that establish alternatives to the economic model of the conventional US food system (Campbell 2012). Seed exchanges allow gardeners and farmers from diverse age, gender, ethnic and subcultural groups to share knowledge and genetics adapted to their home bioregion. Robert Rhoades and Virginia Nazarea, founders of the Southern Seed Legacy, held such gatherings annually to bring together seed-savers and spread good seed and cheer.

The Southern Seed Legacy Project at the University of Georgia

The Southern Seed Legacy (SSL) was founded in 1996 in the University of Georgia Department of Anthropology as a Southern Sustainable Agriculture Research and Education (USDA-SARE) grant-funded project directed by Rhoades and Nazarea. The SSL takes an agroecoregion approach to *in-situ* agrobiodiversity conservation in the US South, aiming to identify seed-savers and seed saving networks in diverse agroecoregions (e.g. Appalachia, the Ozarks, Piedmont, Delta). Once identified, each seedsaver and organization that has worked with the SSL serves a node in the SSL network of collaborative conservation.

Using Nazarea's (2006a) memory banking approach, the SSL has focused on conducting in-depth life-history interviews with heirloom gardeners, farmers, and orchardists. SSL has a backstop seedbank containing over 1,000 Southern US heirloom seeds; but contrary to conventional genetics-focused seedbanks, it puts more emphasis on documenting and circulating the unique cultural, familial, and agroecological histories that accompany Southern seeds. The SSL has conducted hundreds of oral history interviews over the past eighteen years. Its unique approach to strengthening seed saving networks includes the program Pass Along Southern Seeds. When members join the SSL, they have the ability to access much of the heirloom seed collection each year. When the SSL sends out seeds and stories to network members, they are asked to grow and keep 1/3 of the seeds for themselves, send 1/3 of the seeds back to the SSL, and pass along 1/3 to a neighbor or friend. In this way, the SSL is able to continue the circulation of Southern seeds and stories among the populace, and interest new generations in nurturing the legacy of their forbearers and elders.

Another distinctive aspect of the SSL approach has been the hosting of an annual "old-timey" seed swap to encourage interest in and sharing of Southern heirloom seeds. The original seed swap began and continues in Oglethorpe County, Georgia and has expanded to other Southern states including Arkansas, Texas, and North Carolina. Seed swaps allow space for a range of heirloom gardeners to set up displays and exchange seeds and are often accompanied by cultural and culinary activities such as old-time, bluegrass, and American folk music; Slow Food potlucks, and the serving of unique regional variants of Southern barbecue (often using locally grown, heritage hog breeds). Over the years the seed swaps have provided venues where a wide diversity of Southern peoples and cultures exchange seeds and ideas (Figure 1). Technically, all one needs to participate in a seed swap is an interest in gardening—having seeds is not required—but in the spirit of reciprocity it is good to bring something useful to trade such as cuttings or starts from established garden plants, seed-storing envelopes, or garden implements.

Conserving Arkansas' Agricultural Heritage seed swaps

Campbell trained under Rhoades and Nazarea at the University of Georgia, conducting agrobiodiversity research in coastal Georgia USA and in Cotacachi, Ecuador under their supervision. When provided the opportunity to start an applied anthropology program in Arkansas, he knew from his previous research that there remained a strong Ozark tradition of self-reliance, which included seed-saving (Campbell 2005, 2009, 2012). He applied his Southern Seed Legacy experiences and training and founded and directed an agrobiodiversity conservation initiative, Conserving Arkansas's Agricultural Heritage, or CAAH; the acronym sounds like a crow, a reference to the folk prescription for how many corn seeds to put in each hole when planting: "One for the cutworm, one for the crow, one to (rot) share, one to grow." Campbell conducted collaborative research with farmers and gardeners to document and collect local seed varieties and

coordinated the inaugural Ozark Seed Swap at the Ozark Folk Center in Mountain View, Arkansas in 2007, which multiplied to fourteen seed swaps throughout Arkansas within four years (Figure 2).[2]

Figure 1: A 2009 SSL seed swap in Crawford, Georgia. Source: Susannah Chapman

People in Arkansas, and the Ozarks in particular, maintain a cultural tradition of rugged independence, so the area was fertile ground for a concept that re-invigorated self-sufficiency and local control of seeds. While seed saving had decreased significantly over the last quarter century in the Ozarks, many people continue to grow large kitchen gardens, so they had infrastructure in place to plant open-pollinated (heirloom) varieties acquired at swaps. Ozark farmer-gardeners reminisce about varieties no longer grown locally, and when they are reacquired, it connects people to their family, land, and past (Campbell 2010). While CAAH established a substantial seed bank, eventually holding over 500 distinct open-pollinated varieties—including over 150 local Arkansas heirloom varieties—the approach was more grounded in *in situ* rather than *ex situ* conservation. Campbell and his students coordinated with communities throughout Arkansas to host seed swaps. At first, they arranged all the details of the swaps—reserving a location, typically a public library or church—then advertising on online news sites, gardening sites, and through the university public relations wing. Seeds and educational literature were distributed at each swap. After some trial and error, and excessive growth in swaps, the standard protocol became as follows: a community or individual who requested to have a seed swap in their town would secure a location on a particular date and assist in the advertising; then Campbell and CAAH students and volunteers would attend with seeds and educational literature to distribute while also documenting local varieties that other gardeners brought with them. Methods from cultural anthropology (Nazarea 2006a) served the project well, as extensive details were documented about the diverse seed varieties collected, ranging from historical and cultural information to agronomic details.

The networking opportunities, dissemination of locally-adapted genetics and related agroecological knowledge between diverse participants—especially from elders to younger generations—make seed swaps

[2] A documentary film entitled "Seed Swap," which regularly airs on Arkansas' PBS affiliate AETN (http://www.aetn.org/programs/seedswap), showcases the development of the CAAH project.

potentially more vital to agrobiodiversity conservation and food security/sovereignty than seedbanks. As Nazarea (2006a:16) explains: "The overall goal of the memory banking project and the protocol is to help preserve diversity in relation to food crops. Because using is still the best antidote against losing, cultural and genetic diversity are mutually reinforcing…" Seed banks require growouts; if seeds are not grown out regularly they lose viability and the ability to adapt to changing environmental conditions (Nabhan 1989). To ensure that they continue to adapt, CAAH spreads seeds among bioregional growers who can both replicate and increase seed stocks and bring them back the following year to share.

Figure 2: Ozark seedsavers at 2011 CAAH seedswap in Mt. View, Arkansas. Source: Zachariah McCannon.

5. Lessons from seeds

As anthropologists involved in agrobiodiversity conservation, we work to ensure that heirloom seeds are spread around and not lost. Nazarea (2005:157) situates the need for anthropologists' contributions to community networks: "Seed-savers in the United States are notoriously independent. They tend not to participate in formal programs (they're too busy tending plants), and are not integrated into cohesive groups." Without researchers and community networkers to document, conserve, and share seed varieties, they could easily go extinct. The following account from a seventy-one year-old woman in Damascus, Arkansas highlights the role of seed-savers as farmer-breeders and illustrates how and why seed varieties are lost, abandoned, and kept:

> We call it a Miller Bean. My mother-in-law said her mother brought them here, no tellin' when. I've had 'em for 53 years, and they had 'em for years. The Millers came to Damascus from South Carolina in wagons. I saw some beans that look like this Miller Bean in the store; they have a red eye, but don't taste like them; they weren't as good. Usually there's about four or five seeds to the pod, but occasionally there's 6 or 7 in the pod, so I save those [with 6 or 7 in pod] and plant them separately to try to breed. The story about the Miller beans is that we almost lost them during the Depression because of the droughts. They were down to 3 seeds…they got three plants…and they just stood over them and hand-watered them.
>
> I save Rice peas also. They make lots of peas, but most people won't mess with them because they're teeny–tiny. My husband's aunt gave them to me; most other people let them go, they were too tedious [to shell]. I scattered them amongst my family because they all liked them so much. For some reason I did lose the seed once. There was a Purple Hull Crowder, from down in Desha county, [I] kept them for years, then they went out. [I] can't find them anywhere now….Over 50 years ago … I got those…probably the last of the Sugar Crowders, [I] got 'em from a man at Shady Grove; he passed away. He raised them for years; he gave me

> some, I'm too low right now to share, you gotta come back next year… I just save seeds from the ones [varieties] that are more rare. The ones that you can't go get in the store, I keep (Miller 2012).

Multiple variables together or individually can lead to the loss of a crop variety. Sometimes, as with the Rice Peas above, the time required becomes too cumbersome and a family abandons a traditional practice, or weather or pests or other variables causes the loss of a crop variety. If one particular member of a household acts as the sole custodian of family seeds and they suffer an ailment or injury that prevents them from planting the seeds, they could easily be lost. We have encountered many stories of family seeds being left in a freezer that was unplugged (destroyed by mold) or in a barn (lost viability from exposure to heat/cold extremes). This was because the household seed steward died or became unable to tend to their gardens.

The quote above also gives insight into the mindset of a farmer-breeder; the ostensibly inconsequential act of continuously saving the pods with more seeds (6-7) to plant each year influences the genetics and results in a distinctive, locally adapted population. Seed-saving farmers and gardeners around the globe engage in similar conscious decisions, with the seeds they opt to plant that change the genetic makeup of seed varieties. Contemporary seed-savers and farmer-breeders serve an important role in the maintenance and development of unique genetics; as their numbers fade, agricultural biodiversity decreases. Anthropologists and community organizers who establish agrobiodiversity conservation networks also play an important role because they disseminate seed varieties that may otherwise be lost; but also, they have the potential to add to the farmer-breeder ranks by educating the public (and their students) on the significance, logistics, and joys of seed saving.

Red, white and blue: Native *American corn*

Red, White and Blue corn is a long-season, Native American dent corn that grows up to fifteen feet tall in moist growing seasons (Figure 3). A unique feature of the corn is that in some seasons it will produce, in addition to its regular two ears of corn, a small 'baby corn' (similar to those used in Chinese cooking) that grows adjoining both of the regular-sized ears. The baby corn is delicious and at its base is a layer of fibers that is very sweet. In addition, the stalks of the corn are sweet like sugar cane. Veteto first received Red, White and Blue corn seed from Jimmy Cooley of South Carolina at the Southern Seed Legacy Old-timey Seed Swap in Crawford, Georgia in the spring of 1997. Cooley had acquired the seed from a farmer from Heard County, Georgia whose family had been saving it for over 150 years. The farmer's ancestors had acquired the seed from Native American friends. The tribal name of the group was not passed along with the story of the seeds; they were probably Muscogee (Creek) Indians. They were being forced out of their homeland west to "Indian Territory" (the present US state of Oklahoma) because of the Indian Removal Act of 1830 (Purdue and Green 2008). The Native family had traditionally grown the Red, White and Blue Corn and asked their white family friends to grow it "because it belongs here." The Georgia family had grown it for 150 years until passing it along to Jimmy Cooley in the 1990s who then shared it with the SSL and Veteto in the 1990s.

Red, White and Blue Corn has been grown by Veteto in Oglethorpe County, Georgia in 1998, at the Arthur Morgan School (AMS) in Celo, North Carolina from 2000-2003, at Appalachian State University in 2004-2005, and as SSL coordinator again in Oglethorpe County from 2005-2007. Veteto is currently growing a patch of Red, White and Blue corn in a "three sisters" (corn, beans, and squash) garden in Celo, North Carolina at the Appalachian Institute for Mountain Studies/Seed Legacy Farm. Along the way, he has passed the seeds on to dozens of Southern heirloom gardeners from Georgia and North Carolina to Arkansas and Texas. These individuals and organizations range from Earth First! and Food Not Bombs anarchists to permaculture farmers, traditional communitarians in Texas, old-time Southerners in Tennessee, to Campbell and CAAH in Arkansas. When Veteto taught at AMS, middle-schoolers would be out-in-the-field eating the fibers at the base of the baby corn or sucking on stalks to get a sugar rush between classes. During the Thanksgiving holiday, they would hand-grind the corn into a delicious and beautiful cornbread containing red, white and blue flecks within it. Red, White and Blue is a very patriotic corn (containing the colors of the American flag) but in the *original* (i.e. Native) American way. As the students learned about the history,

botany, and agroecology of the corn, they were engaging not only in education and conservation, but acts of everyday resistance against erasing the history of American imperialism and genocide and in the persistence of Native American cultures and seeds.

Figure 3: Red, White and Blue Corn. Source: James Veteto.

6. Changing direction, keeping course

In the Spring of 2010, the future of the SSL became uncertain because of the untimely death of its co-founder Robert Rhoades. In the wake of Rhoades' passing, it was with heavy hearts that a group of graduate students and recent PhDs met with Nazarea (Rhoades' wife and co-director of the SSL) to determine the future of the SSL. Without Rhoades, Nazarea revealed that she did not have the energy to carry the project forward. After discussing many options, including shutting the SSL down, Nazarea and SSL-associated graduate students decided that the recently-minted Dr. Veteto should continue the SSL out of his new lab at the University of North Texas (UNT). The official transfer of SSL to UNT in the spring of 2011 coincided with a Seed Swap in Hot Springs, Arkansas (Veteto's hometown) co-sponsored by Campbell and CAAH (Figure 4). The agrobiodiversity conservation concept designed by Rhoades and Nazarea was being realized in Veteto and Campbell's projects and we were now cross-fertilizing and producing an even stronger grassroots network. This first UNT SSL seed swap symbolically reconnected the seed collections; as Veteto had sent Campbell start-up materials for CAAH from Nazarea's Ethnoecology/Biodiversity Lab at UGA while he was still the graduate coordinator of SSL.[3] CAAH had started as an offshoot of SSL, but by 2010 it was an independent organization with extensive activities throughout Arkansas.

The ambiguity that resulted with Rhoades passing illustrates an obstacle and an opportunity for applied researchers; if academics are the primary force behind an outreach program, they must establish firmly-rooted community partners. As CAAH grew, Campbell established relationships and partners to ensure the project could function without him. For CAAH to be sustainable, seed swaps needed to be run by community members, so local organizations were required as collaborators. CAAH provides seeds and information about how to save seeds, but local organizations set up and host events. Now, this approach will be tested. Campbell has taken an opportunity to teach at another institution, Berry College, in northwestern Georgia. He has concerns that CAAH, the project he developed and nurtured, could falter.

[3] In the fall of 2014, the SSL was again moved to its new home at the Appalachian Institute for Mountain Studies (AIMS; see below) in Yancey County, NC with support from Western Carolina University, where Veteto is now an assistant professor. Campbell's move to Berry College in the Appalachian mountains of NW Georgia (see below) again allows them to collaborate in locations within five hours drive of each other with the goal of strengthening *in situ* seed saving networks in southern Appalachia.

Campbell researched possibilities for ensuring that CAAH remained a viable community seed bank that safeguards conservation of local agrobiodiversity through distributing free seeds. The approach taken represents a viable template for communities in the United States because of the widespread availability of community partners in the form of county museums, libraries, and agricultural extension offices. CAAH's community network includes a county museum with growout gardens, the county library with community garden and a seed library—and a non-profit organization, The Southern Center for Agroecology (SCA), which took over seed swap operations throughout Arkansas and grows seeds to distribute. Campbell had hosted seed swaps at both the county museum and library previously and was in the process of establishing a seed library at the public library when he accepted the new teaching post. To ensure that the seed bank remained available for the bioregion to which it belonged, Campbell explored different possibilities, including another university connection. Ultimately, the local non-profit, which has a stable board of directors and works collaboratively with a successful organic farming operation, became the best option because there are multiple community members invested and the infrastructure exists for growing out the seed bank to ensure its viability. A freezer was donated to the local museum to establish a backstop seed bank where reserve populations of all the local seed varieties collected by Campbell and collaborators will be stored.[4] The county library, that now doubles as a seed library, obtains seeds as necessary from the other partners for distribution. Seed libraries are an innovative new strategy in agrobiodiversity conservation and such an approach became another outgrowth of CAAH that ensures seeds will continue to disseminate.

Figure 4: James Veteto swapping seeds with a local seedsaver at the 2011 SSL/CAAH seed swap in Hot Springs, Arkansas. Source: Alena Veteto.

While researching the seed library concept, Campbell learned about a mobile seed library, Seed Broadcast, in the southwestern US that is an old bread truck retrofitted with solar panels and bookshelves and computers, intended to "broadcast" seeds, their stories, and knowledge about agrobiodiversity conservation

[4] Campbell serves as a member of the SCA Board of Directors and has been made aware of changes to the program after his departure. Two factions have emerged, one focused on stabilizing and improving the genetics in the seed bank collection and another focused on the continuity of the seed swaps. In 2014 SCA distributed seeds at seed swaps throughout Arkansas and propagated and donated seedlings to local community gardens. However the leadership has decided that it is not financially feasible to distribute seeds at all the seed swaps, and in order to generate sufficient funds to cover the growout costs, to test seed varieties and ensure viability and productivity, that they must sell seedlings in addition to giving them out for free. A spin-off organization, ROOST (Revitalizing Ozark-Ouachita Seed Traditions) received many populations from CAAH's seed bank and is working with community partners and using student interns and volunteers from Arkansas Tech University, under the direction of Dr. Joshua Lockyer, to organize seed swaps and ensure the collection and free distribution of seeds.

(Figure 5). It is a seed library on wheels that travels to remote southwestern communities, distributes seeds and literature about how to properly grow out and save that seed. Simultaneously, the speaker on top "broadcasts" stories that its founder records everywhere she goes. She visited the CAAH! headquarters in Arkansas and recorded stories from seed-savers in the CAAH network[5]. Local seed-savers and non-profit organizations were motivated by the visit; as they spread the word on social media, more Arkansans became encouraged to discuss seed saving, trading, and growing.

Figure 5: Mobile Seed Broadcast. Source: Jeanette Hart-Mann.

Establishing community networks

Summer 2013 was the first field season for the Appalachian Institute for Mountain Studies (AIMS), whose mission is to conserve biocultural diversity and encourage sustainable mountain livelihoods for a world in transition. AIMs serves as the home of the SSL and includes the Seed Legacy Farm, JR Dawkins Heirloom Orchard, and a seedbank of approximately 2,000 heirloom vegetable seeds, with a specific focus on southern and central Appalachia. While working on seed growouts at AIMS, Veteto traveled to Burnsville, North Carolina to acquire supplies and met with a local expert on Appalachian agrobiodiversity, Wade McCoury. McCoury offers dozens of local heirloom seeds and plants for sale each gardening season at his greenhouse. In 2005, Veteto interviewed McCoury and gathered heirloom varieties from his collection, including the Old-fashioned Orange tomato, which was acquired from an elderly man from Yancey County, North Carolina. Old-fashioned Orange is a large, sweet orange tomato that can weigh between 1.5 and two pounds (0.68-0.9 kg). On Veteto's 2013 visit, McCoury mentioned that he had lost the Old-fashioned Orange seed and would like to get it back. Veteto was pleased to return the seeds to the original donor. McCoury now grows out the Old-fashioned Orange in his greenhouse for seeds, and offered seedlings to local customers in the spring of 2014. AIMS plans to offer heirloom seeds to the local public through McCoury's Greenhouse in future gardening seasons. Many Yancey County heirloom varieties have become scarce as older generations pass on. Even experienced seed savers like McCoury accidently lose varieties with a failed crop or because of other circumstances. Seed-saving networks can help ensure that varieties remain available to local growers.

The Old-fashioned Orange tomato illustrates the necessary embeddedness of grassroots agrobiodiversity conservation strategies within local and regional networks. Yancey County locals visit AIMS looking for "Dr. Jim" to both share and obtain seeds. Since Appalachian social networks are largely based in kinship and friendship (Veteto 2013), local interest signals the contribution that AIMS represents for

[5] The broadcast report from the visit to CAAH headquarters can be seen here: http://seedbroadcast.blogspot.com/2012/08/conserving-arkansass-agricultural.html

local people; readily available seeds establish interconnections between people and place, and provide security because people know they can rely on one another. Campbell also works closely with nursery owner-farmers who specialize in farmer-breeding and selling seedlings that are exclusively open-pollinated. The work of heirloom nursery operators and seed swappers ensures that gardeners will have locally adapted crops that continue to persist in diverse contexts. Such seed savers can spread relatively large volumes of local seeds throughout communities and simultaneously establish deeply interconnected social networks, woven with seeds. One farmer-breeder, Herb Culver of Bean Mountain Farms in Newton County, Arkansas, reflected on the relative "fecundity" of seed-savers when asked about the connection between his work and food sovereignty:

> I think our situation is tenuous now. If we had a systemic collapse there would be a two or three year period of food shortages before the seed and food supply could be developed to feed everyone satisfactorily. But things are improving. The seed swaps are drawing much larger crowds and the seed-saving workshops are well attended too. When I give workshops now, many of the attendees already have some experience saving seeds. At the plant sales we are getting a lot of new young urban gardeners. The number of people involved is just a small portion of the population, but, just like a seed, they can multiply quickly when needed. We seed-savers may be small in number, but we are everywhere, and the seeds increase exponentially each year (Culver 2012)!

As the ratio of seed-savers to the general population increases, communities become more tightly connected to each other, to their sources of food, and therefore, to food sovereignty.

7. Plumgrannies in the Ozarks

Vance Randolph, the renowned Ozark folklorist, documented an interesting crop variety growing in Ozark gardens early in the 20th century, known locally as *pum-granny* or *plumgranny* (Randolph and Wilson 1953). A plumgranny (Cucumis melo var. Dudaim—pomegranate melon or vegetable peach) is a small muskmelon, much like a baseball-size green cantaloupe with white stripes that becomes yellowish-orange when ripe. Gardeners in Appalachia and the Ozarks traditionally grew them because they emit a pleasant fragrance as they ripen and women would carry them in their dress or apron pockets as a "perfumed sachet" or display them in the home as a type of potpourri. In a local Ozark publication, *Bittersweet*, Watts (1980:2) explains why they have another common name, Queen Annes Pocket Melon: "A legend claims that Queen Anne of England carried a plumgranny tucked in her pocket as a perfumed sachet." The primary use of plumgrannies was ornamental and olfactory, but, despite their bland flavor, they served as a foodstuff—"sliced and preserved in syrup or molasses", peeled and eaten with salt, eaten raw and whole (Randolph and Wilson 1953; Watts 1980), or fed to chickens or hogs after their service as potpourri or sachet. Campbell first learned of plumgrannies during his initial Ozarks research and later acquired seeds from Veteto and the SSL for the CAAH seed bank and swap distribution. Subsequently, Campbell began to see plumgrannies distributed by gardeners who told their own stories about them at Ozark seed swaps; they reminisced about their childhood, how young boys would give them to girls as a shy way to express affection; how girls, especially in the winter when baths were rare, would carry them in the pockets of their dresses to perfume themselves. An elderly man at the 2012 Harrison, Arkansas seed swap gave Campbell a prescription bottle with a hand-written label on the front: "****__**2007 Plumgranney, JKH, from 1920s, Please Grow Out**__******." Heirloom seeds connect people to their past and they do not want to see them die out. If such seeds lose viability and go extinct, local cultural history also fades from memory.

In the late 20th century Ozarkers expressed concern that plumgrannies would become extinct: "In spite of its many uses, the plumgranny is no longer commonly grown. As a result, those acquainted with the plant are becoming fewer, and the plumgranny has come as close as a plant can come to being folklore" (Watts 1980:2). Yet, such concerns coincided with the heirloom crop revival, the emergence of heirloom seed organizations such as Seed Saver's Exchange, and renewed interest among US gardeners in local crop varieties for their flavor and history. Plumgrannies are currently available through numerous seed companies

and online sources as a result of the heirloom seed movement, and we find it humorous that in online reviews people complain about their "awful" flavor. Ozarkers will tell you they were grown first as a perfume, second as a cultural artifact, and third as food. Plumgrannies are a hunger food that can be eaten when necessary. In fact they grow so prolifically in parts of the US that they have become a wild nuisance species that officials recommend eradicating with herbicides (Howell 1985). That an edible fruit grows so readily that it has been classified as a noxious weed attests to its suitability for food sovereignty. It also symbolizes the battle that the food sovereignty movement faces. Plumgrannies embody values beyond agro-industry—rooted cultural traditions, sensory memory, marginal persistence, and a locally-viable hunger option. Such traditions need agricultural biodiversity to be in place, to become rekindled. To this end, Campbell established "sensory" growout gardens at an Arkansas preschool to collaborate with kids in planting seedlings and saving seeds. Plumgrannies were a big hit because the kids loved to throw them and smell them; they even enjoyed eating them.

Figure 6: Plumgrannies. Source: Brian C. Campbell

8. Conclusion

The seeds and plants of traditional subsistence households fulfill many human needs. When humans become alienated from local subsistence, they no longer share a collective connection to place. Locally produced and shared food serves as a major force for cultural cohesion. Applied/activist anthropology can play a strategic and influential role in this process by employing anthropological theory and methods to rejuvenate agroecological traditions that foster the conservation of agricultural biodiversity and community-based food sovereignty (Veteto and Lockyer 2015). As seen in the preceding cases, a practical anthropological approach reveals interconnections between seed-saving and the history and ecology of a place, relationships between people generated by seeds, and viable alternatives to the unsustainability of the US food system. As activist anthropologists who farm and save seeds as part of our daily lives, our participant-observation consists of routine grassroots networking to propagate and disseminate seeds and new hubs and networks of seed-saving community gardens. Our development of community organizations that serve to spread and conserve agrobiodiversity represents an application of anthropology that creates viable alternatives for food sovereignty, rooted in place-based bio-cultural heritage.

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