NEEDS ASSESSMENT

Overview of Inputs Required for Apple Juice Production in Montezuma County
Components of Overall Project

✓ Updated Market Study for Montezuma County Apples (Complete and Available)
✓ Needs Assessment of Business Requirements for Apple Juice Production
  
  Description of the Montezuma County Apple Juice Product
  Key Market Segments for Apple Juice from Montezuma County
  Overview of the Value Chain for Pasteurized Apple Juice
  Business Models for Producing Pasteurized Apple Juice
  Overview of the Value Chain for Apple Juice as Ingredient for Cider
  Business Models for Producing Apple Juice as Ingredient for Cider
  Summary of Key Inputs and Investments Required for Apple Juice Production

✓ Business Plan for Apple Juice Production by MORP (To Be Developed)
As described in more detail in the Montezuma Valley Apple Market Study, Montezuma Valley’s farmers started growing apples over a century ago. The story of these apples is unique and valuable -- and potentially “taste-able” and marketable. Over 3,000 trees planted prior to 1920 and another 4,000 trees planted between 1920 and 1960 remain in today’s landscape.

The diverse flavors that result from the apples of vintage trees that thrive in the soil and climate of Montezuma Valley can be enjoyed as: - fresh products, - pasteurized apple juice or - hard cider after the juice has been fermented.

The pages that follow describe the value chain and summarize requirements for producing juice for either direct consumption or for further fermentation.
The final drinkable products, pasteurized apple juice and hard apple cider, are both first pressed into a non-pasteurized apple juice. As shown in the picture to the left, MORP piloted this pressing process with a mobile juice press in 2016.

To make pasteurized apple juice, the non-pasteurized juice ingredient is then put through a pasteurization process. This pasteurization can be done with a piece of equipment on the mobile juice press.

To make hard apple cider, the non-pasteurized juice must be shipped to a cider maker who will mix it with other ingredients and ferment it into hard apple cider.

NOTE: Hard cider can also be made from pasteurized juice. Some hobbyists may purchase pasteurized juice for this purpose. However, most commercial cider makers prefer non-pasteurized juice for the fermentation process.
MORP will use a mobile juicer to make apple juice to be sold either:

1. Retail by MORP as pasteurized apple juice;
2. Wholesale by MORP or farmers to commercial cideries as an ingredient for cider (see picture to the right).

MORP will sell both the product (apple juice) and the service (pressing and pasteurization of the apples).

<table>
<thead>
<tr>
<th>Product or Service</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Product = Pasteurized Apple Juice (produced and sold by MORP)</td>
<td>Local community and visitors to events</td>
</tr>
<tr>
<td>Retail Product = Pasteurized Apple Juice (produced and sold by MORP)</td>
<td>Hobbyists making hard cider</td>
</tr>
<tr>
<td>Wholesale Product = Unpasteurized Apple Juice (produced and sold by MORP)</td>
<td>Commercial Cideries</td>
</tr>
<tr>
<td>Service = Juicing and Pasteurization of Apple Juice for Consumption or Gifts (not for resale)</td>
<td>Farmers</td>
</tr>
<tr>
<td>Service = Juicing of Apple Juice as Ingredient for Cider</td>
<td>Farmers or Commercial Cideries</td>
</tr>
</tbody>
</table>

NOTE: Retail businesses are interested in purchasing and reselling pasteurized apple juice from MORP. Given the requirements for a HACCP plan (and an approved permanent building to house the press while doing such juicing), MORP considers this wholesale juice market a future opportunity.
Overview of the Value Chain for Pasteurized Apple Juice

**Apple Production**
- Apples grown on over 100 different orchards close to Montezuma County

**Apple Harvest**
- Apples harvested and sorted to meet specifications required for apple juice

**Apple Juice Production**
- Apples juiced, pasteurized and boxed – and waste pulp spread as fertilizer on fields

**Apple Juice Storage and Distribution**
- Apple juice boxes stored either onsite or with buyer
Model One (Product):

MORP buys apples from farmer, presses them, pasteurizes the juice and sells apple juice retail.

Consumers purchase the apple juice at events and on location. Hobby cider makers also purchase the apple juice as an ingredient for their cider.

A future potential market for this juice would be online retail sales.
Model Two (Service):

Farmer hires MORP to make apple juice that the farmer consumes or gives to others (not to be resold).

A related version of this model might be a farmer hosting an apple picking event and visitors “hiring” MORP to make juice from the apples they had just picked.
Overview of the Value Chain for Apple Juice as Ingredient for Cider

**Apple Production**
- Apples grown on over 100 different orchards close to Montezuma County

**Apple Harvest**
- Apples harvested and sorted to meet specifications required for cider production

**Apple Storage and “Ripening”**
- Apples aggregated and “ripened” for cider production

**Apple Juice Production**
- Apples juiced (not pasteurized) and “toted” – and waste pulp spread as fertilizer on fields

**Apple Juice Storage and Distribution**
- Apple juice stored briefly and then loaded into trucks for distribution to cider makers*

* Commercial cider makers will be encouraged to attend the pressing day(s) and load juice into their truck for same-day delivery.
Model One (Product):

MORP buys apples from farmer, stores and ripens some varieties in order to make apple juice for cider from a mix of the apple varieties.

Commercial cider makers purchase and transport the apple juice to their facilities for fermentation.

* Commercial cider makers will be encouraged to attend the pressing day(s) and load juice into their truck for same-day delivery.
Model Two (Service):

Farmer or commercial cider maker hires MORP to “custom-make” apple juice for cider from a mix of the apple varieties provided by the farmer. Commercial cider maker transports the apple juice to its facilities for fermentation.

In this model, the cider maker could contract with the farmer for apples (and pay for the juicing service) or the farmer could pay for the juicing service and then sell the apple juice to the cider maker.

* Commercial cider makers will be encouraged to attend the pressing day(s) and load juice into their truck for same-day delivery.
### Required Inputs for Production of Heritage / Vintage Apples

<table>
<thead>
<tr>
<th>Stage of Production</th>
<th>Required Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required for All Stages</td>
<td>Available Land, Appropriate Soil and Climate, Water</td>
</tr>
<tr>
<td>Rehabilitation (One-Time)*</td>
<td>Existing Trees, Fencing, Equipment and Labor for Pruning</td>
</tr>
<tr>
<td>Planting (One-Time)*</td>
<td>New Trees, Fencing, Equipment and Labor for Preparing Soil, Digging Holes and Planting</td>
</tr>
<tr>
<td>Cultivation (Annual)</td>
<td>Fertilizer, Pest and Weed Management, Labor for Farming and Pruning</td>
</tr>
</tbody>
</table>

*Certain orchards will need to be rehabilitated; others planted. MORP has developed basic financial models for the costs and returns of both rehabilitated and newly planted orchards.*

Apples grown on over 100 different orchards close to Montezuma County.
Summary of Key Inputs and Investments Required for Apple Juice Production

Required Inputs for the Harvest of Heritage / Vintage Apples

<table>
<thead>
<tr>
<th>Stage of Harvest</th>
<th>Required Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvest (Annual)</td>
<td>Equipment (tractors, ladders, tarps, crates, bins), Labor for Harvesting and Sorting</td>
</tr>
</tbody>
</table>

Crates and bins for harvest and storage are a significant cost (with long payback periods) for individual farmers. These costs can be distributed across multiple farms if a single entity like MORP owned and recycled the bins, across a season that could last nearly six months (between the harvest time for different varieties and the ripening periods for some varieties for cider purposes.)
**Required Inputs for Storage and “Ripening” of Apples (for Cider Product Only)**

### Stage of Storage and “Ripening” | Required Inputs
---|---
Transport from Field | Bins for Storing Apples, Forklift for Loading Bins, Truck for Transporting, Labor for Transport
Storage and “Ripening” | Storage Facility and Bins for Ripening Certain Apple Varieties from Multiple Fields for 8-12 Weeks

**Early Fall Apple Varieties which are Ready for Juicing for Cider Product at Harvest:**
- Grimes Golden,
- **Golden Delicious,**
- **Winter Banana,** Famuse/Snow,
- **MacIntosh,** Smith Cider, Senator,
- **Wealthy**

**Late Fall / Winter Apple Varieties which Add Benefits to Cider Product with Post-Harvest Ripening:**
- **Jonathan,** Hewes Crab and other unknown Crabs, **Delicious,** **Rome,** Winesap, **Ben Davis,** Ralls, Wagener

NOTE: MORP has found the greatest number of the varieties in **bold**. These varieties would be used as the main juice component. The other varieties listed (and many more not listed) would be mixed into the blend to add character.
Required Inputs for Apple Juice Production

### Apple Juice Production (for Pasteurized Juice)
- Apples juiced, pasteurized and boxed – and waste pulp spread as fertilizer on fields

### Apple Juice Production (for Cider)
- Apples juiced (not pasteurized) and “toted” – and waste pulp spread as fertilizer on fields

<table>
<thead>
<tr>
<th>Stage of Apple Juice Production</th>
<th>Required Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juicing and Packaging</td>
<td>Mobile Juice Press, Location for Docking Station with Power, Clean Water, Bathroom, Labor for Juicing</td>
</tr>
<tr>
<td>Packaging (Pasteurized Apple Juice)*</td>
<td>Five-Gallon Bag-in-Box Packages</td>
</tr>
<tr>
<td>Packaging (Unpasteurized Apple Juice for Cider)*</td>
<td>270-Gallon Totes</td>
</tr>
<tr>
<td>Waste Disposal</td>
<td>Fields for Spreading Pulp as Fertilizer, Truck / Tractor to Transport / Spread Pulp in Fields, Labor for Spreading Pulp</td>
</tr>
</tbody>
</table>

* Different types of packaging may be required for different customers. The packaging listed above for both the pasteurized apple juice and the cider product is a common way of packaging.
### Required Inputs for Juice Storage and Distribution

<table>
<thead>
<tr>
<th>Stage of Storage and Distribution</th>
<th>Required Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage (Pasteurized Apple Juice)</td>
<td>Location to Store (Shelf-stable) Pasteurized Apple Juice in Bag-in-Boxes</td>
</tr>
<tr>
<td>Storage (Unpasteurized Apple Juice for Cider)</td>
<td>Forklift-accessible Cold Room for Storing Cider Juice, 270-Gallon Totes, Forklift</td>
</tr>
<tr>
<td>Transport</td>
<td>Loading Dock, Labor for Loading Totes on Trucks</td>
</tr>
</tbody>
</table>

Many commercial cideries are located in metropolitan areas. The cost of disposing of pulp from pressing on-site makes the purchase of juice in 270-gallon totes from Montezuma Valley particularly attractive. While MORP needs the ability to store apple juice for cider for a few days, most cideries prefer receiving the unpasteurized apple juice as soon after pressing as possible. As noted earlier, MORP will encourage commercial cider makers to attend the pressing day(s) and load juice into their truck for same-day delivery.
### Summary of Key Inputs and Investments Required for Apple Juice Production

**All Key Inputs and Investments Required for Apple Juice Production**

<table>
<thead>
<tr>
<th>Stage in Value Chain</th>
<th>Required Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Production</td>
<td>Available Land; Appropriate Soil and Climate; Water; Existing and New Trees; Fencing; Fertilizer; Pest and Weed Management; Equipment and Labor for Preparing Soil, Digging Holes and Planting, Farming and Pruning</td>
</tr>
<tr>
<td>Apple Harvest</td>
<td>Equipment for Harvesting and Sorting (tractors, ladders, tarps, crates, bins); Labor for Harvesting and Sorting</td>
</tr>
<tr>
<td>Storage and Ripening of Apples</td>
<td>Bins for Storing Apples; Forklift for Loading Bins; Truck and Labor for Transporting Apples to Storage Facility; Storage Facility and Bins for Ripening Certain Apple Varieties from Multiple Fields for 8-12 Weeks</td>
</tr>
<tr>
<td>Apple Juice Production</td>
<td>Mobile Juice Press; Location for Docking Station with Power, Clean Water, Bathroom; Labor for Juicing; Five-Gallon Bag-in-Box Package; 270-Gallon Totes; Fields for Spreading Pulp as Fertilizer; Truck / Tractor to Transport and Spread Pulp in Fields; Labor for Spreading Pulp</td>
</tr>
<tr>
<td>Apple Juice Storage and Distribution</td>
<td>Forklift-accessible Cold Room for Storing Cider Juice; 270-Gallon Totes; Forklift; Loading Dock, Labor for Loading Totes on Trucks</td>
</tr>
</tbody>
</table>
MORP will invest in the capacity to produce apple juice as an ingredient for cider and as a pasteurized juice. Doing so requires purchasing or renting the equipment and hiring the labor listed below.

Growing the apples needed for juice production (the first row) is the role of farmers, not MORP. Nevertheless, MORP will actively help farmers rehabilitate, plant and find funding for new orchards that will result in the needed increase in vintage apple production.

<table>
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<tr>
<th>Stage in Value Chain</th>
<th>Required Inputs</th>
</tr>
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<tbody>
<tr>
<td>Apple Harvest</td>
<td>Equipment for Harvesting and Sorting (tractors, ladders, tarps, crates, bins), Labor for Harvesting and Sorting</td>
</tr>
<tr>
<td>Storage and Ripening of Apples</td>
<td>Bins for Storing Apples, Forklift for Loading Bins, Truck and Labor for Transporting Apples to Storage Facility, Storage Facility and Bins for Ripening Certain Apple Varieties from Multiple Fields for 8-12 Weeks</td>
</tr>
<tr>
<td>Apple Juice Production</td>
<td>Mobile Juice Press; Location for Docking Station with Power, Clean Water, Bathroom; Labor for Juicing, Five-Gallon Bag-in-Box Package, 270-Gallon Totes; Fields for Spreading Pulp as Fertilizer; Truck / Tractor to Transport and Spread Pulp in Fields; Labor for Spreading Pulp</td>
</tr>
<tr>
<td>Apple Juice Storage and Distribution</td>
<td>Forklift-accessible Cold Room for Storing Cider Juice; 270-Gallon Totes; Forklift; Loading Dock, Labor for Loading Totes on Trucks</td>
</tr>
</tbody>
</table>
The Montezuma Valley Apple Market Study provides:
- An Overview of the History and Current State of Apple Orchards in Montezuma County
- An Outline of Potential Markets and Market Hurdles for Heritage / Vintage Apples from Montezuma County
- Financial Models for Projecting Investment Requirements and Returns for (a) Rehabilitating a Vintage Apple Orchard and for (b) Planting a New Heirloom Apple Orchard

<table>
<thead>
<tr>
<th>User Inputs / Key Assumptions</th>
<th>Scen. #1</th>
<th>Scen. #2</th>
<th>Scen. #3</th>
<th>Scen. #1</th>
<th>Scen. #2</th>
<th>Scen. #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees / Acre</td>
<td>150 trees/acre</td>
<td>150 trees/acre</td>
<td>150 trees/acre</td>
<td>150 trees/acre</td>
<td>150 trees/acre</td>
<td>150 trees/acre</td>
</tr>
<tr>
<td>Average Yield / Tree at Year 5</td>
<td>5 bu/tree</td>
<td>5 bu/tree</td>
<td>5 bu/tree</td>
<td>5 bu/tree</td>
<td>5 bu/tree</td>
<td>5 bu/tree</td>
</tr>
<tr>
<td>Year 4 Yield as % of Year 5’s Yield</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Year 3 Yield as % of Year 5’s Yield</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Year 2 Yield as % of Year 5’s Yield</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>% of Marketable Production - Retail Sales</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>% of Marketable Production - Wholesale Juice</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>% of Marketable Production - Wholesale Cider</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>Price per Bushel - Retail Sales</td>
<td>$25.00/bushel</td>
<td>$30.00/bushel</td>
<td>$40.00/bushel</td>
<td>$25.00/bushel</td>
<td>$30.00/bushel</td>
<td>$40.00/bushel</td>
</tr>
<tr>
<td>Price per Bushel - Wholesale Juice</td>
<td>$2.00/bushel</td>
<td>$3.00/bushel</td>
<td>$7.50/bushel</td>
<td>$2.00/bushel</td>
<td>$3.00/bushel</td>
<td>$7.50/bushel</td>
</tr>
<tr>
<td>Price per Bushel - Wholesale Cider</td>
<td>$4.00/bushel</td>
<td>$6.50/bushel</td>
<td>$11.25/bushel</td>
<td>$4.00/bushel</td>
<td>$6.50/bushel</td>
<td>$11.25/bushel</td>
</tr>
<tr>
<td>Average Labor Costs ($/hr) - Over 5-Year Period</td>
<td>$12.00/hr</td>
<td>$12.00/hr</td>
<td>$12.00/hr</td>
<td>$12.00/hr</td>
<td>$12.00/hr</td>
<td>$12.00/hr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Scen. #1</th>
<th>Scen. #2</th>
<th>Scen. #3</th>
<th>Scen. #1</th>
<th>Scen. #2</th>
<th>Scen. #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Investment</td>
<td>$7,536 /acre</td>
<td>$7,215 /acre</td>
<td>$6,672 /acre</td>
<td>$5,654 /acre</td>
<td>$4,845 /acre</td>
<td>$4,845 /acre</td>
</tr>
<tr>
<td>Annual (Full Production) Revenue at Year 5</td>
<td>$4,275 /acre</td>
<td>$6,413 /acre</td>
<td>$10,031 /acre</td>
<td>$4,275 /acre</td>
<td>$6,413 /acre</td>
<td>$10,031 /acre</td>
</tr>
<tr>
<td>Net Operating Profit at Full Production (Year 5)</td>
<td>$1,798 /acre</td>
<td>$3,935 /acre</td>
<td>$7,554 /acre</td>
<td>$1,557 /acre</td>
<td>$3,219 /acre</td>
<td>$7,313 /acre</td>
</tr>
<tr>
<td>Accumulated Net Cash Receipts at End of Year 5</td>
<td>$5,415 /acre</td>
<td>$8,660 /acre</td>
<td>$14,862 /acre</td>
<td>$3,398 /acre</td>
<td>$6,579 /acre</td>
<td>$12,685 /acre</td>
</tr>
<tr>
<td>Breakeven Year (Assuming Continuing Year 5 Production)</td>
<td>Year 9</td>
<td>Year 6</td>
<td>Year 5</td>
<td>Year 6</td>
<td>Year 4</td>
<td>Year 3</td>
</tr>
</tbody>
</table>

The market report is available by clicking on the document above or going to the following website link:
http://montezumaorchard.org/2016/09/22/montezuma-valley-apple-market-study/
Next Steps

✓ Business Plan for Apple Juice Production by MORP

Feasibility Study for a Mobile Juice Unit for Apple Juice Production by MORP

Overview of Apple Juice and Cider Production Financial Requirements, Thresholds and Risks

Overview of Industry, Market, Key Customers and Potential Competition

Financial Projections and Milestones

Building upon this Needs Assessment, the Business Plan for Apple Juice Production by MORP will model the five-year financials mobile juicing for both products (pasteurized apple juice and apple juice as an ingredient for cider) and services (fee for providing juicing to farmers and commercial cider makers).