Culture, Agriculture, Food and Environment
The Journal of Culture & Agriculture

Seeds of Persistence: Agrobiodiversity in the American Mountain South

James R. Veteto

Abstract

Professor Robert E. Rhoades worked for four decades to construct a comparative, international anthropology of mountain agrobiodiversity. This paper presents research in the tradition of Rhoades's applied agrobiodiversity studies. Baseline landrace inventories were compiled from Appalachia and the Ozark Highlands, United States, based on in-depth ethnoecological research. Results illustrate that southern/central Appalachia is the most diverse foodshed at the varietal level in the United States, Canada, and northern Mexico studied to date. Examples of how this research has contributed to several in situ *agrobiodiversity conservation projects are provided.* [agricultural anthropology, agrobiodiversity, Appalachia, Cherokee, *in situ* conservation, mountains, Ozarks, Robert Rhoades]

Introduction

Robert Rhoades worked throughout his career to construct an international, comparative, mountain agrobiodiversity studies. Julian Steward's cultural ecology influenced Rhoades's research trajectory in studying diverse mountain ranges of the world from the early stages (e.g., Rhoades and Thompson 1975) to the end of his distinguished career (Rhoades 2007). For the last several decades of his life, Rhoades worked with prominent mountain scholars (e.g., Rhoades et al. 1997) to codify and promote the interdisciplinary field of montology. Among Rhoades's contributions to montology were incorporating key insights from agricultural anthropology, comparative cultural ecology, ethnoecology, and increasingly, a human dimensions approach to global mountain climate change (Rhoades et al. 2008). In agrobiodiversity studies, Rhoades's approach was to use insights from basic mountain research to inform applied *in situ* agrobiodiversity programs. Following a 13-year career as the senior social scientist at the International Potato Center, Rhoades applied basic research to a variety of *in situ* projects, including the Southern Seed Legacy (US Southeast), Ancestral Futures Farm (Ecuador), and Agrarian Connections Farm (US Southeast).

This study draws upon insights from Rhoades's comparative mountain agrobiodiversity studies to investigate the persistence of landrace varieties in two important North American highland regions: Southern Appalachia and the Ozarks. First, I present results from landrace inventories in each region to understand current levels of proliferation and place each highland area in several comparative contexts. Second, I demonstrate how results from this study have been applied to *in situ* conservation.

Mountain Agrobiodiversity in the Global North

Consistent with many areas of anthropological inquiry, agrobiodiversity studies have traditionally been situated, to a large extent, in the Global South. The assumption of agrobiodiversity experts worldwide has been that "developed" countries in the North have largely replaced landrace varieties with high-yielding varieties characteristic of industrial agriculture. In the United States, Fowler and Mooney (1990) provided evidence that up to 93 percent of folk crop varieties have been lost and other experts (e.g., McDonald 2001) argue that the rate of disappearance is increasing. Due to several methodological errors, Fowler and Mooney's study has been significantly revised and updated by Heald

James Veteto is assistant professor of anthropology at the University of North Texas where he directs the laboratory of environmental anthropology and the southern seed legacy. James has worked with local and indigenous communities in southern Appalachia, the Ozarks, and the Sierra Madre Occidental Mountains of northwestern Mexico, with a focus on comparative agrobiodiversity inventories, farmer decision making, and conservation strategies in mountain ecosystems.

Culture, Agriculture, Food and Environment Vol. 36, Issue 1 pp. 17–27, ISSN 2153-9553, eISSN 2153-9561. DOI: 10.1111/cuag.12026

and Chapman (2012) showing, at least for commercial available heirloom varieties, that Fowler and Mooney's estimates of crop genetic erosion were greatly inflated in relation to actual loss. In addition, the increase in seed companies offering heritage/heirloom seeds in the United States over the past 25 years has provided access to significantly more folk crop varieties for gardeners and farmers (Nabhan 2013). Although it is true that with precipitous decline in the US farming population over the past century much ubiquitous agrobiodiversity (Chapman and Brown 2013) has been lost, it has also been observed that "heirloom seeds are especially prevalent in isolated mountain areas, such as the Ozarks, Smokies, and Appalachians, and also among traditional peoples such as the Mennonites, Amish, and Native Americans" (Whealy 1998:7). Unfortunately, it is nearly impossible to tell how much overall loss or gain has occurred due to lack of baseline data on noncommercial varieties except in limited specific cases. The prevalence of higher agrobiodiversity levels in marginal areas and groups of the United States is consistent with the correlation between marginality and agrobiodiversity found worldwide (Rhoades and Nazarea 1999).

My previous work (Veteto 2008) has shown that agrobiodiversity levels in southern Appalachia may be as high as or exceed that of many comparable regions in the Global South (e.g., Skarbø 2006). In four months of fieldwork, I found that southern Appalachian farmers and gardeners were maintaining 134 ethnotaxa.[1] Among this diversity, beans (*Phaseolus* spp.) were proportionally dominant, accounting for 61.9 percent of varieties. Bill Best's (2005) long-term bean collecting at The Sustainable Mountain Agriculture Center in Appalachian Kentucky has resulted in over 300 distinct ethnotaxa discovered. The results from Veteto and Best suggest that, when compared with results Sperling and Scheidegger (1997) have obtained in Rwanda, southern Appalachia may be a secondary center of world bean diversity. Other areas of the US South also provide highly diverse pockets of individuals, seeds, and memories. In over a decade of research, the Southern Seed Legacy Project (2013), founded by Rhoades and now directed by the author at The University of North Texas, has collected over 1,000 ethnotaxa from Southern US farmers. Additional agrobiodiversity research and conservation could be undertaken in other Global North regions. For example, a study by Negri (2003) reports that home gardeners in Italy are maintaining high agrobiodiversity levels, but as an aging population they are struggling to interest younger generations in continuing their biocultural seed legacy.

Study Sites

Appalachian North Carolina

The mountains of western North Carolina are part of the Blue Ridge Belt that extends from southern Virginia to north Georgia (Gragson and Bolstad 2006). The portion of the Blue Ridge in western North Carolina is the most rugged in the belt, with an altitude that ranges between 2,000 and 7,000 feet. Present-day topography and climate in the Blue Ridge are thought to be relicts of the Tertiary and Pleistocene. Pedology, aspect, and erosional/soil-forming processes have created diverse environmental conditions that allow for a high variety of plant types and soil properties (Pittillo et al. 1998). The dominant vegetation in southern Appalachia are temperate deciduous forests, an intermixing of northern and southern forest types, a phenomenon characterizing the region as one of the most biodiverse in North America (Braun 2001; Gragson et al. 2008).

The Cherokee and other Native American mountain dwellers were descendants of earlier indigenous inhabitants in the Mississippian and Woodland periods. The Cherokee have a cultural history that may span as long as 4,000 years (Neely 1991), but they most likely emerged as a distinctly organized political tribe after the collapse of the mound-building and large-scale corn (*Zea mays*)-growing Mississippian culture in the 1500s (Davis 2000). Early historical Cherokee were organized into seven matrilineal clans, lived in sedentary villages, and relied upon a corn-beans-squash agricultural complex supplemented by wild plants and animals (Mooney 1992). Cherokee culture was severely impacted by waves of European migration, diseases, and frontier warfare, beginning a process of assimilation into settler mountain society. Traditional Cherokee culture was often blended in different degrees with the American ideal of the "Jeffersonian yeoman farmer" (Neely 1991). On the eve of the forced removal of most of the Cherokee on the "Trail of Tears" from southern Appalachia in 1838–1839, Cherokee people were, to a large extent, living materially like their white neighbors—albeit with differentiated cultural traditions and values in

many communities and individuals (Neely 1991; Rafferty 2001).

After European contact in the Pioneer and Antebellum periods, southern Appalachia was largely peopled by immigrants of Scots-Irish, English, and Germanic origin. Small-scale farmers in the region practiced a highly self-sufficient agriculture, relying on corn as the staple crop with an array of other food crops, and free-range herding of cattle and hogs (Davis 2000). However, southern Appalachia has also been historically characterized by large landholdings of absentee owners, resulting in high rates of tenancy and an extractive economy based on timber and mineral resources (Dunaway 1996). The people of southern Appalachia have maintained higher degrees of geographical, commercial, and cultural autonomy—relative to most Americans—which persist to the present day. Despite this tendency toward semi-autonomy, throughout the 20th century southern Appalachia has suffered from periods of out-migration to northern and midwestern cities to seek jobs due to a history of poverty and unemployment in the region (Williams 2002). In recent years, in-migration of more affluent lowlanders from cities such as Atlanta, Charleston, and Miami and the second-home development associated with them (Gragson and Bolstad 2006) has increased land prices and taxes and made it difficult for natives of the region to practice agriculture and other traditional lifeways.

The Arkansas Ozarks

The Ozarks are a highland region of southern Missouri, northern Arkansas, and northeast Oklahoma comprised of low "mountains" and hills ranging from 250 to 2,400 feet that were formed during the early Paleozoic (Nolan 1998). The Ozarks are not true mountains, instead being the result of the continued erosion and dissection of a "highland dome" throughout millions of years (Blevins 2002; Rafferty 2001). In Arkansas, the Ozarks are north of the Arkansas River Valley and are geographically classified as part of the Interior Highlands Region (Rafferty 2001). Like southern Appalachia, the variation in community elevations, aspects, arable soil types, and precipitation types result in variable environmental conditions throughout the Ozarks. The dominant vegetation type is temperate deciduous forest and the region has relatively high levels of biodiversity.

Native American farming in the Ozarks was traditionally sporadic, small-scale horticulture among various tribes until the early 19th century when the Cherokee brought more intensive farming to the region (Rafferty 2001). Following Euro-American settlement, larger-scale agriculture was practiced in the wider river valleys, along waterways, and on the edges of the mountains where access to markets encouraged commercial farming. In the more mountainous Ozark interior, smallholder subsistence farming prevailed (Blevins 2002). This pattern continued until rapid modernization made inroads into the region following World War II.

The cultural landscape of descendants of the original Euro-American Ozark settlers is fairly continuous, consisting of rural ways of life and the retention of some traditional Upper South customs and folkways (Nolan 1998). Contemporary residents of the Ozarks maintain a degree of economic and cultural isolation from mainstream American influences (Nolan and Robbins 1999). However, due to post–World War II modernization forces and the increasing difficulty of small-scale farming, the Ozarks suffered high population out-migrations from 1940 to 1960. In-migration from retirees and affluent second-home owners has seen considerable increase in the past 50 years (Blevins 2000).

Methodology

This research was conducted with 14 months of fieldwork from July 2008 to August 2009. I lived for six months in Appalachian North Carolina and eight months in the Arkansas Ozarks. Western North Carolina and the Arkansas Ozarks were chosen because they are the most mountainous and ecologically diverse areas of the Appalachians and Ozarks, making them appropriate research sites reflecting the worldwide correlation between mountains and biocultural diversity (Rhoades 2007).

Extensive participant observation was carried out in communities, towns, and cities across each region. Drive-by visits to gardeners and farmers out in their fields were conducted as were visits to dozens of roadside stands, farmers markets, and hardware stores to talk to knowledgeable local people. To further locate seedsavers, a purposive cluster sampling strategy was used. Letters of inquiry were sent out to every county extension agent in each region to recruit participants. Individuals who are maintaining

or are most knowledgeable about landrace varieties were identified based on the recommendations of extension agents. Using an extensive network of previously developed contacts in each region, a chain-referral method was also used to identify seedsavers.

Through participant observation methods described above and phone conversations following trails of chain-referral recommendations, approximately 100 knowledgeable local people in each region were consulted, which provided important information for understanding the context of Mountain South agrobiodiversity. Seedsavers who were maintaining the highest numbers of landrace varieties in the widest diversity of locales were identified; accordingly, detailed semi-structured oral history interviews were conducted with 30 seedsavers in both regions. Each participant was asked to free list landrace varieties still being grown and those that have been lost. In addition, interviews investigated farmer decision making and grower motivations for maintaining landrace varieties, which is beyond the scope of this paper (see Veteto 2010 for full analysis).

An important task of this research was to place Mountain South agrobiodiversity in context with other North American regions. Working in collaboration with the Renewing America's Food Traditions alliance (RAFT), an inventory of Mountain South folk crop varieties currently known to exist or to have gone extinct was developed. This involved compiling plant lists developed by folk crop expert Bill Best of The Sustainable Mountain Agriculture Center (where I also inventoried a freezer of 400 folk crop varieties that had not been previously documented), apple hunters Lee Calhoun (2010) and Tom Brown (2009) in North Carolina, and the variety lists of the Southern Seed Legacy Project (2013) and Conserving Arkansas' Agricultural Heritage (2010). The resulting inventories were analyzed and compared with lists that had been developed by RAFT alliance researchers in other diverse North American foodsheds.

Results and Discussion

Appalachian Agrobiodiversity Results

Three hundred fifty-two distinct ethnotaxa among 43 species of plants were being grown among the 30 Appalachian growers interviewed. Beans were most numerous among varieties being maintained ($n = 101$), followed by apples (*Malus* × *domestica*; $n = 63$), tomatoes (*Lycopersicon esculentum*; $n = 44$), and a variety of other fruits and vegetables (see Tables 1 and 2). Culturally significant folk crop varieties among non-Cherokee Appalachians included Mr. Stripey—a large yellow tomato with red streaks that is a preferred "slicer" for sandwiches because of low acid content and sweet flavor; Candyroaster (*Cucurbita maxima*, see Figure 1)—a sweet winter squash that originated with the Eastern Cherokee and is used for baking and candyroaster butter; Tater onions (*Allium cepa*; see Figure 2)—a spicy onion that overwinters, is good for making relish, and has both tops and bulbs that can be eaten; and Hickory King—a tall dent corn that is either yellow or white and is regarded as the premier hominy corn in the region. Among the Eastern Cherokee, culturally significant varieties included Cherokee White Flour corn—a tall, white flour corn used for making bean bread, corn pone, hominy, lye dumplings, and is eaten fresh in the "roasting ear" stage; Cherokee Tender October bean (*P. vulgaris*)—a round, beige-colored bean that is mottled with maroon streaks and is eaten as a dry or "shelly" soup bean; and Cherokee Butterbean (*P. coccineus*)—a large bean of various colors that is used as an ingredient in bean bread and is eaten as a soup bean in both shelly and dried stages of processing.

Table 1.
Total *N* Ethnotaxa

	N
Western North Carolina	352
Non-Cherokee	253
Eastern Band of Cherokee Indians	128
Ozarks	191
Non-Cherokee	167
Cherokee Nation	29
Total	543

Ozark Agrobiodiversity Results

In the Ozarks, growers were maintaining 191 distinct ethnotaxa among 39 species, which, at the variety level, is significantly lower than results found in Appalachia. It was also more difficult to locate seedsavers in the Ozarks due to various historical and agroecological reasons (see Veteto 2010). Bean variet-

Table 2.
Appalachian Ethnotaxa

Plant type	Scientific name	Total varieties *N* = 352	Examples of local variety names
Bean	*Phaseolus vulgaris*	101	Greasy Cutshort, Tender October, Pink Tip, Peanut, Lazywife, Turkey
	P. coccineus		
	Dolichos lablab		
	Richinus communis		
Apple	*Malus x domestica*	63	Crows Egg, Winesap
Tomato	*Lycopersicon esculentum*	44	Stripey, Red Oxheart
Corn	*Zea mays*	28	Hickory King, Wild Goose
Squash	*Cucurbita maxima*	24	Candyroaster, Cushaw, Sugar Pumpkin
	C. argyrosperma		
	C. pepo		
Greens	*Brassica juncea*	10	Creasy Greens, Curly Mustard
	Lepidum sativum		
	Rorippa nasturtium		
Flowers	*Dahlia spp.*	9	Dinner Plate Dahlia, Rust Colored Marigold, Sunflower
	Tagetes spp.		
	Helianthus annuus		
Okra	*Abelmoschus esculentus*	9	Long Pod Green, White Pod
Gourd	*Lagenaria siceraria*	7	Vine Okra, Dipper, Snake
	Luffa acutangula		
	Trichosanthes anguina		
Sweet Potato	*Ipomoea batatas*	7	Poplar Root, Sweet Gum
Grape	*Vitis* spp.	6	Pond Mountain
Cowpea	*Vigna unguiculata*	5	Clay, Beige Crowder
Pepper	*Capsicum annum*	5	Cowhorn, Doorknob
Cucumber	*Cucumis sativus*	4	Little White
Raspberry	*Rubus spp.*	4	Black, Red, Yellow
Cherry	*Prunus avium*	3	Sweet, Wild
Onion	*Allium cepa*	3	Tater, Walking
Peach	*Prunus persica*	3	Little White, Purple Indian
Plum	*Arachis hypogaea*	3	Blue Danville, Wild
Garlic	*Allium sativum*	2	Old-Time, Elephant
Sorghum	*Sorghum bicolor*	2	Ashe County Cane
Asparagus	*Asparagus officinalis*	1	Beech Mountain
Cantaloupe	*Cucumis melo var. reticulatus*	1	Little Cantaloupe
Gooseberry	*Ribes* spp.	1	Gooseberry

Table 2. *Continued*

Plant type	Scientific name	Total varieties *N* = 352	Examples of local variety names
Ground Cherry	*Physalis pubescens*	1	Yellow
Jerusalem Artichoke	*Helianthus tuberosus*	1	Jerusalem Artichoke
Jobs Tears	*Coix lacryma-jobi*	1	Cornbeads
Lettuce	*Lactusa sativa*	1	Greenleaf
Peanut	*Arachis hypogaea*	1	Georgia Red
Potato	*Solanum tuberosum*	1	Irish Cobbler
Rhubarb	*Rheum rhabarbarum*	1	Rhubarb

Figure 1.
Candyroaster Squash, on the right (*Cucurbita maxima*).

ies were most numerous ($n = 37$), followed by corn ($n = 26$), cowpeas (*Vigna unguiculata*; $n = 17$), and peaches (*Prunus persica*; $n = 14$) (see Tables 1 and 3). Culturally significant varieties among non-Cherokee Ozarkers included Thousand-to-One (*P. vulgaris*)—a bean that originated in Wayne County, Tennessee in the 19th century that has oval beige seeds of medium size with black speckles and mottles on them and is eaten fresh, canned and frozen; Pencil Cob—a yellow-seeded dent corn with a small cob that is dependable, germinates well, and is used for cornbread and hominy and to roll fish in for frying (see Figure 3); and Rice Pea (*V. unguiculata*)—a very small, cream-colored pea with a black-eye that cooks fast, has a unique flavor, and is typically eaten on top of cornbread. Among Cherokee Nation growers, culturally significant plants included Indian Corn—a flint corn with a small cob and kernels that are multicolored and eaten both fried and boiled; Kochani (*Rudbeckia laciniata*)—a favorite spring green of the Cherokee that is both wild-harvested and cultivated and is prepared by parboiling in several rinses of water and frying in grease; and an old-time variety of garlic (*Allium sativum*) that is used to flavor foods, as medicine for colds, and to wear around the neck to ward off skillies (a type of spirit sent out by witch doctors, boogers, and shapeshifters—all supernatural beings who can cause harm to humans).

Comparison with Other North American Foodsheds and World Areas

The RAFT has developed folk crop variety lists for most North American foodsheds. RAFT's work represents the first attempt to develop an inventory for endangered foodways across North America. Using RAFT lists, it is possible to place agrobiodiversity levels in the Mountain South in context by comparing them with other North American foodsheds.

I worked collaboratively with RAFT during the Appalachian portion of this research to compile varietal lists from other experts across the region and create an inventory of heirloom foods incorporating results from my fieldwork. RAFT has targeted southern/central Appalachia as a priority area for its conservation work. Parallel research in the Ozarks has not been pursued by the RAFT project and less research has been done on Ozark agrobiodiversity in general (for an important exception, see Campbell 2010). However, the 191 ethnotaxa documented in the Ozarks in eight months of fieldwork in this research

Figure 2.
Tater Onions (*Allium cepa*).

creates a baseline from which a more comprehensive inventory can be created and suggests the Ozarks should be targeted as a priority region by RAFT in future research initiatives.

A total of 1,412 ethnotaxa were inventoried for southern/central Appalachia. Apples are most prominent ($n = 667$), followed by beans ($n = 485$). The inventory for southern/central Appalachia totals 183 more ethnotaxa than all the rest of the North American foodsheds studied by RAFT combined ($n = 1229$) (Veteto et al. 2011). These results show that southern/central Appalachia is the most diverse foodshed at the varietal level in the United States, Canada, and Mexico studied to date. As RAFT continues to expand its research efforts and improve its methodologies, these findings will be able to be further confirmed or otherwise updated appropriately.

Comparing results from the inventory of southern/central Appalachia with selected world regions yields informative insights, particularly with regard to folk crop varieties of beans and apples. Sperling and Scheidegger (1997:2) have documented 550 local bean varieties in Rwanda and have characterized it as "one of the most varied and vibrant bean varietal pools in the world." The 485 bean ethnotaxa documented in this study indicates that southern/central Appalachia is nearly as rich in bean diversity as Rwanda. Further research may prove that the region is a secondary world center of bean diversity. Apples tell a similar story. The 667 ethnotaxa documented in southern/central Appalachia are more numerous than any other RAFT foodshed studied in North America. Future research may prove southern/central Appalachia to be a world center for domesticated apple diversity.

Application

Collaborative conservation was achieved during the course of this research with several projects in the following ways:

1. The Center for Cherokee Plants—two months of collaborative fieldwork produced recordings and transcriptions with 15 Eastern Cherokee seedsavers; 128 folk crop varieties were identified, documented, and many were gathered for *ex situ* storage; a Cherokee intern was trained in ethnoecological research methods and the center adopted memory banking protocols (Nazarea 2006) as one of its major conservation methodologies (see Veteto 2010, 2013; Veteto and Welch 2013).
2. Conserving Arkansas' Agricultural Heritage—recorded and transcribed oral history interviews and seed varieties collected during the Ozark research phase were donated.
3. RAFT—a master list of at-risk southern/central Appalachian folk crop varieties was developed. Due in part to the results obtained from this research, RAFT identified Appalachia as a focus region for its foodways conservation initiative "Forgotten Fruits."
4. The Ozark Seed Bank—30 Ozark landrace cultivars were donated and an invited lecture on Ozark agrobiodiversity was given at the program's Brixey, Missouri facility.

All of the above projects are not-for-profit educational programs focused on promoting local agrobiodiversity proliferation.

Since the conclusion of field research, in collaboration with RAFT, I published the booklet *Place-Based Foods of Appalachia: From Rarity to Community Restoration and Market Recovery* (Veteto et al. 2011), which featured a complete list and rarity status (extinct, endangered, threatened, common) for each of the 1,412 Appalachian ethnotaxa compiled in this study. One thousand five hundred copies of the booklet were printed and distributed to agriculture and food conservation organizations, activists, food scholars, and community leaders throughout Appalachia. The booklet has been adopted as promotional material by

Table 3.
Ozark Ethnotaxa

Plant type	Scientific name	Total varieties *N* = 191	Examples of local variety names
Bean	*Phaseolus vulgaris*	37	Thousand-to-One, Creaseback
Corn	*Zea mays*	26	Pencil Cob, Tennessee Red Cob
Cowpea	*Vigna unguiculata*	17	Whippoorwill, Red Ripper, Rice
Peach	*Prunus persica*	14	White Cling, Mountain Gold, Alberta, Indian
Gourd	*Lagenaria siceraria*	11	Dipper, Vine Okra, Dishrag
	Luffa acutangula		
	Trichosanthes anguina		
Okra	*Abelmoschus esculentus*	9	Cowhorn, Texas Long Horn
Tomato	*Lycopersicon esculentum*	9	Nettie's Juice, Big Orange
Apple	*Malus x domestica*	6	Hensley/Cash
Grape	*Vitis* spp.	6	Scuppernong, White Muscadine
Squash/pumpkin	*Cucurbita maxima*	6	Old-Fashioned Field Pumpkin, Cushaw
	C. argyrosperma		
	C. pepo		
Flowers	*Celosia spp., Clematis spp.*	5	Cockcomb, Old-Time Poinsettia, Rose Campion, Sunflower
	Euphorbia pulcherrima		
	Helianthus annuus		
	Lychnis coronaria		
Pear	*Pyrus communis*	5	Barlett
Pecan	*Carya illinoinensis*	5	Mayhan, Stewart
Sorghum	*Sorghum bicolor*	5	Tennessee Tall Girl, Honey Drip
Watermelon	*Citrullus lanatus*	5	Yellow Meated, Moon and Stars
Pepper	*Capsicum annum*	4	Bouque
Garlic	*Allium sativum*	3	Old-Time Hardneck
Cucumber	*Cucumis sativus*	2	White
Fig	*Ficus carica*	2	Brown Turkey
Onion	*Allium cepa*	2	Winter
Plum	*Prunus* spp.	2	Red, Wild
Tobacco	*Nicotiana rustica*	2	Old-Time
Blackberry	*Rubus* spp.	1	Black
Blackhaw	*Viburnum prunifolium*	1	Blackhaw
Cherry	*Prunus avium*	1	Cherokee
Greens	*Rudbeckia laciniata*	1	Sochani
Jerusalem Artichoke	*Helianthus tuberosus*	1	Jerusalem Artichoke
Lemon Balm	*Melissa officinalis*	1	Lemon Balm
Mulberry	*Morus* spp.	1	Black
Peanut	*Arachis hypogaea*	1	Grannies Red Skin
Strawberry	*Fragaria x ananassa*	1	Cardinal
Sweet Potato	*Ipomoea batatas*	1	Japanese Leaf

Figure 3.
Pencil Cob Corn (*Zea mays*).

cooperative extension agencies and sustainable farming organizations and in the classroom by university and college professors.

Conclusions

The American Mountain South has high agrobiodiversity levels existing in homegardens and fields throughout Appalachia and the Ozarks. In particular, southern/central Appalachia contains the highest known folk crop variety levels in the United States, Canada, and northern Mexico, and is a possible world agrobiodiversity secondary center for apples and beans. Varieties documented during the fieldwork portion of this study in Appalachia outnumber Ozark cultivars by an almost 2:1 ratio. The Eastern Band of Cherokee Indians is still maintaining high agrobiodiversity levels, whereas the Cherokee Nation of Oklahoma has lost the majority of their landrace cultivars due to various historical and agroecological reasons. Beans, apples, tomatoes, and corn are most prominent among landraces being maintained across the Mountain South. Crop varieties are being maintained as distinct cultivars, managed as heterogeneous populations, and improved upon by farmer-breeders who are actively creating folk crop varieties of the future (see Veteto 2010; Veteto and Welch 2013). Such stability and dynamism in Mountain South crop complexes illustrates the varying routes by which genetic diversity is created, maintained, and experimented with by local people committed to continuing or expanding their food traditions. Case studies from Mexico (Soleri and Cleveland 2002), the Andes (Rhoades 1989), and the American Southwest (Soleri and Smith 1999), suggest that Mountain South growers are following a pattern of mixing dynamism with stability in local crop populations practiced by smallholder agriculturalists worldwide.

By focusing on two American highland regions with comparable topographies and indigenous and local histories, I aim to extend the cultural ecology approach to mountain agrobiodiversity studies that Robert Rhoades introduced and expanded over the course of four decades (Rhoades 2007). The results of this study produced solid, baseline empirical data—a hallmark of Rhoades's research protocol. Never limiting his work to basic research exclusively, Rhoades was a leader in both agricultural anthropology and dismantling the false divide between basic and applied research. During the course of this study, I engaged in collaborative research and continue to work with Mountain South communities to conserve biocultural diversity throughout the Appalachian and Ozark Highland regions.

Note

1. Ethnotaxa are not equivalent to landraces or scientific varieties. Ethnotaxa are varieties recognized in the naming practices of local people and may not correspond to recordable genetic differences. Using synonyms for the same variety can cause an overestimation of agrobiodiversity, but recent research has also shown that ethnotaxa can account for finely graded, scientifically validated morphological differences that cannot be recognized in genetic studies (Maloles et al. 2011). Ethnotaxa is used interchangeably with the term "folk crop variety" throughout this paper.

References Cited

Best, Bill 2005 Saving Heirloom Bean Seeds—How You Can Help. Electronic document, http://www.heirlooms.org/help.html, accessed November 13, 2010.

Blevins, Brooks 2000 Retreating to the Hill: Population Replacement in the Arkansas Ozarks. Agricultural History 74(2):475–488.

——— 2002 Hill Folks: A History of Arkansas Ozarkers and Their Image. Chapel Hill: University of North Carolina Press.

Braun, E. L. 2001 (orig. 1950) Deciduous Forests of Eastern North America. 2nd edition. Caldwell, New Jersey: The Blackburn Press.

Brown, Tom 2009 Apple Search. http://www.applesearch.org/, accessed August 20, 2009.

Calhoun, Lee 2010 Old Southern Apples. White River Junction, VT: Chelsea Green Publishing.

Campbell, Brian C. 2010 "Closest to Everlastin": Ozark Agricultural Biodiversity and Subsistence Traditions. Southern Spaces. http://southernspaces.org/2010/closest-everlastin-ozark-agricultural-biodiversity-and-subsistence-traditions, accessed December 17, 2013.

Chapman, Susannah, and Tom Brown 2013 Apples of Their Eyes: Memory Keepers of the American South. *In* Seeds of Resistance/Seeds of Hope: Place and Agency in the Conservation of Biodiversity. V. D. Nazarea, R. E. Rhoades, and J. Andrews-Swann, eds. Pp. 42–64. Tucson: University of Arizona Press.

Conserving Arkansas' Agricultural Heritage 2010 http://arkansasagro.wordpress.com/, accessed January 8, 2010.

Davis, Donald Edward 2000 Where There Are Mountains: An Environmental History of the Southern Appalachians. Athens and London: University of Georgia Press.

Dunaway, Wilma 1996 The First American Frontier: Transition to Capitalism in Southern Appalachia, 1700–1860. Chapel Hill: University of North Carolina Press.

Fowler, Cary, and Pat Roy Mooney 1990 Shattering: Food, Politics, and the Loss of Genetic Diversity. Tucson: University of Arizona Press.

Gragson, Ted L., and Paul V. Bolstad 2006 Land Use Legacies and the Future of Southern Appalachia. Society & Natural Resources 19:175–190.

Gragson, Ted L., Paul V. Bolstad, and Meredith Welch-Devine 2008 Agricultural Transformation of Southern Appalachia. *In* Agrarian Landscapes in Transition. Charles Redman and David Foster, eds. Pp. 89–121. New York: Oxford University Press.

Heald, Paul J., and Susannah Chapman 2012 Veggie Tales: Pernicious Myths about Patents, Innovation, and Crop Diversity in the Twentieth Century. Illinois Law Behavior and Social Science Research Papers Series, Research Paper No. LBSS11-34.

McDonald, Michael 2001 Protecting Precious Life. The Seedhead News 72:1–2.

Maloles, Jose Rey, Kevan Berg, Subramanyam Ragupathy, Balasubramaniam C. Nirmala, Kabeer A. Althaf, Vadaman C. Palanisamy, and Steven G. Newmaster 2011 The Fine Scale Ethnotaxa Classification of Millets in Southern India. Journal of Ethnobiology 31(2):262–287.

Mooney, James 1992 History, Myths, and Sacred Formulas of the Cherokees. Asheville, NC: Historical Images/Bright Mountain Books.

Nabhan, Gary Paul, ed. 2013 Conservation You Can Taste: Best Practices in Heritage Food Recovery and Successes in Restoring Agricultural Biodiversity over the Last Quarter Century. Tucson: University of Arizona Southwest Center/Slow Food USA.

Nazarea, Virginia D. 2006 (orig. 1998) Cultural Memory and Biodiversity. Tucson: University of Arizona Press.

Neely, Sharlotte 1991 Snowbird Cherokees: People of Persistence. Athens and London: University of Georgia Press.

Negri, Valeria 2003 Landraces in Central Italy: Where and Why They Are Conserved and Perspectives for Their On-farm Conservation. Genetic Resources and Crop Evolution 50:871–885.

Nolan, Justin M. 1998 The Roots of Tradition: Social Ecology, Cultural Geography, and Medicinal Plant Knowledge in the Ozark-Ouachita Highlands. Journal of Ethnobiology 18:249–269.

Nolan, Justin M., and M. C. Robbins 1999 Cultural Conservation of Medicinal Plant Use in the Ozarks. Human Organization 58:67–72.

Pittillo, J. Dan, Robert D. Hatcher, and Stanley W. Buol 1998 Introduction to the Environment and Vegetation of the Southern Blue Ridge Province. Castanea 63:202–216.

Rafferty, Milton D. 2001 The Ozarks: Land and Life. 2nd edition. Fayetteville: University of Arkansas Press.

Rhoades, Robert E. 1989 The Role of Farmers in the Creation of Agricultural Technology. *In* Farmer First: Farmer Innovation and Agricultural Research. Robert Chambers, Arnold Pacey, and Lori Ann Thrupp, eds. Pp. 3–9. London: Intermediate Technology Publications.

——— 2007 Listening to the Mountains. Dubuque, Iowa: Kendall/Hunt Publishing Company.

Rhoades, Robert E., and Virginia D. Nazarea 1999 Local Management of Biodiversity in Traditional Agroecosystems: A Neglected Resource. *In* Biodiversity in Agroecosystems. W. W. Collins and C. O. Qualset, eds. Pp. 215–236. Boca Raton: Lewis Publishers, CRC Press.

Rhoades, Robert E., and Stephen I. Thompson 1975 Adaptive Strategies in Alpine Environments: Beyond Ecological Particularism. American Ethnologist 2(3):535–551.

Rhoades, Robert E., Jack D. Ives, and Bruno Messerli 1997 Agenda for Sustainable Mountain Development. *In* Mountains of the World: A Global Priority. B. Messerli and J. D. Ives, eds. Pp. 455–466. New York and London: The Parthenon Publishing Group.

Rhoades, Robert E., Xaviar Zapata Ríos, and Jenny Aragundy Ochoa 2008 Mama Cotacachi: History, Local Perceptions, and Social Impacts of Climate Change and Glacier Retreat in the Ecuadorian Andes. *In* Darkening Peaks. B. Orlove, E. Wiegandt, and B. Luckman, eds. Pp. 216–225. Berkeley: University of California Press.

Skarbø, Kristine 2006 Living, Dwindling, Losing, Finding: Status and Changes in Agrobiodiversity of Cotacachi. *In* Development with Identity: Community, Culture and Sustainability in the Andes. R.E. Rhoades, ed. Pp. 123–139. Oxford, UK: CABI Publishing.

Soleri, Daniela, and David A. Cleveland 2002 Farmers' Genetic Perceptions Regarding Their Crop Populations: An Example with Maize in the Central Valleys of Oaxaca, Mexico. Economic Botany 55(1):106–128.

Soleri, Daniela, and Steven E. Smith 1999 Conserving Folk Crop Varieties: Different Agricultures, Different Goals. *In* Ethnoecology: Situated Knowledge/Located Lives. Virginia D. Nazarea, ed. Pp. 133–154. Tucson: University of Arizona Press.

Southern Seed Legacy Project 2013 http://pacs.unt.edu/southernseedlegacy, accessed September 18, 2013.

Sperling, Louise, and Urs Scheidegger 1997 Participatory Selection of Beans in Rwanda: Results, Methods, and Institutional Issues. Gatekeeper Series no. 51: IDRC.

Veteto, James R. 2008 The History and Survival of Traditional Heirloom Vegetable Varieties in the Southern Appalachian Mountains of Western North Carolina. Agriculture and Human Values 25(1):121–134.

——— 2010 Seeds of Persistence: Agrobiodiversity, Culture, and Conservation in the American Mountain South. Doctoral Dissertation, Department of Anthropology, University of Georgia.

——— 2013 Down Deep in the Holler: Chasing Seeds and Stories in Southern Appalachia. Journal of Ethnobiology and Ethnomedicine 9:69.

Veteto, James R., and Kevin Welch 2013 Food from the Ancestors: Documentation, Conservation, and Revival of Eastern Cherokee Heirloom Plants. *In* Seeds of Resistance/Seeds of Hope: Place and Agency in the Conservation of Biodiversity. V.D. Nazarea, R.E. Rhoades, and J. Andrews-Swann, eds. Pp. 65–84. Tucson: University of Arizona Press.

Veteto, James R., Gary Paul Nabhan, Regina Fitzsimmons, Kanin Routson, and Deja Walker, eds. 2011 Place-Based Foods of Appalachia: From Rarity to Community Restoration and Market Recovery. Tucson: University of Arizona Southwest Center.

Whealy, Kent 1998 Foreword. *In* Heirloom Vegetables: A Home Gardener's Guide to Finding and Growing Vegetables from the Past. S. Stickland, ed. 7–9. New York: Fireside.

Williams, John 2002 Appalachia: A History. Chapel Hill and London: University of North Carolina Press.