Montezuma Orchard Restoration Project

Montezuma Valley Apple Market Study

Funded by:
Colorado Department of Agriculture: Enrich CO Ag
Gates Family Foundation
Kenney Brothers Foundation
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1. Introduction

Montezuma Orchard Restoration Project

Montezuma Orchard Restoration Project (MORP) formed in 2008 as an informal partnership with the Montezuma County Historical Society. Through conversations with descendants of pioneer settlers, MORP founders and horticulturalists Addie and Jude Schuenemeyer were excited to learn that fruit orchards featured prominently in the agricultural landscape of southwestern Colorado during the early 1900s. Montezuma County was known for its quality fruit and some 200 historic orchard sites still exist today—primarily apples. Thousands of heritage trees live in these orchards, and many of the rare fruit varieties are more resilient, better adapted, and tastier than commodity varieties grown commercially today. These trees hold tremendous value not only in their history and genetic diversity, but in their potential for use in restored and new orchards that will serve as the foundation of a local fruit economy. MORP envisions southwestern Colorado being renowned again for an orchard culture and economy based on the legendary quality of Montezuma Valley fruits, and believes this possible through research, education, and preservation. Our mission is ***to preserve Montezuma County's fruit-growing heritage and restore an orchard culture and economy to our region.***

Since its founding, MORP has rediscovered two apples previously thought extinct, the Colorado Orange apple in Canon City (see Conclusion, page 33) and the Cedar Hill Black apple in northern New Mexico; researched our region's rich fruit-growing history; secured a Colorado Most Endangered Place designation for the Gold Medal Orchard; collaborated with Montezuma School to Farm in planting heritage orchards in every school in our three districts; developed orchard survey and mapping protocol; initiated DNA testing of unknown varieties and started a nursery of hand-grafted heirloom trees. What MORP is most proud of, however, is raising awareness about Montezuma Valley Fruits and inspiring historic orchard restoration. Two in particular, the Miller and T Lazy T orchards, are currently being restored and managed to supply apples to local cider start-ups. Both owners sought inspiration and advice from MORP. This Apple Market Study results from eight years of MORP investigating local apples and sharing this knowledge with others.

Apple Market Study - Background and Methods

Interest in local and heirloom foods as well as a resurgence in the US hard cider industry are potential emerging markets for southwestern Colorado heritage apples. As part of MORP's goal to return an orchard economy to our region, we are interested in the economic viability of a renewed local fruit industry. In 2015 the Colorado Department of Agriculture's Enrich Colorado Agriculture Program awarded MORP a grant to conduct market research for southwestern Colorado heirloom apples. The Gates Family Foundation and Whole Foods Market provided matching funds.

Assessing the markets for heirloom apples is a first step towards understanding the economic feasibility of restoring historic and planting new orchards. Key issues this study seeks to address include:

- Current and projected demand for fresh market heritage apples grown in southwestern Colorado and apples for juice and cider
- Characteristics of target markets for these products
- Supply of heirloom fresh market and juice/cider apples in Montezuma County
- Price premiums for heritage varieties, Colorado Grown, organic?
- Production costs associated with growing apples?
- Does the information garnered in this study justify a more in-depth feasibility analysis with specific focus on the utility of a mobile cider press? Additional issues to be analyzed subsequently include labor, pest control, packaging, storage, transportation, and solutions to market barriers.

The Market Study began by assessing existing foundational apple market data. To collect new data, MORP and consultants surveyed 13 apple buyers representing local and statewide grocers, natural food stores, local and regional distribution cooperatives and school districts; 37 orchard owners representing small to commercial growers; and 21 cider makers representing hobbyist, craft, and commercial operations. Buyer surveys were conducted via phone and in person; orchard owner and cider maker surveys were conducted on-line via Survey Monkey. Productions costs were estimated from the surveys as well as in-person interviews with five growers in Montezuma County. Cost models in the form of enterprise budgets were created for rehabilitating historic orchards and establishing new ones.

Acknowledgements
This project has been made possible by funding from Colorado Department of Agriculture, Gates Family Foundation and Whole Foods Market. Additional support from the Kenney Brothers Foundation enabled concurrent orchard survey work from which we based production estimates. Consultants Carolyn Dunmire of Dunmire Consulting and Bob Bragg of Southwest Management Services provided invaluable technical expertise in designing the study, collecting and analyzing data and developing the report and cost models. Most of Carolyn and Bob's time was donated to the project. Dr. Gregory Peck, Assistant Professor of Horticulture and Sustainable Fruit Production Systems at Cornell University, and Dr. Dawn Thilmany, Professor and Agribusiness Extension Economist at Colorado State University, reviewed surveys and provided valuable feedback to improve them. Seventy-one apple buyers, cider makers and orchard owners took the time to answer and respond to survey questions. Finally, we must acknowledge our hard-working pioneer orchardists and the people who have kept these trees alive. We are grateful to the teams of people that have supported this work for the last 126 years.

2. Background on Market for Apples and Apple Products from Southwestern Colorado

History of Montezuma Valley Orchards
Remote, rural southwestern Colorado is home to an abundance of remnant heritage apple orchards containing heirloom trees that were planted as early as the 1870s. Fruit-growing pioneers from New England, Tennessee and the Midwest took advantage of the region's climate, deep mineral-rich soils and ample irrigation to plant orchards that supported an award-winning fruit industry. Montezuma County fruit alone won three gold medals at the 1904 St. Louis World Fair. Two years later, establishing a record "that has never been approached, much less equaled", Montezuma County fruits took 101 of 104 ribbons at the Colorado State Fair, 97 of them first place.

Montezuma County's fruit economy supported schools, banks, warehouses and a strong community identity as "the most favored fruit district in Colorado". Trees grafted from larger commercial orchards were planted in home subsistence orchards throughout the county, with Mancos Valley, Lakeview, Lebanon, Lewis-Arriola and McElmo Canyon considered major orchard districts. The 1922 *Orchard Survey of the Southwestern District of Colorado* completed by state horticulturalist, E.P. Sandsten,

documented 67 apple orchards with 49 known apple varieties and 48,630 apple trees growing in Montezuma County [1]. Jonathan was the most popular variety; Rome, Winesap, Gano, Old Fashioned Delicious, White Winter Pearmain, Ben Davis and Grimes followed in decreasing abundance. Peaches, sour and sweet cherries and apricots were grown as well, but it was apples that were by far the most widely planted fruit crop.

Early Montezuma Valley fruit marketing

The Sandsten survey also foretold the future of Montezuma Valley fruit, "The district has great potential possibilities for commercial fruit growing...and if transportation facilities were available it would become one of our greatest fruit sections in the State" [2]. Southwestern Colorado had no interstate highway and its only rail line, the Rio Grande Southern, was a regional narrow gauge train that struggled through the Great Depression and ceased operations in 1951. By that time the US apple industry was focused on five commodity varieties: Red and Golden Delicious, Rome Beauty, Jonathan, and Winesap. North Central Washington, with its access to transcontinental railroads and Pacific Rim ports, had become the "Apple Capital of the World"[3].

In 1975, Bill and Denise Russell of Dolores established the Mountain Sun Juice Plant and manufactured apple and fruit juice from Montezuma Valley fruit. Mountain Sun earned and maintained a reputation for high-quality organic juices that were sold in grocery and natural food stores nationally. Bill and Denise started Mountain Sun after purchasing an old farm and homestead in central Montezuma County. The property included 700 apples trees planted in the 1940s. After a few years of hauling fresh apples to market in California for not much return, they were ready to try making juice. The Russells purchased an old meat packing plant on the banks of the Dolores River in the Town of Dolores to house the enterprise. Their vision was to create quality natural juice made entirely from fruit. The dream was to

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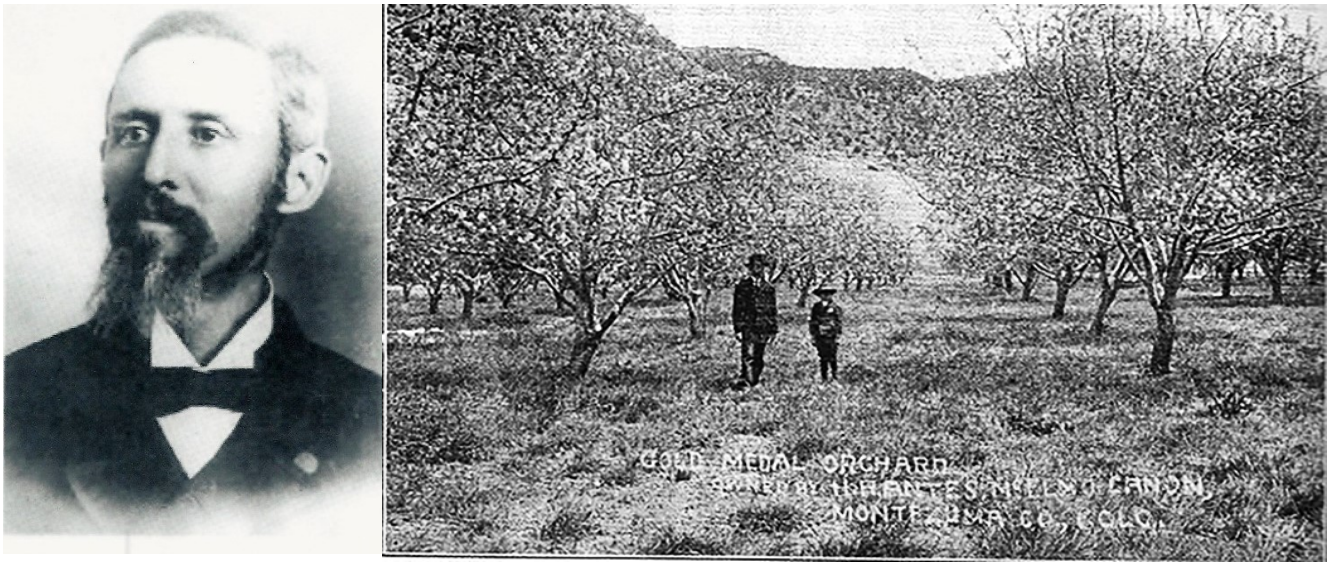
[1] Sandsten, E.P. and C.M. Tompkins. *Orchard Survey of the Southwestern District of Colorado*, The Agricultural Experiment Station of the Colorado Agricultural College. Bulletin 274. 1922

[2] Ibid.

[3] Overley, Fred, L. *History and Development of Apple Production in Washington*. ReConnect Magazine, Washington State University.



Reverend Howard R. Antes (left) winner of the 1904 Gold Medal. Antes and son in the Gold Medal Orchard (right), McElmo Canyon, Montezuma County, CO.

use Montezuma Valley fruit. In the early years of operation, fruit was sourced solely from Montezuma Valley orchards. Russell hired traveling fruit pickers who travelled from stone fruit to citrus fruit orchards throughout the West. They stayed on Russell's farm and could pack 60 pounds of apples into a sack by climbing the ladder backwards, leaning back and stripping fruit into bags on their bellies. Up to 100 bushels of apples per picker per day was not unheard of. Russell also arranged to harvest and prune trees in nearby orchards in return for free apples.

The largest harvest Mountain Sun reaped from local orchards was 25,000 bushels in the early 1980s. Mountain Sun broke even (covered costs, payed bills, but not owner salary) when sales hit $350,000 per year. On average, 25,000 bushels of fruit produced 75,000 gallons. At that point it was clear that they needed more apples than those available locally to earn a profit. Russell purchased an 820-acre orchard in Wilcox, AZ in 1981 to expand the operation. At the peak in the early 2000's, Mountain Sun had $11,000,000 sales annually and transported 80 semi-loads of juice monthly from Dolores. Sixty people were employed at the plant. Mountain Sun Juice sold and closed in 2002 but the label and recipes are still marketed by owner Hain (http://www.mountainsun.com/). Their website boasts: "*Drinking Mountain Sun juices is like putting your straw right into the orchard or berry patch. We choose fruits dripping with nutritional goodies, fresh press them at the peak of flavor and deliver the healthy benefits right to your glass"*. The juice plant was the last significant local market for Montezuma Valley apples. Today, MORP estimates that 200 historic orchard sites remain in Montezuma County that contain well over 3,000 trees. Unlike Mesa County to the north, Montezuma County did not see the widespread eradication of apple trees in the last century. Following Mesa County's apple boom of 1895, over half a million apple trees were pulled up and destroyed due to poor irrigation management and arsenic resistant codling moth infestations[4]. Mesa County's apple industry continues to fluctuate depending on market trends, and most of the apple orchards have been planted with newer varieties.

While historic fruit trees can be found in all of Colorado's historic fruit districts, the concentration and diversity of remaining historic orchards in Montezuma Valley is unique. Many old trees have co-existed

[4] Sexton, Joyce. History of the Fruit Industry in Mesa County. Colorado State University Western Agriculture Research Center. 1986.

with grazing and passive management, and in 2002, Montezuma County had the highest percentage of old trees and unknown varieties as compared with Colorado' s top apple producing counties of Delta, Mesa, Fremont and Montrose[5]. Even so, many Montezuma County orchards were top-worked—grafting newer varieties directly onto the older trees—after 1920. The diversity found in the old trees that were not top-worked is what MORP seeks to document and preserve.

Current Research on Montezuma Valley Orchards and Colorado Apples

MORP is researching old Colorado apples and creating an **Old Colorado Apples** list. By searching historical books, reports and records, we have so far documented 436 varieties of apples that were once grown in Colorado. Some of the apples on this list we see still growing in our landscape on trees up to 100 years old or older. Others, nearly 50% of the list, are now considered lost/extinct.

A few details from the list of **Old Colorado Apples**:

- 64 varieties (15%) are **Common**—10 or more mail order sources carry them; these varieties are NOT commonly found in nurseries, but can be found with specialty nurseries and collectors.
- 55 varieties (13%) are **Rare**—4 to 9 mail order sources carry them.
- 108 varieties (25%) are **Endangered**—1 to 3 mail order sources; MORP works to get our hands on these apples and increase their numbers before they end up on the lost list.
- 205 varieties or (47%) are **Lost**—considered Extinct; MORP has rediscovered two lost varieties - the Colorado Orange and the Cedar Hill Black apples.
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Approximately 32 varieties of apples have been identified (or tentatively identified) thus far by MORP in Montezuma County orchards planted before 1920. Surveying orchards entails taking a Global Positioning Unit (GPS) coordinate of each tree, photographs and field notes; and importantly, talking to the owners about the history of the trees. Data is entered into MORP's fruit database, building knowledge of the heritage fruit resources as we design strategies to preserve them. This represents the first comprehensive orchard survey conducted since E.P. Sandsten in 1922.

Varieties MORP has identified include, in no particular order, Chenango Strawberry, Maiden Blush, Winter Banana, Stayman Winesap, Winesap, Yellow Bellflower, Gano, White Winter Pearmain, Grimes Golden, Yellow Transparent, Early Strawberry, Wolf River, Black Ben Davis, Willow Twig, Thunderbolt, Northwest Greening, Rhode Island Greening, Golden Delicious, Colorado Orange, Cedar Hill Black, Wealthy, MacIntosh (old fashioned), Wagener, Hawkeye Delicious, Double Red Delicious, Standard Delicious, and many Rome and Jonathan types—including some of the "old-fashioned" type. Dozens of other varieties have been tentatively identified with names of Liveland Raspberry, Winter Rambo, Summer Rambo, Ben Davis, Northern Spy, Baldwin, Cortland, Early Harvest, Sweet Pear, Ralls, and others. The results from the DNA testing will help us better understand the valuable resources remaining in our heritage orchards.

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[5] Colorado Agricultural Statistics Service, Colorado Fruit Tree and Vineyard Survey 2002. August 2002.

When compared to 49 varieties documented in our district in 1922, we find that 65% of that diversity is still found in our area's oldest orchards. Yet, this diversity is hanging on a limb, so to speak; preserving it before it is gone is what MORP works to do.

A possible Liveland Raspberry apple tree at the historic Greenlee orchard

When compared to the 436 varieties of apples that were introduced to the *state* of Colorado by 1922, Montezuma County today harbors an estimated 7% of that total diversity. From our observations we predict this is a much higher number than elsewhere in the state; yet it also demonstrates the devastating loss of diversity that occurred in Colorado and across the country over the last century. This great diversity disappeared not because these varieties did not grow well here; rather because many were simply not shiny red apples representing the standard of the time. For a copy of the **Old Colorado Apples** list, email MORP at morp@montezumaorchard.org.

Colorado Apple Production and Pricing Patterns

In 2014, Colorado ranked 25th in U.S. apple production, producing 8.9 million pounds[6]. While peaches provide most of the fruit income in Colorado, fresh apples comprised just over $4,000,000 in farm income cash receipts in 2012[7]. The only thing consistent about apple production in Colorado is the wild swings in production levels year to year. For the average 1,350 bearing acres in Colorado, between 2005 and 2014, annual yield has varied from a high of 20,700 to a low of 4,670 pounds per acre (Table 1).

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[6] National Agricultural Statistics Services. Colorado Field Office. Colorado Agricultural Statistics 2015. https://www.nass.usda.gov/Statistics_by_State/Colorado/index.php.

[7] Ibid.

Table 1. Conventional Apple Statistics in Colorado[8]

Year	Bearing Acres	Yield (pounds per acre)	Production (Million Pounds)	Price received by farmers ($ per pound)
2005	***1500***	***20,700***	***31.0***	***$0.0179***
2006	***1500***	***10,000***	***15.0***	***$0.0270***
2007	1600	8,130	13.0	$0.0215
2008	1400	12,900	18.0	$0.0234
2009	1500	10,700	16.0	$0.0258
2010	1400	10,000	14.0	$0.0216
2011	1300	6,920	9.0	$0.0293
2012	1200	14,200	17.0	$0.0304
2013	1200	4,670	5.6	$0.0363
2014	1200	7,420	8.9	$0.0892
Average	1380	10,564	14.75	$0.0322

Since most of the apple orchards in Colorado are located at relatively high elevation, 3000 feet or higher, the apple crop is at risk for a late spring freeze each year. The years 2005 and 2006 are representative of the annual production and price variation. Apple yields and production in Colorado were double the long term average in 2005 and average in 2006. Prices in 2006 were 50% higher than in 2005. Prices have stabilized in recent years because as a relatively small-producer, Colorado is a "price-taker". However, in 2014, the lower than average yield resulted in triple than average prices. This demonstrates that demand for local apples may be shifting the market.

The top ten apple varieties produced in the U.S. are Red Delicious, Gala, Granny Smith, Fuji, Golden Delicious, Honeycrisp, MacIntosh, Rome, Cripps Pink/Pink Lady®, Empire[9]. In Colorado, the top apple varieties are Gala, Golden Delicious, Fuji, Red Delicious, Jonathan, Jonagold, Rome, Honey Crisp, Cameo, and Granny Smith.[10] In 2002, the most recent detailed statistical data for fruit trees in Colorado, about 20% of the apples were grown on certified organic acreage.

The long term trends in Colorado and Montezuma County show a reduction in apple-bearing acres. In Colorado, apple-bearing acres were reduced by one-quarter between 2004 and 2013.[11] In Montezuma County, bearing acres have reduced by 40% from 200 acres in 1994 to 120 acres in 2002. Montezuma County is unique in Colorado, as it has a predominance of old trees and "other/unknown varieties". According to the *Colorado 2002 Fruit Tree and Vineyard Survey*, almost two-thirds of the trees in Montezuma County in 2002 were planted before 1981 and a quarter of the trees were described as "other/unknown" varieties[12]. These statistics support non-commodity apple production and marketing in Montezuma County.

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[8] National Agricultural Statistics Services. Colorado Field Office. Colorado Agricultural Statistics 2015. https://www.nass.usda.gov/Statistics_by_State/Colorado/index.php.

[9] Usapple.org

[10] Colorado Agricultural Statistics Service, Colorado Fruit Tree and Vineyard Survey 2002. August 2002.

[11] Ibid.

[12] Ibid.

Montezuma Valley Apple Products

Montezuma Valley apple products include fresh apples, juice and cider apples that can be designated as local, organic, or naturally produced. For the purposes of this report, juice is defined as sweet, unfermented apple juice and cider is defined as fermented hard (alcoholic) cider. The apple varieties include heritage varieties grown on old trees that result in "old-fashioned" apple varieties that were selected for taste rather than durability or red color. There are some value-added apple products available from southwestern Colorado such as apple juice and cider, but since the closure of the Mountain Sun Juice plant in 2002, there have not been any commercial-scale value-added operations in the area. In addition, farmers offer U-pick and agritourism programs that provide income to their orchard operations, but these are also on a relatively small scale.

Fresh Apples

Fresh apples are considered those produced to be sold whole for fresh eating or cooking. These apples can be marketed and sold retail or wholesale. Because of this they are subject to a higher standard of grading than juice apples.

Grading

Washington State was the first to develop apple grading standards followed by the USDA in 1923. Apple grading standards are based primarily on appearance. Current standards are as follows:

- Washington Extra Fancy
- U.S. Extra Fancy
- Washington Fancy
- U.S. Fancy
- U.S. No. 1
- U.S. No. 1 Hail

Unlike major commodity varieties that are graded in large part on color, uniformity, sugar content and overall appearance, heirloom apples are valued primarily for flavor, variable seasons of ripening, storage qualities, desirable characteristics for cider and historical significance. Heirloom apples can be expected to have a much greater degree of variability in appearance, flavor, texture, and use —including the presence of scabs and russeting. Interestingly, recent research indicates that apple "blemishes" can increase phenolic compounds which have been linked to increased nutritional value[13].

A Heritage Fresh #1 apple may have spots and other variations.

MORP proposes adapting USDA grade US Extra Fancy to allow for russeting and other variabilities commonly present on heirloom apple varieties to meet a "Heritage Fresh #1" standard with the

[13] ANA SLATNAR, MAJA MIKULIC PETKOVSEK, HAIDRUN HALBWIRTH, FRANCI STAMPAR, KARL STICH and ROBERT VEBERIC. Response of the phenylpropanoid pathway to Venturia inaequalis Infection in maturing fruit of 'Braeburn' apple. Journal of Horticultural Science & Biotechnology (2010) 85 (6) 465–472

following specifications: *apples that are mature, but not overripe, clean, fairly well formed, and free from decay, internal browning, internal breakdown, freezing injury, visible water cores, and broken skins. The apples are also free from damage caused by bruises, hail, disease, insects, bitter pit, Jonathan spot, or damage by other means, and russeting and scabbing will not disqualify an heirloom apple from being a Heritage Fresh #1 apple.*

Juice and Cider Apples

A load of #2 juice/cider apples. Note bruising and other discoloration.

Apples used for juice and cider need not meet stringent fresh eating standards as they are pulverized prior to juice extraction. Apples can exhibit hail damage, stem punctures, russeting, sunburn, bruising and some insect damage. Cider-specific apples are grown for hard cider production, and they are generally not pleasant to eat. Tannins, which are found also in tea and red wine, are a key component of bittersweet and bittersharp cider apples and lead to bitterness and astringency which produces the dry or puckering mouthfeel in cider[14]. Other important components of cider apples include acidity and sugar content which affect how a cider ferments and tastes. Cider makers produce both single variety and blended ciders depending on their preferences. Dual-purpose apples, like the Stayman Winesap, are good for both fresh eating and cider production. Finally, quality juice apples such as Jonathan, Delicious, and Winesap, provide a balance of sweet and acid which leaves the apple juice drinker wanting for more[15]. Montezuma County has a preponderance of juice apples as well as many dual-purpose varieties; cider-specific apples are a focus of MORP's propagation efforts, as well as new orchards currently being planted.

Sizing

Generally, apples are sized according to how many fit in a bushel. A bushel represents a unit of volume or capacity which in the US is the equivalent of 2,150 cubic inches, or eight gallons of dry measure. Today, a bushel is also attributed to a weight, depending on the crop. According to the US Weights and Measures Act, the Standard Weight Per Bushel for Agricultural Products—Apples, is 47 pounds. Practically, it is a variable weight, typically around 40 pounds. The average size of commercial apples is just under 3" in diameter; 100 of these apples would fill a bushel. See Appendix 1: Apple Sizing Chart.

Additional Designations and Descriptions

Other designations are used to distinguish conventional, commodity apples from those grown locally, on old trees, using organic or natural cultivation methods. These designations should help Montezuma Valley apples command a premium price in the market.

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[14] www.cider.org.uk

[15] Russell, Bill, personal communication. August 2016.

Heirloom/Heritage/Old-Fashioned Apple Varieties

MORP uses heirloom and heritage interchangeably to describe old apple varieties that have been grafted and maintained by generations of gardeners and farmers. They have been cultivated for qualities such as taste, storage, season, historical significance and use—not for color and uniformity. In the case of cider apples, they are cultivated for acidity, presence of tannins and sugar content.

It is worth mentioning the history of what we commonly know today as the Red Delicious apple. The oldest Delicious apple was called *Hawkeye*[16], and MORP believes this original tree to be present in some of the oldest Montezuma County orchards. By the 1930s, numerous still tasty cultivars of Delicious, known as "double-red", "standard" and "original" existed in local orchards. Some 300 cultivars[17] of Delicious have been documented by fruit-preservationists, although many of these disappeared or became endangered soon after they were named. Given the tremendous variety in Delicious cultivars, MORP refers to heritage Delicious apples that are red in color simply as "Delicious". Delicious apples grown on 100-year old trees have a complexity of taste that is not available on apples grown on smaller rootstock or Red Delicious apples grown commercially today. As Jay Kenney of Clear Fork Cidery says, "these old varieties of common apples today just taste different when grown on 100-year old trees compared to those that have been bred for extended shelf life, color and size"[18].

Local Designation

MORP uses the United States Department of Agriculture (USDA) definition for locally grown produce that includes agricultural products grown within a 400-mile radius of the destination market or within the same state. According to this definition, local markets for Montezuma Valley apples include:

Colorado	New Mexico	Utah	Arizona
Cortez Durango Telluride Grand Junction Denver, Boulder, Fort Collins, Colorado Springs Southern Ute and Ute Mountain Ute Reservations	Farmington Albuquerque Santa Fe Jicarilla Apache Reservation	Moab Salt Lake City	Flagstaff Navajo Reservation Hopi Reservation

Colorado Proud

More than 90% of Coloradans would buy more Colorado grown and produced products if they were available and identified as being from Colorado[19]. The Colorado Department of Agriculture developed COLORADO PROUD in 1999. It is a free marketing program designed to help consumers, restaurants and retailers identify and purchase Colorado food and agricultural products. The bright distinctive COLORADO PROUD logo series helps residents of our state, other states and other countries easily

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[16] Schuenemeyer, Adalyn. Personal Communication. May 2016.

[17] Schuenemeyer, Jude. Personal Communication. May 2016.

[18] http://www.cpr.org/news/story/how-about-them-cortez-apples. May 2016.

[19] https://www.colorado.gov/pacific/agmarkets/colorado-proud

identify Colorado food and agricultural products. All southwestern Colorado fruit-growers should take advantage of this marketing program.

Organic Designation

Organic designation is restricted for crops grown with organic certification under the USDA National Organic Program (NOP). USDA organic regulations describe organic agriculture as the application of a set of cultural, biological, and mechanical practices that support the cycling of on-farm resources, promote ecological balance, and conserve biodiversity. These include maintaining or enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of toxic and persistent pesticides and herbicides, antibiotics, synthetic fertilizers, sewage sludge, irradiation, synthetic growth hormones, and genetic engineering. USDA Organic regulations can be found in Title 7, Subtitle B, Chapter 1, Subchapter M, Part 205 of the Federal Register. Periodic inspections are required to certify fruit as organic and are an added cost to the grower.

Certified Naturally Grown Produce

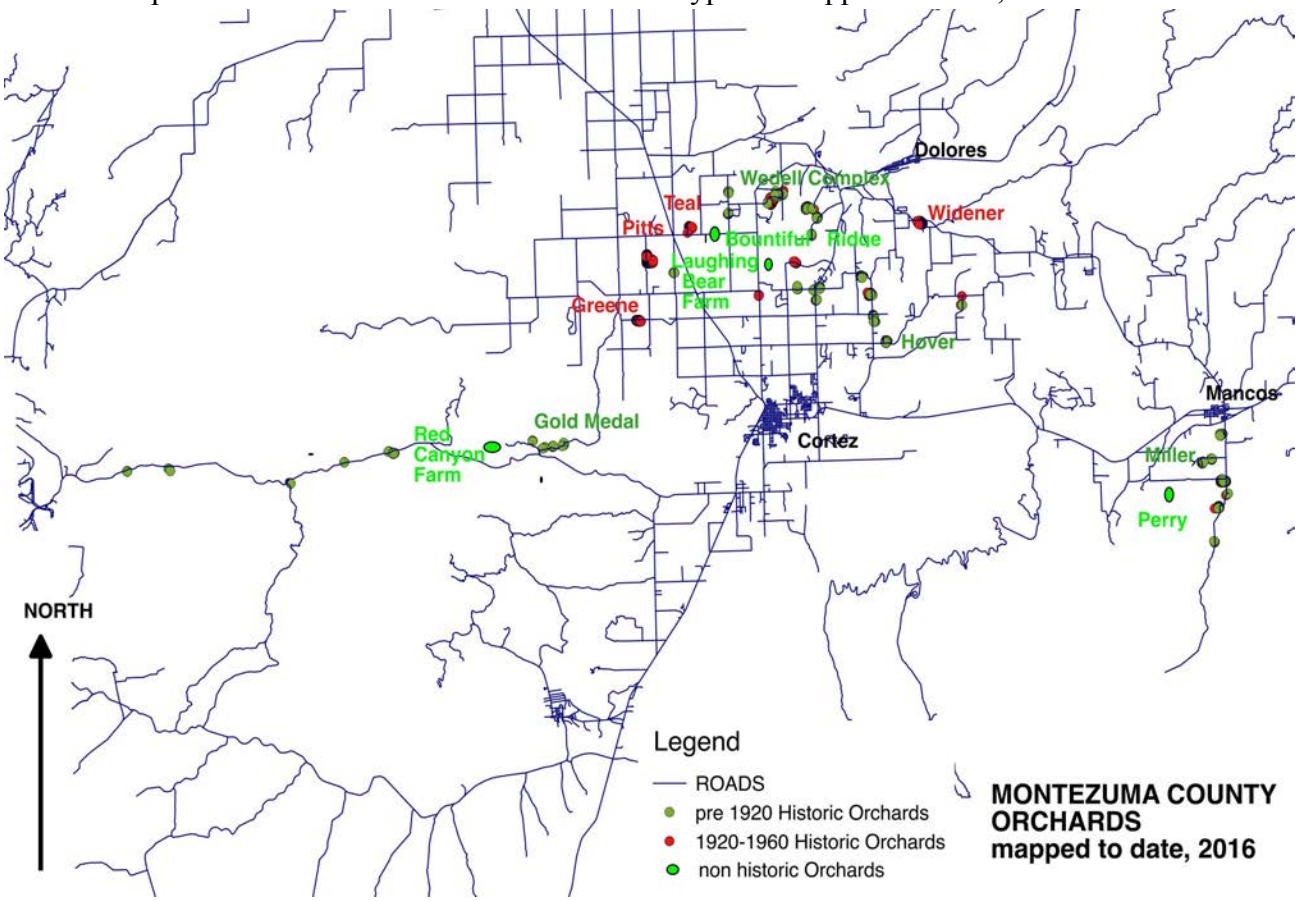
Certified Naturally Grown (CNG) produce standards are based on the USDA NOP requirements but CNG is neither accredited by nor affiliated with NOP. CNG offers peer-reviewed certification to farmers and beekeepers producing food for their local communities by working in harmony with nature, without relying on synthetic chemicals or GMOs.

Whole Foods Market Responsibly Grown Produce

Whole Foods Market has general requirements for produce suppliers that address labeling, supply chain transparency, traceability, food safety and their own Responsibly Grown Index. This Index addresses: pest management, including prohibited and restricted pesticides, farmworker welfare, pollinator protection, water conservation and protection, soil health, ecosystems, biodiversity, waste, energy, and climate. Whole Foods Market's produce standards reward farmers working to protect human health and the environment; prohibit the most harmful chemicals; and provide shoppers with information for sustainable farming practices. Suppliers must respond to all topics regarding responsibility standards prior to becoming a vendor.

3. Montezuma Valley Apple Production

Montezuma Valley apple production is described by the age of the orchard, tree density, apple varieties planted, and estimated annual production by apple product and grade. MORP has mapped each tree in 63 of the estimated 200 historic orchard sites in Montezuma County. The resultant tree database is used to estimate production levels for the various orchard types and apple varieties, when known.



Pre-1920 Historic Orchards

These are the orchards that represent the diversity of apple varieties that MORP seeks most to document, preserve, and propagate. Typical in these orchards were 20 to 50 varieties of apples planted on standard rootstock that included a mix of summer, fall and winter apples that carried people through most of the year by storing well through winter into the following spring. They were planted prior to 1920 and are exemplified by the Miller (George Halls), Hover, Wedell, Wayt and Doerfer Orchards. To date, the mapped historic orchards are located on 14 acres throughout Montezuma County and have a total of approximately 1,000 trees. These orchards are characterized by highly-desired and rare heritage apple varieties on 97 to 128 year-old trees.

MORP has documented numerous varieties in these orchards, including, among others: Chenango Strawberry, Maiden Blush, Winter Banana, Stayman Winesap, Winesap, Yellow Bellflower, Gano, White Winter Pearmain, Grimes Golden, Yellow Transparent, Early Strawberry, Wolf River, Black Ben Davis, Willow Twig, Thunderbolt, Northwest Greening and Rhode Island Greening. Given the age and rarity of these trees, they require "vintage" tree care and are probably best suited for selective harvest and as genetic stock for future tree-planting. For example, many trees are too fragile to shake for harvest and more expensive hand-harvesting on standard-sized trees will be required. These orchards will likely have higher maintenance and harvest costs but these higher costs could be recovered by premium prices for smaller quantities of these highly desirable heritage varieties. Furthermore, low production or availability of these apples will also drive up prices. The estimated annual production from the mapped historic orchards using a production estimate of five bushels per tree is 1,000 bushels being suitable for Heritage Fresh #1 products and 4,000 bushels for Grade B or juice.

The Pre-1920 Historic Wayt Orchard

1920 to 1960's Historic Orchards

These are orchards planted between 1920 and 1960 with primarily several varieties of Delicious and Golden Delicious, Rome, and Jonathan as well as Winesap and Stayman Winesap. The heritage orchards in this group include Burrell Orchards such as Pitts, Widener and T Lazy T orchards. The mapped orchards in this group are comprised of about 1500 trees on 21 acres, with at least that amount yet to be mapped. The market issues with this group are the varieties planted. Consumer education will be needed to demonstrate that these "old-fashioned" strains of Delicious, Rome and Jonathan apples taste better than modern strains because they were selected for flavor rather than color and durability and are growing on old standard rootstock. Rome and Jonathan varieties are good for cider and juice as well. Using a production volume of 10 bushels per tree, it is estimated that annual production for this group would be 3000 bushels of Heritage Fresh #1 apples and 8000 bushels of juice/cider using a tree-shaking harvest method. As this group of trees moves into the vintage stage, these production levels will likely fall to five bushels per tree and tree-shaking harvest method may not be likely.

A 1920-1960s Historic Orchard planted in 1944 showing mixed agricultural use

Non-Historic Orchards

Most of these orchards were planted in the 1970s and include about 2000 mapped trees on 20 acres. These orchards are exemplified by Laughing Bear, Bountiful Ridge and Red Canyon orchards. The varieties grown on standard and semi-dwarf root stock include modern fresh market varieties such as Red Delicious, Golden Delicious, Rome, Jonathan, and MacIntosh. The issue with harvest from this group is that these varieties are mostly suitable for juice not cider, and the market is saturated with fresh-pack apples of these varieties. Estimated annual production from this group using an assumption of 500 bushels per acre is 3000 bushels of Grade A apples and 7000 bushels of apples.

A 1970 non-historic orchard planted on dwarfing rootstock

Modern Orchards – 2010 to Present

Most of the new orchards being planted in southwestern Colorado are at "artisan" or hobbyist scale. Many of these plantings are adjacent to existing historic orchards where the orchard owners plan to undertake cider operations using the old and new trees. Commercial-scale production from these orchards is likely to be five to 10 years in the future and small compared to other categories. It is likely that production from these new orchards will replace the historic and heritage orchard production. Therefore, these orchards are not included in the total production estimate at this time.

A modern 300-tree orchard of heirloom varieties planted over the last three years

Total Estimated Montezuma Valley Apple Production

MORP has surveyed 63 of the 200 (approximately one-third) known historic orchards sites in Montezuma County. Orchard survey includes locating and mapping each tree with Global Positioning Unit (GPS) and collecting data on age, condition, variety if known, irrigation, fencing. Additional, MORP interviews owners to known historical information. Further data from orchard owners was collected by survey and is included in Appendix A. Using these data, and production trends from Colorado Department of Agriculture (see Section 1.2), an estimate of annual apple production from southwestern Colorado is included in the table below.

Table 2: Estimated Annual Average Montezuma Valley Apple Production

Orchard Type	Varieties	Number of Trees (production estimate bushels/tree)	Fresh #1 (bushels)	Juice (bushels)	Cider (bushels)
Historic Pre-1920	Diversity, up to 20 in one orchard alone, including: Winter Banana, Chanango Strawberry, Original Delicious, Gano, White Winter Permain, Grimes Golden...	3000 (5 bushels/tree)	3,000		12,000
Historic 1920-1960s	Delicious, Golden Delicious, Rome, Jonathan, Stayman Winesap and others	4000 (10 bushels/tree)	8,000	32,000	
Modern	Red Delicious, Golden Delicious, Rome, Jonathan, Jonagold, "Improved" Macintosh	2000 (5 bushels/tree)	3,000	8,000	
Totals			14,000	40,000	12,000

Given the variation in production typical of Colorado orchards and the apple varieties grown, Montezuma Valley apple production would have the following attributes:

- The production pattern is assumed to be a heavy crop followed by light crop because of weather and other factors. Therefore, annual production will range 50% above or below the average reported in Table 2.
- Most of the fresh apple production will be "old-fashioned" strains of Delicious, Jonathan, Rome and Golden Delicious. Annual production will range from 7,000 to 21,000 bushels.
- Juice apples will be the largest volume of production ranging from 20,000 to 60,000 bushels annually.
- Cider apples from pre-1920 historic orchards will range from 6,000 to 18,000 bushels annually. These rare varieties will command a premium price because of high cost hand-harvesting techniques and low-production.

4. Cost Structure for Montezuma Valley Apple Growers

Montezuma Valley orchards do not conform to typical commercial orchard production cost models. Therefore, MORP interviewed five apple orchardists in Montezuma County and staff of the Colorado State University (CSU) Southwest Colorado Research Center to determine costs and returns associated with their production practices. Two of the growers were in the second to fifth year of establishing new orchards. Three of them were producing apples on established trees ranging from 50 to over 100 years old, and were planting young trees to fill in space in their orchards where old trees had been removed.

To further examine the costs related to typical Montezuma Valley orchards, MORP developed cost models (enterprise budgets) for a multi-purpose orchard with apple varieties for fresh, juice, and cider apples on standard or 3/4 –sized root stock. Our goal is to model "traditional" orchards that are characterized by widely-spaced heirloom varieties grown on standard or near standard rootstock with perennial ground-cover, often pasture grasses, below. These orchards preserve the historic nature of our older orchards and use fewer costly inputs than large-scale commercial orchards using trellised, shorter-lived smaller trees. This model could augment small diverse family farms and homestead gardens. Interestingly, research in the United Kingdom is showing that traditional orchards are hotspots for biodiversity, finding over 1,800 species across the plant, fungi, and animal kingdoms in 2.2 ha of orchard[20]. Another use for this model of orchard is in conjunction with hay and livestock operations if the trees are spaced widely enough to allow for haymaking and irrigation equipment.

The models represent two types of orchards: rehabilitating an established heritage orchard and establishing a new orchard and are included in the Appendix. For rehabilitating an historic orchard, there are models for year 1, year 2, and at "maturity"—defined as once the orchard needs only routine maintenance and the backlog of rehabilitation pruning is complete. For establishing a new orchard, the models show year one, and at production—five to ten years out from planting. The orchards model 150

[20] Johnson, Henry. The Traditional British Orchard A Precious and Fragile Resource. www.buildingconservation.com. 2010.

trees/acre and assume 90% production for juice or cider and 10% production of fresh Heirloom #1 apples. Assumptions are included in the budgets.

Both models show that initial investment is about $5,000 per acre, not including land or irrigation water costs. In addition, orchard owners would have to invest $2,750 per acre each year for the first five years until yield is sufficient for commercial-scale sales. The annual operation cost by the time the orchard is in full production (between years 5 and 10) it is about $2,500 per acre. To cover this annual cost, the orchard would need to produce about 1,240 bushels per acre of juice apples (sold at $2.00 per bushel/ $0.05 per pound). This is equivalent to average yield of about 8 bushels or more per tree of juice apples. At the higher price point of $7.50/bushel/$0.18 per pound, orchards would need only to produce 330 bushels/acre or 2.2 bushels per tree. The higher quality apples that could be sold as fresh apples would generate profit. Profit could also be generated by growing desirable cider varieties that certain craft cider makers are willing to pay a premium well above the $2.00/bushel required to cover costs. Given the uneven production of Montezuma Valley orchards year to year, orchard owners would have to garner higher than average profits in good years to cover fixed costs in years with lower yields. These fixed costs, such as labor, for a typical orchard average about $2,000 per acre do not vary substantially with yield.

A summary of the anecdotal production cost information reported during the interviews is included below:

1. **Miller Orchard, Mancos Colorado. Sara Miller, Owner-Operator**

   Sara Miller has been rehabilitating an orchard in the Mancos area for the past five years that was first established in the 1890s by early fruit-growing pioneer, George Halls. The orchard consists of almost 300 trees. Most of them are the original trees, along with one-to-three year-old trees that were planted when she started managing the orchard for fruit production. She counts 24 varieties of apples in the orchard.

   Miller's initial work involved cutting out dead wood and poorly shaped branches on the old trees. She harvested some of the slash for fire wood and chipped smaller branches, some of which she has sold for smoking meat in area restaurants.

   Sara has hired workers to help with spring pruning, with labor costs running from $7.00 to $8.00 per hour. She pays similar wages for picking, and the workers pick from four to six bushels of apples per hour. Other costs for orchard operations include pest control, rent of a chipper to handle slash, planting new trees and maintenance of equipment. However, she has not kept close track of costs each of the operations performed.

   Her goal is to develop a local hard cider operation that will have a retail outlet in Durango. She has installed a cider press in a building at her orchard, which is pressing apples from her orchard as well as other orchards in the area. A problem she has encountered is that there is no place to store the juice in the area, and has had to ship the juice to a storage facility near Grand Junction. She currently pays $600/month to store 10,000 gallons of frozen juice.

2. T Lazy T Orchard, Arriola Colorado, Dusty and Martha Teal, Owner-operators

The Teals bought a farm a few years ago, located northeast of Arriola that had 55 standard apple trees that are about 75 years old. The trees had not been managed as a productive orchard for many years and have required considerable work to get back into production. They have also planted 35 new trees and plan to eventually have 50 heritage-variety trees on semi-dwarf root stock when the planting is complete.

The Teals do all of the work associated with the orchard themselves. Since they have been rehabbing the old trees, pruning has been quite time consuming, often taking several hours per tree per year. Pruning all of the newly established trees took about a day to complete this spring.

The Teals will market all of their apple crop through production of hard cider. They will mill and press the apples and store the juice on site, until they ferment it make the cider. One difficulty they have encountered is the licensing requirements for cider-makers. Colorado has not established a license for small-scale producers to sell hard cider. This will require legislation to be approved through the Colorado State legislature and could take a few years given that each state legislator has a limited number of bills that they can introduce each session.

While deer do not bother their large, standard trees, they have erected a deer-proof fence to protect the newly planted trees. They also must provide protection for these trees from damage caused by rabbits and other rodents.

3. Sam Perry

Sam Perry tends an orchard near Mancos that contains both five-to-ten year-old trees and some recently planted trees. He is also establishing a new orchard adjacent to the older orchard, and is caring for another orchard near Ignacio.

Perry's cost associated with rehabilitating old, neglected, standard trees is about $25 per tree, plus rental costs for lift equipment. He also has costs associated with slash disposal from pruning of the older tree, pest management treatments for codling moth, and irrigation water. Cost estimates to introduce parasitic wasps for codling moth control depend on release rates, and include labor for monitoring, releasing, and evaluating treatment effect. For moderate release rates (60-70% control) on standard trees, supplies (wasps, shipping, traps, thermometers) can cost $270 per acre annually. Labor (temperature monitoring, trap setting and monitoring, wasp releases) is estimated at $125 per acre assuming a labor cost of $20 per hour though this is generally done by orchard owner.

Perry is installing deer-proof fencing for his new orchard using native cedar posts and recycled fence material. He is bearing all of the costs himself, rather than applying for assistance from Colorado Parks and Wildlife Department. The fence that will surround the new orchard is similar to the one that encloses the older orchard. However, he had considerable damage to small trees from rabbits gnawing on the trunks during this last winter with particularly deep snowfall.

4. Bountiful Ridge Farm, Dolores, Colorado Rick and Gerrie Goodall, Owner-operators

Mr. Goodall planted 250 Golden Delicious trees in 1992 on semi-dwarfing rootstock. Since 2009 he has planted another 250 trees. The Goodalls sell apples retail at the Cortez Farmer's Market and wholesale to area restaurants and natural growers through Southwest Farm Fresh Cooperative.

He believes that finding orchard labor is one of his top concerns. His pruning costs amount to about $5.00 per tree; and reports picking costs are about $2.00 per bushel, sorting $2.00 per bushel and he spends $2.50 for each cardboard box he uses to market fresh apples.

Since he is planting trees on soil that has not been used as an orchard before, he first surveys the land and draws up a design for the trees. Then he works the ground much like preparing the soil for any other crop. He plows, discs and harrows the soil before digging holes to plant the trees.

His costs for planting trees include land preparation at $55 per acre, $10 for each tree and $10.00 to prepare a hole and plant the tree. He also cultivates the ground between trees to control vegetation two to three times per year at a cost between $25 and $30 per acre. During the fifth year, he establishes grass and further cultivation is not required.

5. Colorado State University Yellow Jacket Fruit Tree and Vineyard Research & Demonstration Project

Gus Westerman, Colorado State University Cooperative Extension Agent, Dolores County, coordinates the fruit tree and research project. The project was started in 1991 to answer questions posed by people who wanted to know if fruit production would be profitable on lands irrigated by Dolores Project water. It is the highest-elevation research orchard in the world. A full description of the project is available at: http://www.coopext.colostate.edu/WR/Dolores/fruitmgmtguide.pdf.

The orchard is maintained by Cooperative Extension staff from Montezuma and Dolores counties, and knowledgeable volunteers. The orchard has benefited from the research conducted at the CSU Orchard Mesa Research Center located near Grand Junction, Colorado, and the University staff.

Apples are produced on 300 trees, consisting of four different rootstocks, ranging from trellised dwarf trees to trees that are 70% of standard. Since some of the trees that were first planted are now at the end of their productive life, they are being replaced by new trees of various varieties. Because of the diversity of trees within the orchard, visitors can see the management methods used with various tree layouts, irrigation methods and production practices. The Research Center staff shares their knowledge during tours and workshops at various times during the year.

Apples are marketed through "U- Pick" harvests during the fall. These events attract a large number of people who both visit the orchard and obtain a supply of apples at $1.00 per pound.

Estimated time spent on the 300-tree (dwarf and semi-dwarf) orchard annually include:

- Pruning 200 hours
- Cleaning prunings 45 hours
- Fertilizing 3 hours
- Mowing 60 hours

- Spraying 60 hours
- Irrigation 30 hours

Equipment used in the orchard includes:

1	50-gallon sprayer
3	Heavy duty pole looper pruners with 6 foot to 12 ft. extensions
1	Tree-pruning portable system
1	Portable tree pruning compressor
3	Hand pruners
1	Poulan gas powered pole pruner
1	Kawasaki Mule 610 UTV
3	Tallman orchard ladders, 6, 10 and 12 foot
1	John Deere Lawn Mower

For comparison, the cost information reported in orchard owner surveys includes the following:

- Experienced fruit pickers are paid $10.00 per hour. Pickers with no experience are paid minimum wage. One grower reported that they had difficulty finding labor even when offering $10 per hour. A grower and juice maker in the Grand Valley reported most fruit costs about $40 to $50 per bin to harvest.
- U-Pick and local retail operations are breaking-even at prices of $20 to $40 per bushel ($0.50 to $1.00 per pound for fresh apples).
- Wholesale prices of $1.00 for natural apples and $1.65 for certified organic apples reported to support break-even operations at several orchards.

5. Demand for Montezuma Valley Apples

Characteristics of Target Markets

There are four target markets for Montezuma Valley apples:

1. Wholesale – Fresh Apples #1
2. Wholesale – Fresh Juice Apples #2
3. Wholesale – Fresh Cider Apples #2
4. Retail – Fresh Apples Fancy/#1, #2, Fresh Juice, U-Pick.

The characteristics of demand from these target markets are described below in terms of product specifications (size, quality, variety, organic, local); harvest, process, and packaging requirements; storage and transport options from southwestern Colorado to the destination market; as well as pricing and contract terms. MORP conducted a buyer survey by phone and personal interview to collect data for this demand analysis. Most of the data provided was anecdotal or referenced other apple suppliers because of the small number of wholesale transactions completed recently for Montezuma Valley apples. Therefore, the resulting demand estimates are not very precise but the anecdotal data about market transactions and conditions provide insights into how the market works and what drives potential demand.

Wholesale – Fresh Apples #1

Wholesale demand for fresh apples by grocery stores such as Whole Foods Market, Kroger, and other grocery chains is focused on apples of the following varieties: Gala, Honeycrisp, Fuji, Granny Smith, Pink Lady, Jonagold. Another source of demand for fresh apples is regional produce wholesalers such as Southwest Fresh Cooperative that sells farm produce to restaurants, schools, hospitals, and multi-farm CSAs in Cortez, Telluride, and Durango. In all cases, suppliers are looking to fill demand for local, Colorado apples and this is where Montezuma Valley's orchards can fit in the market.

Fresh apples for this wholesale market must meet Heritage Fresh #1 specifications and be delivered to the destination retail outlets with minimal damage or spoilage. Target is less than 10 percent spoilage. This requires hand-harvesting and sorting of the apples as well as sturdy, padded packaging that prevents damage to the apples during transport. With the long distances to retail markets, refrigerated storage and transport are usually required to get Montezuma Valley apples to market in good shape.

Some of the existing, historic orchards have sorting equipment and cold storage such as a root cellar on-site. Much of this equipment is in disrepair and would require some rehabilitation before it could be used to supply #1 apples. The commercial-scale orchards in the area noted that there is an acute shortage of available cold storage in the region. Some of the packing options that have been used for Montezuma Valley apples include 20-pound field boxes, 40-pound wooden crates, and standard 40-pound cardboard boxes. Buyers require that whichever packaging is used that be well-labeled with variety and source location.

In discussions with wholesale apple buyers, some options identified for transporting apples from southwestern Colorado to large markets include:

1. Catch a ride with other regional products such as Bow and Arrow Corn and Adobe Milling beans and other products. This option is only feasible for retailers that source these other products locally and would probably not have refrigeration needed to keep apples in top condition.

2. Backhaul/deliver apples to local/regional store loading dock for internal distribution – Some retailers return empty trucks to Denver after deliveries to local markets. For example, Kroger Stores deliver to City Market in Cortez and can return to Denver area with an empty truck. Whole Foods Market has a store in Basalt, Colorado that could be a loading point for Montezuma Valley apples. This option would require that apples are delivered to the regional store in proper packages or pallet lots with clear labelling. It would require that suppliers be willing to accommodate "special" deliveries and that apple producers work cooperatively to create required lot sizes and packaging on specified dates. This level of storage and packaging is currently not possible with existing infrastructure in southwestern Colorado.

3. Group with other apples/fruit being transported from Grand Junction, Colorado area. This would involve delivering apples to Grand Junction area. Because of the shorter distance, refrigerated transport would not be required and is generally similar to the backhaul option #2.

Pricing for fresh wholesale apples is determined by the retail market set by conventional/commodity apples. While there is a retail price premium for heritage, organic, and local apples, much of this price premium would be absorbed by the additional harvest, storage, and transport costs required to get Montezuma Valley apples to distant retail markets. Buyer survey results revealed that with a 50% margin, wholesale prices for Montezuma Valley apples would be in the range of $1.00 to $1.50 per pound. The grower survey reported that certified organic apples were sold wholesale for $1.65 per pound. Estimated total weekly demand among surveyed buyers for fresh #1 apples is approximately 2000 pounds per week for conventional apples, and 2000 pounds per week for local, organic, or natural apples. The estimated fresh #1 Montezuma Valley apple supply is about 15,000 to 30,000 pounds per week (Table 2). However, current labor and infrastructure constraints would reduce the consistent weekly supply to 10 to 20% of the supply estimate.

Overall, Montezuma Valley apples need to receive premium prices to cover the additional harvest, storage, and transport costs to get these apples to larger retail markets. Some of the barriers to meeting the fresh #1 apply demand include:

- Lack of refrigerated storage and harvest labor to provide consistent weekly supply.
- Low production from historic orchards with highly desired heirloom apple varieties.
- Sorting equipment available but in disrepair prevents processing necessary to meet #1 standards.
- Some varieties such as heritage Delicious are in low demand and would require consumer education to support premium pricing for "old-fashioned" varieties. These older Delicious varieties have a far superior flavor to the modern Red Delicious.
- Establishment of natural and costly pest control methods that would meet certified natural or organic requirements to support premium pricing without organic certification.
- Cost and availability of trained picking, sorting, and packaging labor.

Wholesale – Fresh Juice Apples #2

The target market for fresh juice apples would be juice makers in the Grand Valley such as Big B's and cold-press juice-makers in the Denver area where Montezuma Valley apples could qualify for local-source status. The Montezuma Valley is well-suited to providing juice apples and many orchards have a history of providing apples to the Mountain Sun juice plant in Dolores, Colorado. However, the harvesting, packaging, and transport infrastructure needed to support these juice apples is rapidly deteriorating.

Heritage juice apple varieties exist in the greatest quantity in Montezuma County and include Delicious, Rome and Jonathan. Hand-stripping and tree-shaking are local harvest method for juice apples and large orchard bins are used to package the apples. They also can be transported without packaging by truck, but the apple integrity can suffer. Shaking apples is best done at peak ripeness and apples must be pressed in short order to avoid spoilage from bruising.

Pricing for juice apples varies widely. Juice apple suppliers reported receiving prices of up to $0.50 per pound for certified organic #1 apples or desirable heirloom varieties in crates and as low as $0.01 to $0.02 per pound for Grade B juice apples on the tree. The juice/cider makers that responded to the MORP survey reported paying $0.18 per pound for juice apples.

Demand for Montezuma Valley juice apples is highly uncertain as this market is growing quickly with demand for locally-sourced apple juice and cold-pressed juice. Big B's reported using 5 million pounds of apples for juice and cider in 2014. The estimated Montezuma Valley juice apple supply (Table 2) is about 40,000 to 80,000 pounds per week assuming a 20-week season. However, the same constraints on harvest labor and storage infrastructure apply to juice apples as fresh apples so it is expected that less than a quarter of this supply would be available at this time.

Market barriers for supplying Montezuma Valley juice apples to meet the local juice demand are the same as those for fresh apples and include:

- Refrigerated storage and transport are not as important for juice apples as #1 apples, but packaging and transport require some consideration to avoid spoilage and excessive damage to the apples during handling and transport.
- Given the long distances to destination markets, shipping fresh juice would be more economically efficient than shipping juice apples. With the closure of the Mountain Sun juice plant, presently there is no juice-making infrastructure that meets commercial production standards in southwestern Colorado.

Wholesale – Fresh Cider Apples #2

The target market for fresh cider apples is essentially the same as for fresh juice apples. The only difference is the varieties available in Montezuma County include Stayman Winesap, Winter Banana, and other heirloom varieties currently present in smaller quantities. The primary barrier to meeting cider apple demand with Montezuma Valley apples is that the desired apple varieties are on the oldest trees that are not suited to tree-shaking as a harvesting method. This can make Montezuma Valley apples

Stayman Winesap apples en route to Denver for cider

prohibitively expensive to cider makers. However, cider makers are willing to pay a premium for apples that match their "taste profile".

The demand for cider apples in Colorado and New Mexico is growing rapidly. In June 2015, USA Cider Market Survey reported that Colorado had 15 cider producers, two apple wineries, and one meadry.[21] New Mexico reported two cider producers and a commercial cidery is currently being built in Durango. The estimated supply of cider apples is 12,000 to 24,000 pounds per week but given that the apple source is historic orchards and very old trees the supply could be much lower because of inconsistent fruit year-to-year and difficult harvest conditions (Table 2). The market barriers for Montezuma Valley cider apples are the same as for juice apples noted above.

Local Retail – Fresh Apples #1, #2, Fresh Juice, U-Pick.

Most of the revenue generated by Montezuma Valley orchards is through local retail operations such as selling fresh apples at local farmers' markets and farm stands. In addition, several orchards host U-Pick operations and are supplying artisan-scale juice and cider operations.

Given the relatively small scale of retail sales in the Montezuma Valley, it is difficult to characterize this market. Suppliers reported pricing in the range of $18 to $20 per bushel for bulk sales and $5 to $10 per bushel for U-Pick operations. Natural, local apples sold at farmers markets range in price from $1.50 to $5.00 pound depending upon apple variety, quality, and season. Early and late season apples sales can command a price premium when there are no other apples or fruit available at local markets.

[21] https://cydermarket.com/Cider_Maker_Survey.html

Total demand for this market was reported in the grower survey to be 100 to 300 bushels per year sold at Farmer's market, on-farm, and U-Pick. However, this varies widely with supply and season and does not include the demand that is met by apple imports from Mesa County at local stores and roadside stands. Market barriers for meeting local retail demand include access to liability insurance for U-Pick operations and storage. Lack of storage and packing infrastructure, as well as the inability of orchard owners to pick fruit themselves, leads to high percentages of apples dropping to the ground and feeding deer and livestock.

6. Findings and Recommendations

The long history of fresh apple and juice production in the Montezuma Valley is experiencing a renaissance with the increased demand and premium pricing offered for local heirloom apples. The agricultural heritage in southwestern Colorado has preserved the orchards and infrastructure but the lack of market for them in the past 30 years has resulted in neglect and disrepair. Furthermore, the long distances to destination markets and lack of low-cost transport options requires that Montezuma Valley apples receive premium pricing to be economic. The risks and barriers to Montezuma Valley apple production as well as some recommendations for near-term solutions are listed below.

- **Vintage trees producing the most desirable apple varieties –** These 80 to 100+ year-old trees are the foundation of what makes Montezuma Valley apples unique and desirable in the local marketplace. However, these trees have variable annual production and may only produce for a few more years. Most trees are on standard root stock and in fragile condition requiring expensive hand-harvesting in tall trees. These orchards are best suited as a genetic source with minimal production to keep the "taste" for these apples alive in the marketplace while new trees grown from these vintage trees mature.

- **Infrastructure and labor constraints —**The infrastructure required to get fresh Montezuma Valley apples to market is in disrepair after decades of neglect. The sorting equipment, packing boxes and storage locations require significant investment to get them back into commercial-scale condition. Similarly, the labor needed to harvest Montezuma Valley apples and to prune trees has long dispersed and a new workforce would need to be trained and supported to have a steady apple supply available for market. MORP is applying for grant money to refurbish existing equipment and packaging as well as exploring options for training and supporting local labor.

- **Long distance to destination markets —** The major destination markets for Montezuma Valley apples include Denver area (400 mi from Montezuma Valley), Albuquerque (300 mi), and Salt Lake City (350 mi). These distances require padded packaging and refrigerated transport to ensure that the apples arrive in good shape. As there is no rail service to southwestern Colorado that serves these destinations, trucking is the only feasible transport option. While there are several transport options, they are all based on special arrangements to be economically feasible with retail apple prices, even with local, heirloom price premiums. MORP is currently working

with Whole Foods Markets to implement a pilot project for delivering Montezuma Valley apples to local stores during the 2016 season. The goals of the pilot project include:

- To prove sorting and transport of #1 quality heirloom apples to Basalt, Colorado.
- Develop education/marketing for "old-fashioned" Delicious variety.
- Experiment juice-making with these apples and sell juice next to fresh apple display.

- **Difficulty in meeting fresh #1 apple standards and natural certification requirements with heirloom varieties —** Varieties of certain heirloom apples such as Stayman Winesap are not able to meet USDA #1 apple standards because they have a greater degree of variability in appearance, flavor, texture, and use than conventional apple varieties grown to meet #1 standards. MORP seeks to educate buyers about the differences between heirloom and commodity apples especially with respect to appearance. In particular, russeting and scabbing should not disqualify an heirloom apple from being a #1 apple. MORP has proposed adapting USDA grade #1 to allow for russetting and other variabilities commonly present on heirloom apple varieties to meet a "Heritage Fresh #1" standard. In addition, it is difficult to meet organic and natural certification pest control requirements with old apples trees. MORP is proposing alternative pest control methods specifically designed for older trees that would qualify for organic or natural certification and education and marketing around the variability in appearance of heirloom apples.

- **Abundance of juice apples—** The Mountain Sun juice plant in Dolores, Colorado closed 14 years ago, but the source trees for the organic apple juice are still producing. The Montezuma Valley has a predominance of heirloom Delicious as well as Jonathan and Rome apples that are well suited to juice production. Juice apples do not have to meet the more stringent #1 fresh apple standards, but the distance to destination markets is even more of a barrier for these low-priced apples. One solution that MORP is evaluating is the implementation of a mobile juice unit. The unit would be suitable for apple and other fruits in the Montezuma Valley. In addition to providing a value-added product for the juice apples, the mobile juice unit could help solve the transport problem of shipping juice apples to distant markets as shipping juice is much more efficient and economical.

- **Matching supply and demand for cider apples—** While the Montezuma Valley seems to be a cider maker's ideal source for heirloom apple varieties, there are some constraints that make the potential supply less than perfect. Unlike more common commercial varieties, older cider varieties may not be suited to closely spaced production on dwarfing rootstock due to the pressure of fire blight. Furthermore, annual production can be limited as many cider apple varieties are biannual bearers. Fortunately Delta County growers are experimenting with cider varieties planted on dwarfing rootstock to help answer this question. The bitter taste that adds complexity to cider flavor makes the fruit otherwise inedible and unavailable for multiple uses as fresh and juice apples. All of these factors create upward pressure on the cost of producing cider apples. Currently, local cider apples are commanding a price premium over juice apples, but it is not sufficient to offset the higher costs and limited supply. To alleviate the supply/demand mismatch for cider apples, MORP is building sources of cider apple scion wood for and encouraging new and expanded orchards to be planted in the Montezuma Valley featuring cider

varieties. These new orchards feature heirloom varieties grown on standard rootstock to meet the cider and juice taste requirements while maximizing tree durability.

- **Recommendations from Bill Russell, Mountain Sun Juice owner/operator 1975-2002**
  - ✦ Tree-shaking as a harvest technique only works when fruit is ripe and the fruit must be used immediately because it does not keep very long. This harvesting technique would be most appropriate with the mobile juice unit on-site.
  - ✦ Russell invested a lot of time marketing the story of Montezuma Valley apples and Mountain Sun juice. He developed a "training and sales" program that he personally presented to all store employees to ensure that everyone knew the story, and lobbied to get the Mountain Sun juice shelved in the produce department.
  - ✦ Russell is enthusiastic about the concept of a mobile juice press coming to the Montezuma Valley. He believes that juice would be a viable product again if the enterprise is led by someone with business sense, vision, and tenacity. While he doesn't think there is currently enough fruit in Montezuma Valley alone to support a profitable juice enterprise, a regional operation can be profitable. However, with southwestern Colorado's ample land, water and growing climate, the potential to increase production to meet enterprise needs is here.
  - ✦ Russell recommends building the brand by marketing in one location initially and expanding from there. He says to create a business model by learning lessons in one location and to size every part of the operation to fit each other: apples, freight, pressing, packaging, delivery, and capacity. He believes that more volume is better in the food business, generally. For Mountain Sun, the cool building was a big advantage for them as they didn't have to refrigerate their processing area as they do in California.

7. Conclusion

In summary, Montezuma County is Old Orchard Country. Today's interest in local and heirloom food, together with the resurgent hard cider industry foretells a new future for old apples. The work of our early fruit-growing pioneers remains in our landscape to use as building blocks to restart a local fruit economy. This is evident in the rediscovered Colorado Orange apple's recent addition to **Slow Food Food Ark of Taste** - a living catalog of delicious and distinctive foods facing extinction and champion of keeping them in production and on our plates. Their description of this apple could not speak better. of our fruit growing past and for its future.

When was the last time an apple asked more of you than just to slice it and smear it with peanut butter? When it seduced you into its color, aroma and flavor as slowly and deeply as a glass of Puligny Montrachet? Turn this heirloom in your hand and watch as pink-orange melts into yellow highlights and a sun-touched rosy blush. Breathe in the aroma of cider and soft rose. Smack into the crisp, crunch for a juicy explosion of complexity: lemon geranium, strawberry, bitter beer… even cheddar, butter and earth. Have you ever in your life? Well, have you?

The Colorado Orange Apple is an "apple by accident". The first tree sprang out of the root graveyard of a less fortunate variety of apple sapling planted by settlers in the late 1800s. After its first season of bearing fruit, the Colorado Orange Apple tree became the apple of many an orchard-owner's eye, and it was grafted widely across the state. In 1908, there were 3200 acres of apple orchard in Colorado, and the Colorado Orange Apple was one of only a dozen varieties that produced a full crop each season. Due to its late bloom, reliable harvest, sensuous flavor and buttery texture in pie, this Colorado native was in high demand and fetched high prices. During its heyday, it was cultivated all over the Midwest and planting was continually recommended to be more widespread.

It is unclear how or why the Colorado Orange Apple fell out of favor with orchardists [was not a red apple], but as of 2016, there is only one tree still in existence bearing fruit. Efforts have been undertaken to preserve this tasty treat by distributing scions to other orchards in the Colorado area, and though there are a total of 50-60 new trees, none of them have yet borne fruit. This means the apple is only available for home consumption. If only vintners [attention cider makers] could grow a passion for apples, helping us to highlight their terroir and complexity as they have wine, we may have a shot at successfully dedicating orchards to the production of the Colorado Orange Apple as preservationists recommend. Until then, the paper description of flavor will have to stand in for the real thing. Are you satisfied with that? Well, are you?[22]

We at the Montezuma Orchard Restoration Project are not satisfied to simply read about tasty heirloom apples when there is a chance to taste them in person and share with others. Join us in our mission *to preserve our fruit-growing heritage and restore and orchard culture and economy to southwestern Colorado:* www.montezumaorchard.org.

[22] https://www.slowfoodusa.org/ark-item/colorado-orange-apple

8. Appendices

Appendix 1: Apple Sizing Chart

Appendix 2: SW COLORADO HISTORIC APPLE ORCHARD REHAB BUDGET YEAR 1

SOUTHWEST COLORADO HISTORIC APPLE ORCHARD REHAB BUDGET YEAR 1						
ENTERPRISE	**Cider Apples – Rehabbing Mature Orchard 1st**			**ACRES:**	**1**	
VARIETY	Mixed Varieties Mature Orchard			**TREES PER ACRE:**	**150**	
2016						
<<PRODUCTION AND MARKETING ASSUMPTIONS>>						
Note: Please consult the table at the end of this spread sheet for additional returns data.						
Sales Description		Units	Units Sold /Acre	Sales Price Per Unit		
a. Sales by bushels		Bushels	0	$0.00		
b. Other sales		lbs.	0	$0.00		
c. Insurance		dol.	0	0		
d. Disaster payment		dol.	0	0		
<<OPERATING RECEIPTS>>						
SALE ITEM	**UNITS**	**PRICE /UNIT**	**QNTY. /ACRE**	**VALUE /ACRE**	**VALUE /TREE**	**TOTAL VALUE**
a. Sales by bushels	Bushels	$0.00	0	$0.00	$0.00	$0.00
b. Other Sales	lbs.	$0.00	0	$0.00	$0.00	$0.00
TOTAL OPERATING RECEIPTS				**$0.00**	**$0.00**	**$0.00**
<<CASH OPERATING EXPENSES>>						
EXPENSE ITEMS			**UNITS**			
LABOR:	**UNITS**	**COST /UNIT**	**PER ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Pruning	hrs.	$12.00	300	$3,600.00	$24.00	$3,600.00
b. Prunings removal	hrs.	$12.00	12	$144.00	$0.96	$144.00
c. Weed Control	hrs.	$12.00	2	$24.00	$0.16	$24.00
d. Tillage/Mowing	hrs.	$12.00	4	$48.00	$0.32	$48.00

e. Thinning	hrs.	$0.00	0	$0.00	$0.00	$0.00
f. Irrigation	hrs.	$12.00	15	$180.00	$1.20	$180.00
g. Harvest Field Picking	Bushels	$0.00	0	$0.00	$0.00	$0.00
h. Fertilization	hrs.	$12.00	12	$144.00	$0.96	$144.00
i. Harvest Transport/Renta	bin	$0.00	0	$0.00	$0.00	$0.00
j. Payroll Taxes		$0.00	0	$0.00	$0.00	$0.00
TOTAL LABOR EXPENSE				**$4,140.00**	**$27.60**	**$4,140.00**

EXPENSE ITEM (CONT.)

REPAIRS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Machinery & Equipment	$100.00	1	$100.00	$0.67	$100.00
b. Bldgs., Fences & Improvements	$150.00	1	$150.00	$1.00	$150.00
TOTAL REPAIR EXPENSE			**$250.00**	**$1.67**	**$250.00**

CHEMICALS & SPRAYS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Insect	$0.00	1	$0.00	$0.00	$0.00
b. Disease	$0.00	1	$0.00	$0.00	$0.00
c. Weed Control	$15.00	1	$15.00	$0.10	$15.00
d. Hormone	$0.00	1	$0.00	$0.00	$0.00
TOTAL CHEMICAL & SPRAY			**$15.00**	**$0.10**	**$15.00**

FERTILIZER:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Compost/manure	$35.00	1	$35.00	$0.23	$35.00
b. Foliar Fertilizer				$0.00	$0.00
TOTAL FERTILIZER EXPENSE			**$35.00**	**$0.23**	**$35.00**

SUPPLIES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. All supplies	$30.00	1	$30.00	$0.20	$30.00
b.	$0.00	1	$0.00	$0.00	$0.00
TOTAL SUPPLY EXPENSE			**$30.00**	**$0.20**	**$30.00**

OTHER OPERATING EXPENSES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**

a. Fuel & Lubrication	$30.00	1	$30.00	$0.20	$30.00
b. Rent & Leases	$0.00	1	$0.00	$0.00	$0.00
c. Packing/ Marketing	$0.00	1	$0.00	$0.00	$0.00
d. Irrigation Water	$35.00	1	$35.00	$0.23	$35.00
e. Machine Hire	$0.00	1	$0.00	$0.00	$0.00
f. R. E. & Property Taxes	$20.00	1	$20.00	$0.13	$20.00
g. Crop Insurance	$0.00	1	$0.00	$0.00	$0.00
h. Utilities	$0.00	1	$0.00	$0.00	$0.00
i. Professional Fees	$0.00	1	$0.00	$0.00	$0.00
j. Travel/Education	$0.00	1	$0.00	$0.00	$0.00
k. Misc.	$10.00	1	$10.00	$0.07	$10.00
l. Insurance	$30.00	1	$30.00	$0.20	$30.00
m. Interest on operating capital	$335.00	1	$335.00	$2.23	$335.00
	$0.00	1	$0.00	$0.00	$0.00
o. Other	$0.00	1	$0.00	$0.00	$0.00
TOTAL OTHER OPERATING EXP.			**$460.00**	**$3.07**	**$460.00**
TOTAL CASH OPERATION EXPENSES			**$4,930.00**	**$32.87**	**$4,930.00**
NET CASH RECEIPTS			**($4,930.00)**	**($32.87)**	**($4,930.00)**

ASSUMPTIONS USED IN THIS BUDGET

Yield: No apples harvested for sale in year one

DETAILS OF EXPENSES

Labor: Labor is at $12.00/hr.

Pruning will take about 2 hours per tree and will consist mainly of removing dead wood and non productive limbs.

Raking and removing the prunings will take 12 hours per acre @ $12.00.

Mowing occurs 3 times per year. It will take 1.25 hours per acre @ $12.00.

Irrigation will start the 15th of May will take about 10 hours per season.

Applying compost/manure will take about 5 minutes per tree.

Appendix 3: SW COLORADO HISTORIC APPLE ORCHARD REHAB BUDGET YEAR 2

SOUTHWEST COLORADO HISTORIC APPLE ORCHARD REHAB BUDGET FOR YEAR 2

ENTERPRISE	**Cider Apples – Rehabbing Mature Orchard 2nd**			**ACRES:**	**1**	
VARIETY	Mixed Varieties Mature Orchard			**TREES PER ACRE:**	**150**	
2016						

<<PRODUCTION AND MARKETING ASSUMPTIONS>>

Note: Please consult the table at the end of this spread sheet for additional returns data.

Sales Description	Units	Units Sold /Acre	Sales Price Per Unit
a. Sales by bushels	Bushels	450	$2.00
b. Other sales	lbs.	0	$0.00
c. Insurance	dol.	0	0
d. Disaster payment	dol.	0	0

<<OPERATING RECEIPTS>>

SALE ITEM	UNITS	PRICE /UNIT	QNTY. /ACRE	VALUE /ACRE	VALUE /TREE	TOTAL VALUE
a. Sales by bushels	Lbs.	$2.00	450	$900.00	$6.00	$900.00
b. Other Sales	lbs.	$0.00	0	$0.00	$0.00	$0.00
TOTAL OPERATING RECEIPTS				**$900.00**	**$6.00**	**$900.00**

<<CASH OPERATING EXPENSES>>

EXPENSE ITEMS LABOR:	UNITS	COST /UNIT	UNITS PER ACRE	COST /ACRE	COST /TREE	TOTAL VALUE
a. Pruning	hrs.	$12.00	150	$1,800.00	$12.00	$1,800.00
b. Prunings removal	hrs.	$12.00	8	$96.00	$0.64	$96.00
c. Weed Control	hrs.	$12.00	2	$24.00	$0.16	$24.00
d. Tillage/Mowing	hrs.	$12.00	4	$48.00	$0.32	$48.00

e. Thinning	hrs.	$0.00	0	$0.00	$0.00	$0.00
f. Irrigation	hrs.	$12.00	10	$120.00	$0.80	$120.00
g. Harvest Field Picking	Bushels	$0.00	0	$0.00	$0.00	$0.00
h. Fertilization	hrs.	$12.00	12	$144.00	$0.96	$144.00
i. Harvest Transport/Renta	bin	$0.00	0	$0.00	$0.00	$0.00
j. Payroll Taxes		$0.00	0	$0.00	$0.00	$0.00
TOTAL LABOR EXPENSE				**$2,232.00**	**$14.88**	**$2,232.00**

EXPENSE ITEM (CONT.)

REPAIRS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Machinery & Equipment	$100.00	1	$100.00	$0.67	$100.00
b. Bldgs., Fences & Improvements	$150.00	1	$150.00	$1.00	$150.00
TOTAL REPAIR EXPENSE			**$250.00**	**$1.67**	**$250.00**

CHEMICALS & SPRAYS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Insect	$0.00	1	$0.00	$0.00	$0.00
b. Disease	$0.00	1	$0.00	$0.00	$0.00
c. Weed Control	$15.00	1	$15.00	$0.10	$15.00
d. Hormone	$0.00	1	$0.00	$0.00	$0.00
TOTAL CHEMICAL & SPRAY			**$15.00**	**$0.10**	**$15.00**

FERTILIZER:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Compost/manure	$35.00	1	$35.00	$0.23	$35.00
b. Foliar Fertilizer				$0.00	$0.00
TOTAL FERTILIZER EXPENSE			**$35.00**	**$0.23**	**$35.00**

SUPPLIES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. All supplies	$30.00	1	$30.00	$0.20	$30.00
b.	$0.00	1	$0.00	$0.00	$0.00
TOTAL SUPPLY EXPENSE			**$30.00**	**$0.20**	**$30.00**

OTHER OPERATING EXPENSES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Fuel & Lubrication	$30.00	1	$30.00	$0.20	$30.00
b. Rent & Leases	$0.00	1	$0.00	$0.00	$0.00
c. Packing/ Marketing	$0.00	1	$0.00	$0.00	$0.00
d. Irrigation Water	$35.00	1	$35.00	$0.23	$35.00

e. Machine Hire	$0.00	1	$0.00	$0.00	$0.00
f. R. E. & Property Taxes	$20.00	1	$20.00	$0.13	$20.00
g. Crop Insurance	$0.00	1	$0.00	$0.00	$0.00
h. Utilities	$0.00	1	$0.00	$0.00	$0.00
i. Professional Fees	$0.00	1	$0.00	$0.00	$0.00
j. Travel/Education	$0.00	1	$0.00	$0.00	$0.00
k. Misc.	$10.00	1	$10.00	$0.07	$10.00
l. Insurance	$30.00	1	$30.00	$0.20	$30.00
m. Interest on operating capital	$189.00	1	$189.00	$1.26	$189.00
	$0.00	1	$0.00	$0.00	$0.00
o. Other	$0.00	1	$0.00	$0.00	$0.00
TOTAL OTHER OPERATING EXP.			**$314.00**	**$2.09**	**$314.00**
TOTAL CASH OPERATION EXPENSES			**$2,876.00**	**$19.17**	**$2,876.00**
NET CASH RECEIPTS			**($1,976.00)**	**($13.17)**	**($1,976.00)**

ASSUMPTIONS USED IN THIS BUDGET

Yield: Three bushels of apples harvested for cider in year 2

DETAILS OF EXPENSES

Labor: Labor is at $12.00/hr.

Pruning will take about 1 hour per tree and will consist mainly of removing non productive limbs and shaping the tree.

Raking and removing the pruning will take 8 hours per acre @ $12.00.

Mowing occurs 3 times per year. It will take 4 hours per acre @ $12.00.

Irrigation will start the 15th of May and occur about 10 times per year.

Fertilization will take about 5 minutes per tree for 12 hors @ $12.00.

Apples: Apples will be sold on the tree. Buyer will be responsible for harvesting.

Appendix 4: SW COLORADO HISTORIC APPLE ORCHARD At MATURITY REHAB BUDGET

SOUTHWEST COLORADO HISTORIC APPLE ORCHARD BUDGET AT MATURITY						
ENTERPRISE:	**Cider Apples**			**ACRES:**	**1**	
VARIETY	Mixed Varieties Mature Orchard			**TREES PER ACRE:**	**150**	
2016						
<<PRODUCTION AND MARKETING ASSUMPTIONS>>						
Note: Please consult the table at the end of this spread sheet for additional returns data.						
			Units	Sales		
Sales			Sold	Price		
Description		Units	/Acre	Per Unit		
a. Sales by bushels for cider		Bushels	675	$2.00		
b. Other sales		Bushels	75	$25.00		
c. Insurance		dol.	0	0		
d. Disaster payment		dol.	0	0		
<<OPERATING RECEIPTS>>						
		PRICE	**QNTY.**	**VALUE**	**VALUE**	**TOTAL**
SALE ITEM	**UNITS**	**/UNIT**	**/ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. Sales by bushels	Bushels	$2.00	675	$1,350.00	$9.00	$1,350.00
b. Retail Sales	Bushels	$25.00	75	$1,875.00	$12.50	$1,875.00
TOTAL OPERATING RECEIPTS				**$3,225.00**	**$21.50**	**$3,225.00**
<<CASH OPERATING EXPENSES>>						
EXPENSE ITEMS			**UNITS**			
		COST	**PER**	**COST**	**COST**	**TOTAL**
LABOR:	**UNITS**	**/UNIT**	**ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. Pruning	hrs.	$12.00	50	$600.00	$4.00	$600.00
b. Prunings removal	hrs.	$12.00	4	$48.00	$0.32	$48.00
c. Spraying	hrs.	$12.00	0	$0.00	$0.00	$0.00
d. Tillage/Mowing	hrs.	$12.00	4	$48.00	$0.32	$48.00

e. Thinning	hrs.	$0.00	0	$0.00	$0.00	$0.00
f. Irrigation	hrs.	$12.00	15	$180.00	$1.20	$180.00
g. Harvest Field Picking	hrs.	$12.00	20	$240.00	$1.60	$240.00
h. Fertilization	hrs.	$12.00	12	$144.00	$0.96	$144.00
i. Sorting	hrs.	$12.00	20	$240.00	$1.60	$240.00
j. Payroll Taxes		$0.00	0	$0.00	$0.00	$0.00
TOTAL LABOR EXPENSE				**$1,500.00**	**$10.00**	**$1,500.00**

EXPENSE ITEM (CONT.)

REPAIRS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Machinery & Equipment	$100.00	1	$100.00	$0.67	$100.00
b. Bldgs., Fences & Improvements	$150.00	1	$150.00	$1.00	$150.00
TOTAL REPAIR EXPENSE			**$250.00**	**$1.67**	**$250.00**

CHEMICALS & SPRAYS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Insect	$0.00	1	$0.00	$0.00	$0.00
b. Disease	$0.00	1	$0.00	$0.00	$0.00
c. Weed Control	$15.00	1	$15.00	$0.10	$15.00
d. Hormone	$0.00	1	$0.00	$0.00	$0.00
TOTAL CHEMICAL & SPRAY			**$15.00**	**$0.10**	**$15.00**

FERTILIZER:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Compost/manure	$35.00	1	$35.00	$0.23	$35.00
b. Foliar Fertilizer				$0.00	$0.00
TOTAL FERTILIZER EXPENSE			**$35.00**	**$0.23**	**$35.00**

SUPPLIES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. All supplies	$30.00	1	$30.00	$0.20	$30.00
b.	$0.00	1	$0.00	$0.00	$0.00
TOTAL SUPPLY EXPENSE			**$30.00**	**$0.20**	**$30.00**

OTHER OPERATING EXPENSES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Fuel & Lubrication	$30.00	1	$30.00	$0.20	$30.00
b. Rent & Leases	$0.00	1	$0.00	$0.00	$0.00
c. Packing/ Marketing	$0.00	1	$0.00	$0.00	$0.00
d. Irrigation Water	$35.00	1	$35.00	$0.23	$35.00

e. Machine Hire	$0.00	1	$0.00	$0.00	$0.00
f. R. E. & Property Taxes	$20.00	1	$20.00	$0.13	$20.00
g. Crop Insurance	$0.00	1	$0.00	$0.00	$0.00
h. Utilities	$25.00	1	$25.00	$0.17	$25.00
i. Professional Fees	$0.00	1	$0.00	$0.00	$0.00
j. Travel/Education	$0.00	1	$0.00	$0.00	$0.00
k. Misc.	$10.00	1	$10.00	$0.07	$10.00
l. Insurance	$30.00	1	$30.00	$0.20	$30.00
m. Interest on Operating capital	$147.00	1	$147.00	$0.98	$147.00
n. Apple boxes for retail sale	$2.50	75	$187.50	$1.25	$187.50
o. Other	$0.00	1	$0.00	$0.00	$0.00
TOTAL OTHER OPERATING EXP.			**$484.50**	**$3.23**	**$484.50**
TOTAL CASH OPERATION EXPENSES			**$2,314.50**	**$15.43**	**$2,314.50**
NET CASH RECEIPTS			**$910.50**	**$6.07**	**$910.50**

ASSUMPTIONS USED IN THIS BUDGET

Yield: 750 bu. per acre. 90% sold as cider apples, 10% sold as fresh apples in the local market

Inputs: Cider apples are harvested by buyers. Orchard is minimally managed, so that inputs are few.

DETAILS OF EXPENSES

Orchard consists of mature trees that have been brought back to production two or more years of rehabilitation.

Labor: Labor is at $12.00/hr.

Pruning will take 50 hours per acre @ $12.00.

Raking and removing the prunings will take 4 hours per acre @ $8.00.

Tillage/Mowing occurs 3 times per year. It will take about 4 hours per acre @ $12.00.

Fertilization uses compost or manure, rather than purchased fertilizer. Labor amounts to 12 hours for application.

Irrigation will start the 15th of May and then occur every 14 days giving 10 times per year.

One person can do 1 acre per hour so it will take 10 hours per acre @ $12.00.

Fertilization will take 1.5 hours per acre @ $12.00.

Appendix 5: SW COLORADO HEIRLOOM APPLE ORCHARD ESTABLISHMENT BUDGET

SOUTHWEST COLORADO HEIRLOOM ORCHARD ESTABLISHMENT BUDGET							
ENTERPRISE:	**Cider Apples – Establishment 1st Year**			**ACRES:**	**1**		
VARIETY	Mixed Varieties for cider or fresh			**TREES PER ACRE:**	**150**		
<<PRODUCTION AND MARKETING ASSUMPTIONS>>							
Note: Please consult the table at the end of this spread sheet for additional returns data.							
Sales Description		Units	Units Sold /Acre	Sales Price Per Unit			
a. Sales by bushels		Bushels	0	$0.00			
b. Other sales		lbs.	0	$0.00			
c. Insurance		dol.	0	0			
d. Disaster payment		dol.	0	0			
<<OPERATING RECEIPTS>>							
SALE ITEM	**UNITS**	**PRICE /UNIT**	**QNTY. /ACRE**	**VALUE /ACRE**	**VALUE /TREE**	**TOTAL VALUE**	
a. Sales by bushels	Bushels	$0.00	0	$0.00	$0.00	$0.00	
b. Other Sales	lbs.	$0.00	0	$0.00	$0.00	$0.00	
TOTAL OPERATING RECEIPTS				**$0.00**	**$0.00**	**$0.00**	
<<CASH OPERATING EXPENSES>>							
EXPENSE ITEMS			**UNITS**				
LABOR:	**UNITS**	**COST /UNIT**	**PER ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**	
a. Digging holes for trees	hrs.	$12.00	8	$96.00	$0.64	$96.00	
b. Planting trees	hrs.	$12.00	37	$444.00	$2.96	$444.00	
c. Pruning removal	hrs.	$0.00	0	$0.00	$0.00	$0.00	
d. Weed Control	hrs.	$12.00	2	$24.00	$0.16	$24.00	

e. Tillage/Mowing	hrs.	$12.00	3	$36.00	$0.24	$36.00
f. Thinning	hrs.	$0.00	0	$0.00	$0.00	$0.00
g. Irrigation	hrs.	$12.00	15	$180.00	$1.20	$180.00
h. Harvest Field Picking	Bushels	$0.00	0	$0.00	$0.00	$0.00
i. Fertilization	hrs.	$12.00	12	$144.00	$0.96	$144.00
j. Harvest Transport/Renta	bin	$0.00	0	$0.00	$0.00	$0.00
k. Payroll Taxes		$0.00	0	$0.00	$0.00	$0.00
TOTAL LABOR EXPENSE				**$828.00**	**$5.52**	**$828.00**

EXPENSE ITEM (CONT.)

REPAIRS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Machinery & Equipment	$100.00	1	$100.00	$0.67	$100.00
b. Bldgs., Fences & Improvements	$20.00	1	$20.00	$0.13	$20.00
TOTAL REPAIR EXPENSE			**$120.00**	**$0.80**	**$120.00**

CHEMICALS & SPRAYS:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Insect	$0.00	1	$0.00	$0.00	$0.00
b. Disease	$0.00	1	$0.00	$0.00	$0.00
c. Weed Control	$15.00	1	$15.00	$0.10	$15.00
d. Hormone	$0.00	1	$0.00	$0.00	$0.00
TOTAL CHEMICAL & SPRAY			**$15.00**	**$0.10**	**$15.00**

FERTILIZER:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Compost/manure	$35.00	1	$35.00	$0.23	$35.00
b. Foliar Fertilizer				$0.00	$0.00
TOTAL FERTILIZER EXPENSE			**$35.00**	**$0.23**	**$35.00**

SUPPLIES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. All supplies	$30.00	1	$30.00	$0.20	$30.00
b.	$0.00	1	$0.00	$0.00	$0.00
TOTAL SUPPLY EXPENSE			**$30.00**	**$0.20**	**$30.00**

OTHER OPERATING EXPENSES:	**COST /UNIT**	**UNITS /ACRE**	**COST /ACRE**	**COST /TREE**	**TOTAL VALUE**
a. Custom work for preparation of soil	$30.00	1	$30.00	$0.20	$30.00
b. Excavator for digging holes for trees	$185.00	1	$185.00	$1.23	$185.00
c. Packing/ Marketing	$0.00	1	$0.00	$0.00	$0.00

d. Irrigation Water	$35.00	1	$35.00	$0.23	$35.00
e. Machine Hire	$0.00	1	$0.00	$0.00	$0.00
f. R. E. & Property Taxes	$20.00	1	$20.00	$0.13	$20.00
g. Crop Insurance	$0.00	1	$0.00	$0.00	$0.00
h. Utilities	$0.00	1	$0.00	$0.00	$0.00
i. Professional Fees	$0.00	1	$0.00	$0.00	$0.00
j. Travel/Education	$0.00	1	$0.00	$0.00	$0.00
k. Misc.	$10.00	1	$10.00	$0.07	$10.00
l. Insurance	$30.00	1	$30.00	$0.20	$30.00
m. Interest on operating capital	$322.00	1	$322.00	$2.15	$322.00
n. Trees	$20.00	150	$3,000.00	$20.00	$3,000.00
o. Other	$0.00	1	$0.00	$0.00	$0.00
TOTAL OTHER OPERATING EXP.			**$3,632.00**	**$24.21**	**$3,632.00**
TOTAL CASH OPERATION EXPENSES			**$4,660.00**	**$31.07**	**$4,660.00**
NET CASH RECEIPTS			**($4,660.00)**	**($31.07)**	**($4,660.00)**

ASSUMPTIONS USED IN THIS BUDGET

Yield: No apples harvested for sale in year one

Planting Density Depending upon the grid system chosen, up to 200 trees can be planted per acre.

DETAILS OF EXPENSES

Labor: Labor is at $12.00/hr.

Working ground prior to planting trees including deep chisel plowing @ $25/acre, disking @$20/acre and harrowing @$17 per acre,

Land leveling may be necessary in some fields @ $19 per acre.

Tillage 3 times per year to control weeds and vegetation @ $45 per acre.

Tillage costs based upon Colorado Custom Rates compiled by Colorado State University, which would be similar machinery costs whether equipment is owned or the work is hired out.

Irrigation will start the 15th of May and and be applied as necessary to keep an optimal level of soil moisture for tree establishment

Using flood or furrow irrigation, labor would amount to about 15 hours per acre @ $12.00.

Applying compost/manure is estimated at 12 hours @ $12.00.

Planting includes excavator rental @ $185 for one day rental plus labor to dig holes and plant trees.

Tree cost ranges from $10 per tree to $30 or more depending on variety. An average cost of $20 per tree used for this budget.

Tree cost can be lowered if the grower is wiling and able to graft trees by first purchasing 15-20 trees of suitable variety that are then used as genetic source material for propagation of the rest of their orchard.

Appendix 6: SW COLORADO HEIRLOOM APPLE ORCHARD At MATURITY BUDGET

SW COLORADO HEIRLOOM APPLE ORCHARD At MATURITY 5-10 YEARS							
ENTERPRIS	Cider Apples with 15% fresh production				ACRES:	1	
VARIETY	Mixed Varieties Mature Orchard			TREES PER ACRE:		150	
2016							
<<PRODUCTION AND MARKETING ASSUMPTIONS>>							
Note: Please consult the table at the end of this spread sheet for additional returns data.							
				Units	Sales		
Sales				Sold	Price		
Description			Units	/Acre	Per Unit		
a. Sales by bushels for cider			Bushels	648	$2.00		
b. Other sales			Bushels	112	$25.00		
c. Insurance			dol.	0	0		
d. Disaster payment			dol.	0	0		
<<OPERATING RECEIPTS>>							
			PRICE	QNTY.	VALUE	VALUE	TOTAL
SALE ITEM		UNITS	/UNIT	/ACRE	/ACRE	/TREE	VALUE
a. Sales by bushels		Bushels	$2.00	648	$1,296.00	$8.64	$1,296.00
b. Retail Sales		Bushels	$25.00	112	$2,800.00	$18.67	$2,800.00
	TOTAL OPERATING RECEIPTS				$4,096.00	$27.31	$4,096.00
<<CASH OPERATING EXPENSES>>							
EXPENSE ITEMS				UNITS			
			COST	PER	COST	COST	TOTAL
LABOR:		UNITS	/UNIT	ACRE	/ACRE	/TREE	VALUE
a. Pruning		hrs.	$12.00	50	$600.00	$4.00	$600.00
b. Prunings removal		hrs.	$12.00	4	$48.00	$0.32	$48.00
c. Spraying		hrs.	$12.00	0	$0.00	$0.00	$0.00
d. Tillage/Mowing		hrs.	$12.00	4	$48.00	$0.32	$48.00

e. Thinning		hrs.	$0.00	0	$0.00	$0.00	$0.00
f. Irrigation		hrs.	$12.00	15	$180.00	$1.20	$180.00
g. Harvest Field Picking		hrs.	$12.00	20	$240.00	$1.60	$240.00
h. Fertilization		hrs.	$12.00	12	$144.00	$0.96	$144.00
i. Sorting		hrs.	$12.00	25	$300.00	$2.00	$300.00
j. Payroll Taxes			$0.00	0	$0.00	$0.00	$0.00
	TOTAL LABOR EXPENSE				**$1,560.00**	**$10.40**	**$1,560.00**
EXPENSE ITEM (CONT.)							
			COST	**UNITS**	**COST**	**COST**	**TOTAL**
REPAIRS:			**/UNIT**	**/ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. Machinery & Equipment			$100.00	1	$100.00	$0.67	$100.00
b. Bldgs., Fences & Improvements			$150.00	1	$150.00	$1.00	$150.00
	TOTAL REPAIR EXPENSE				**$250.00**	**$1.67**	**$250.00**
			COST	**UNITS**	**COST**	**COST**	**TOTAL**
CHEMICALS & SPRAYS:			**/UNIT**	**/ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. Insect			$0.00	1	$0.00	$0.00	$0.00
b. Disease			$0.00	1	$0.00	$0.00	$0.00
c. Weed Control			$15.00	1	$15.00	$0.10	$15.00
d. Hormone			$0.00	1	$0.00	$0.00	$0.00
	TOTAL CHEMICAL & SPRAY				**$15.00**	**$0.10**	**$15.00**
			COST	**UNITS**	**COST**	**COST**	**TOTAL**
FERTILIZER:			**/UNIT**	**/ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. Compost/manure			$35.00	1	$35.00	$0.23	$35.00
b. Foliar Fertilizer						$0.00	$0.00
	TOTAL FERTILIZER EXPENSE				**$35.00**	**$0.23**	**$35.00**
			COST	**UNITS**	**COST**	**COST**	**TOTAL**
SUPPLIES:			**/UNIT**	**/ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. All supplies			$30.00	1	$30.00	$0.20	$30.00
b.			$0.00	1	$0.00	$0.00	$0.00
	TOTAL SUPPLY EXPENSE				**$30.00**	**$0.20**	**$30.00**
			COST	**UNITS**	**COST**	**COST**	**TOTAL**
OTHER OPERATING EXPENSES:			**/UNIT**	**/ACRE**	**/ACRE**	**/TREE**	**VALUE**
a. Fuel & Lubrication			$30.00	1	$30.00	$0.20	$30.00
b. Rent & Leases			$0.00	1	$0.00	$0.00	$0.00

c. Packing/ Marketing		$0.00	1	$0.00	$0.00	$0.00
d. Irrigation Water		$35.00	1	$35.00	$0.23	$35.00
e. Machine Hire		$0.00	1	$0.00	$0.00	$0.00
f. R. E. & Property Taxes		$20.00	1	$20.00	$0.13	$20.00
g. Crop Insurance		$0.00	1	$0.00	$0.00	$0.00
h. Utilities		$25.00	1	$25.00	$0.17	$25.00
i. Professional Fees		$0.00	1	$0.00	$0.00	$0.00
j. Travel/Education		$0.00	1	$0.00	$0.00	$0.00
k. Misc.		$10.00	1	$10.00	$0.07	$10.00
l. Insurance		$30.00	1	$30.00	$0.20	$30.00
m. Interest on Operating capital		$162.00	1	$162.00	$1.08	$162.00
n. Apple boxes for retail sale		$2.50	112	$280.00	$1.87	$280.00
o. Other		$0.00	1	$0.00	$0.00	$0.00
	TOTAL OTHER OPERATING EXP.			**$592.00**	**$3.95**	**$592.00**
TOTAL CASH OPERATION EXPENSES				**$2,482.00**	**$16.55**	**$2,482.00**
NET CASH RECEIPTS				**$1,614.00**	**$10.76**	**$1,614.00**
ASSUMPTIONS USED IN THIS BUDGET						
	Budget is for an orchard that is 5 to 10 years after establishment					
Yield:	750 bu. per acre. 90% sold as cider apples, 10% sold as fresh apples in the local market					
Inputs:	Cider apples are harvested by buyers. Orchard is minimally managed, so that inputs are few.					
DETAILS OF EXPENSES						
	Orchard consists of mature trees that have been brought back to production two or more years of rehabilitation.					
Labor:	Labor is at $12.00/hr.					
	Pruning will take 50 hours per acre @ $12.00.					
	Raking and removing the prunings will take 4 hours per acre @ $8.00.					
	Tillage/Mowing occurs 3 times per year. It will take about 4 hours per acre @ $12.00.					
	Fertilization uses compost or manure, rather than purchased fertilizer. Labor amounts to 12 hours for application.					
	Irrigation will start the 15th of May and then occur every 14 days giving 10 times per year.					
	One person can do 1 acre per hour so it will take 10 hours per acre @ $12.00.					
	Fertilization will take about 12 hours per acre @ $12.00.					

Appendix 7: QUESTIONS FOR FRESH APPLE PRODUCT BUYERS

Ask to speak to produce manager or person that orders fruit/apples - if talking to individual store. For chains/corporate, try for purchasing for produce or apples.

QUESTIONS

1. How do you purchase apples? Directly from orchard? Produce vendor? Other supplier?

2. What volume do you order of fresh apples in each order? For example, if you order weekly, do you order enough to get volume discount? Look at last year's sales? Other?
3. What types and volumes do you order of fresh apples? We are particularly interested in fresh apples only available in the fall - harvested in Aug, Sept, Oct, Nov.
If you can break it out by Apple variety, organic, local/Colorado grown that would be most useful.
Apple Variety _____ Volume_____
Organic? _____Local/Colorado?_____ Heirloom?_____

Apple Variety _____ Volume_____
Organic? _____Local/Colorado?_____ Heirloom?_____

4. What are average prices you paid for theses apples - in most recent orders?
Apple Variety _____
Organic? _yes/no_____Local/Colorado?_____ Heirloom?_____
Other/Natural/Conventional? Y/N

Apple Variety _____
Organic? _____Local/Colorado?_____ Heirloom?_____
Other/Natural/Conventional? Y/N

Apple Variety _____
Organic? _____Local/Colorado?_____ Heirloom?_____
Other/Natural/Conventional? Y/N
5. What other types or kinds of fresh apples or apple products would you like to buy?
6. What aren't you going to buy in the future?
7. Do you also sell any fresh apple products such as fresh apple cider or caramel apples?
If yes, what?_____
Where/ how do you purchase these?_____
Are they Colorado made? _____

8. What do you recommend that Colorado apple growers do to make it easier for you to purchase their produce?

9. Who else do you recommend that I talk to about apple purchasing either at your company or another company or organization?

Thank you for your time and information. It will really help us shape the future of fresh apple production and sales from SW Colorado in the future.

Appendix 8: ORCHARD OWNER SURVEY QUESTIONS

1. Your name and contact info

2. Describe your orchard (s)

•How many acres are planted in apple trees? Of those, how many are currently productive?
•Approx. how many apple trees total; or trees per acre?
•Do you grow other types of fruit besides apple that are turned into juice or cider? If so, what types and volumes (bushels/gallons)? note: 42 pounds in a bushel and 2000 pounds in a ton
•General condition of orchard (Actively managed, yielding well; Generally managed; yielding moderately; Passively maintained and harvested; Little or no management currently)
•Age range of apple trees planted; and type of rootstock(s)
•Apple varieties planted, if known

•Orchard history (date established, historic orchard name and ownership if applicable)
•Tell us more

3. Describe how apples from your orchard(s) are currently being used/marketed. (Check all that apply)
•U-pick sales/operation
•Direct farm sales, picked
•Wholesale direct to retailers
•Wholesale to cooperative/other suppliers
•Offsite retail outlet, owned by you
•Sell at farmers market
•Contract out crop (X agrees to buy your crop X price for X years)
•Use crop for home use ONLY
•Allow gleaning; others pick for free
•Give away to family, friends, charity
•Fresh market apples, grade A
•Juice grade, not grade A
•Juice
•Hard cider
•Value added products
•Tell us what of the above (or other) best describes your orchard/operation. If you do not currently use or sell your apples tell us why not; and last known use/market, if any.

4. How many bushels of apples and/or gallons of juice did you produce and sell in the last two seasons? Did any get turned into hard cider? note: 42 pounds in a bushel or 2000 pounds in a ton
•Apples produced 2015/ Bushels/Gallons
•Apples produced 2014/ Bushels/Gallons
•Apples sold 2015/ Bushels/Gallons
•Apples sold 2014/ Bushels/Gallons
•What volumes of apples/juice did you produce/sell in the past 2 years to be made into hard cider?
•Tell us more

5. What average price do you charge per bushel of apples? If you sell apple juice, use the last blank to list your price per gallon. If there are price differences per categories of apples (say, juice grade vs grade A; or conventionally grown vs Certified Organic, please let us know all average prices.) Note volume discounts, if any. Put N/A as needed.
•U-pick operation
•Wholesale, picked
•Retail, picked (note if direct farm sales or off site retail)
•Contract Price (note if picked or not; and what type of customer you contract with - cider or juice maker, grocery, other)
•List specific varieties of apples you plan to grow more of
•Price per gallon of apple juice

6. Do you make a profit selling apples or juice?

2015 Apples made profit
2015 Apples no profit
2015 Apples broke even
2015 Apples unsure
2015 Apples N/A

2014 Apples made profit
2014 Apples no profit
2014 Apples broke even
2014 Apples unsure
2014 Apples N/A

2015 Juice made profit
2015 Juice no profit
2015 Juice broke even
2015 Juice unsure
2015 Juice N/A

2014 Juice made profit
2014 Juice no profit
2014 Juice broke even
2014 Juice unsure
2014 Juice N/A
Tell us more

7. What types of apples would you be interested in growing more of; and what price per bushel would you like to get?

Existing fresh market varieties

Existing fresh market varieties yes
Existing fresh market varieties no
Existing fresh market varieties maybe

Heirloom apples, multipurpose for cider, juice, fresh, and processing

Heirloom apples, multipurpose for cider, juice, fresh, and processing yes
Heirloom apples, multipurpose for cider, juice, fresh, and processing no
Heirloom apples, multipurpose for cider, juice, fresh, and processing maybe

Specialized cider specific varieties

Specialized cider specific varieties yes
Specialized cider specific varieties no
Specialized cider specific varieties maybe
Price per bushel you would like to get; and how many more acres/and or trees you may be interested in planting?

8. Operation details: if applicable to your operation

•price you pay your pickers per bushel to pick
•how do you transport crops to market; what does this cost, and how do you pass that cost along
•what types of infrastructure do you have (i.e.) cold storage, trucks/tractor, processing equipment, other
•Tell us more

9. What growing and marketing methods do you practice? (mark all that apply) note: our definition of naturally grown is no synthetic pesticides/fertilizers/treatments pre or post harvest
•Certified Organic
•Naturally Grown, un-certified
•Locally Grown
•Heirloom/Heritage
•Certified Naturally Grown
•Conventionally Grown
•other (describe)
•Please give your definition of local, organic, heirloom, natural, and heritage/heirloom if you use the terms in your marketing.
10. What cultural/mgmt. practices DO YOU USE in your orchard/operation? Please, first mark yes or no, IF YOU DO any of the following; then mark one more box to let us know how much support you could use from Montezuma Orchard Restoration Project (or others) to grow your orchard/operation. (so, please mark TWO boxes per row!)

feral orchard (no management)

feral orchard (no management) yes
feral orchard (no management) no
feral orchard (no management) no support needed
feral orchard (no management) some support needed
feral orchard (no management) a lot of support needed

pruning

pruning yes
pruning no
pruning no support needed
pruning some support needed
pruning a lot of support needed

grafting

grafting yes
grafting no
grafting no support needed
grafting some support needed
grafting a lot of support needed

fencing (deer, etc)

fencing (deer, etc) yes
fencing (deer, etc) no
fencing (deer, etc) no support needed
fencing (deer, etc) some support needed
fencing (deer, etc) a lot of support needed

water/irrigation

water/irrigation yes
water/irrigation no
water/irrigation no support needed
water/irrigation some support needed
water/irrigation a lot of support needed

pest control (coddling moth, etc)

pest control (coddling moth, etc) yes
pest control (coddling moth, etc) no
pest control (coddling moth, etc) no support needed
pest control (coddling moth, etc) some support needed
pest control (coddling moth, etc) a lot of support needed

disease control (fire blight, etc)

disease control (fire blight, etc) yes
disease control (fire blight, etc) no
disease control (fire blight, etc) no support needed
disease control (fire blight, etc) some support needed
disease control (fire blight, etc) a lot of support needed

planting new trees

planting new trees yes
planting new trees no
planting new trees no support needed
planting new trees some support needed
planting new trees a lot of support needed

harvesting/labor

harvesting/labor yes
harvesting/labor no
harvesting/labor no support needed
harvesting/labor some support needed
harvesting/labor a lot of support needed

processing

processing yes
processing no
processing no support needed
processing some support needed
processing a lot of support needed

direct marketing

direct marketing yes
direct marketing no
direct marketing no support needed
direct marketing some support needed
direct marketing a lot of support needed

wholesale marketing

wholesale marketing yes
wholesale marketing no
wholesale marketing no support needed
wholesale marketing some support needed
wholesale marketing a lot of support needed

distribution to commercial buyers

distribution to commercial buyers yes
distribution to commercial buyers no
distribution to commercial buyers no support needed
distribution to commercial buyers some support needed
distribution to commercial buyers a lot of support needed

liability coverage for U-pick

liability coverage for U-pick yes
liability coverage for U-pick no
liability coverage for U-pick no support needed
liability coverage for U-pick some support needed
liability coverage for U-pick a lot of support needed

beneficial/natural/organic orchard mgmt.

beneficial/natural/organic orchard mgmt. yes
beneficial/natural/organic orchard mgmt. no
beneficial/natural/organic orchard mgmt. no support needed
beneficial/natural/organic orchard mgmt. some support needed
beneficial/natural/organic orchard mgmt. a lot of support needed

frost protection (heat, fans, sprinkler, other)

frost protection (heat, fans, sprinkler, other) yes
frost protection (heat, fans, sprinkler, other) no
frost protection (heat, fans, sprinkler, other) no support needed
frost protection (heat, fans, sprinkler, other) some support needed
frost protection (heat, fans, sprinkler, other) a lot of support needed
Tell us more about how Montezuma Orchard Restoration Project can help you grow our local fruit economy.

Appendix 9: CIDER MAKER SURVEY QUESTIONS

1. Tell us about your cider making operation:

•Are you a commercial or hobbyist cider maker?
•Your first and last name; Job title
•Name of your business/operation
•Mailing address; Phone number; Email
•What year did you start selling cider (commercial); How many years have you been in production (hobbyist); Or are you a start up?
•What is the size of your operation? For commercial cider makers define in terms of # of employees, total square feet of operation (note amount in retail space if any), acres in orchard, and revenue generated; for hobbyist cider makers define in terms of square feet of operation and acres in orchard.
•How do yo see your future growth?
•How do you go about sourcing apples/juice? From your own orchard; Directly from producer; Delivered by supplier; You/your crew pick in area orchards; Put contracts on crops; Gleaning; Other. Discuss all that apply.
•Tell us more

2. How many gallons of cider have you: (for hobbyist cider makers: fill in first two blanks of this question only)

•produced 2015
•produced 2014
•sold retail 2015
•sold retail 2014
•sold wholesale 2015
•sold wholesale 2014

•Tell us more

3. How many bushels of apples did you PURCHASE to press as part of your operation? If you use any types of fruit besides apple fill third blank under this question. Also see last blank under this question if you used any apples you did not directly pay for. note: 42 pounds in a bushel and 2000 pounds in a ton
•2015 Season
•2014 Season
•Do you use any other types of fruit besides apple? If so, what types and how many bushels in the past 2 years?
•In the past two seasons, how many bushels of apples were from a Colorado grower? Why or why not? How many bushels of apples did you "glean", trade for, or grow yourself in the last two seasons?

4. How many gallons of pressed apple juice (or gallon equivalent of concentrate) did you purchase? See third blank under this question if you purchase any other type of juice besides apple.
•2015 Season
•2014 Season
•Do you purchase other types of juice besides apple? If so, what kinds of juice; and how many gallons in the past two years?
•In the past two seasons, how many gallons of apple juice were from a Colorado source?
•Why or why not from Colorado source?

5. What average price do you pay per bushel of apples? If there are price differences per categories of apples (say, juice grade vs grade A, or conventional vs Certified Organic) please let us know. Note volume discounts, if applicable.
•existing fresh market varieties "on the tree"; your CREW picks
•existing fresh market varieties "off the tree"; already picked/wholesale
•classic cider/heirloom varieties "on the tree"; your CREW picks
•classic cider/heirloom varieties "off the tree"; already picked/wholesale
•delivery cost, if applicable (specify average order size and method(s) of delivery)
•labor cost per bushel to pick, if applicable
•Do you put contracts on crops (agree to buy crop at X price for X years); why or why not?
•Do you manage (prune, harvest, etc) any orchards not owned by you in exchange for crop, or agreed price on crop?
•Do you own your own orchard(s); acres planted in apple trees? Approx. # of apple trees?
•Do you have a preference of rootstocks whether you are growing, picking, or producing?
•Tell us more

6. What average price do you pay per gallon of pressed apple juice? If there are price differences per categories of apples (say, juice grade vs grade A, or conventional vs Certified Organic) please let us know. Note volume discounts, if applicable.
•made from existing fresh market varieties
•made from classic cider/heirloom varieties
•delivery cost (specify average order size and method(s) of delivery)
•Tell us more

7. What growing & marketing method is most important to you? rank in order of importance with #1 being the highest. (O ur definition of naturally grown is no synthetic pesticides/fertilizers/ treatments pre or post harvest)
•Certified Organic
•Local
•Conventional
•Certified Naturally Grown
•Naturally Grown, uncertified
•Heritage/Heirloom

8. What most influences your decision on where to buy apples and/or juice? rank in order of biggest influence with #1 being the biggest.
•apple variety
•availability to meet needs
•price
•standing relationships with growers/producers
•growing/marketing methods (includes local, etc)

9. Are you able to source enough apples locally; and are you able to get enough of the varieties you want?
•How do you define local?
•Are you generally able to source enough apples locally? Why or why not?
•If you use organic, natural, or heirloom/heritage in your marketing- please define what the words mean to you.
•Are there categories of apples you need more of? (Certified organic, natural, heirloom, other)
•DO YOU have a strong preference for specialized cider specific varieties (such as Harry Masters Jersey and Dabinett) vs heirloom/heritage varieties that are good for cider among other uses (such as Winter Banana and Stayman Winesap)?
•IF YES a STRONG PREFERENCE, what percentage more, if any, would you be willing to pay for a cider specific vs "good for cider" multipurpose, heritage variety?
•Please tell us what specific varieties of apples you would like more of.

10. Tell us more about how Colorado growers, producers, and the Montezuma Orchard Restoration Project can help meet your needs.