



**FFY2013 Specialty Crop Block Grant**

**Final Report**

**Agreement #12-25-B-1658**

**November 30, 2016**

---

**Program Contact:**

Glenda Mostek, Marketing Specialist

Phone: (303) 869-9173

E-mail: [glenda.mostek@state.co.us](mailto:glenda.mostek@state.co.us)

## Table of Contents

Projects in bold were Final Reports and were accepted in last Annual Report; non-bold projects have changed.

<b>Southern Colorado Food Hub .....</b>	<b>3</b>
<b>Colorado Certified Potato Growers Association – PMA 2014 Booth .....</b>	<b>7</b>
<b>Promotion of Colorado Specialty Crops through Colorado Proud.....</b>	<b>13</b>
<b>Plant Something Colorado .....</b>	<b>18</b>
<b>Colorado Pavilion at the 2014 PMA Fresh Summit Expo.....</b>	<b>23</b>
<b>Colorado Potato Administrative Committee – Potato Screening .....</b>	<b>29</b>
<b>Denver’s Horse Barn’s Farmer’s Market .....</b>	<b>37</b>
<b>Plant Select Brand Initiative .....</b>	<b>42</b>
<b>CSU - Specialty Crop Marketing, Research &amp; Technical Support.....</b>	<b>60</b>
<b>Blending Colorado Wines and Consumer Response .....</b>	<b>70</b>
<b>*CCPGA PMA 2015 .....</b>	<b>112</b>
<b>*Oenofoss Wine Must Testing.....</b>	<b>116</b>
<b>*Cytospora Canker in Peach.....</b>	<b>125</b>
<b>*Organic Sweet Cherry Production .....</b>	<b>133</b>

\*These projects were made possible by re-allocated money that was not used by other projects within the confines of the FFY2013 Specialty Crop Block Grant.

**Final Report: The Southern Colorado Food Hub & Seed Library**  
**Partner Organization: Arkansas Valley Organic Growers**

**Project Summary**

The Southern Colorado Food Hub was developed as a multi-function facility in Avondale, Colorado, providing a commercial kitchen, cold storage, frozen storage, product distribution, custom seed cleaning, access to a seed library, and training and education workshops to the agricultural community of southeastern Colorado. The Food Hub was designed as a three phase, four year project. Phase 1 involved preparing a business plan and raising \$235,000 of capital funds to renovate the Excelsior School shop and cafeteria kitchen areas. Phase 2, supported by the SCBGP, built core capacity, and conducted outreach to prospective clients and marketing of specialty crops. The primary products that are expected to be the main profit centers for the Food hub are those that are recognized as native to southeast Colorado and are the ones for which the AVOG growers grow exceptionally well and lend to value added products: peppers, tomatoes, allium crops, and melons. The primary market to which these products will be marketed is a multi-farm CSA. Phase three will be outreach and education: outreach to the agricultural community of southeastern Colorado to promote the community use of the facility and expand participating producer base, and initiation of training and educational offerings and service.

**Project Purpose**

During the last ten years there has been a proliferation of independent restaurants and food businesses specializing in seasonal and local cuisine throughout the United States. There has also been a major increase in consumer demand for local food and agricultural experiences. This demand is helping to revitalize family farms and change farming practices. Yet local food and farming efforts remain highly decentralized, many small and medium size farms are struggling to remain viable, there is virtually no post-harvest infrastructure in place, and there are a limited number of successful and profitable farm-based businesses. Infrastructure and support services are particularly under-developed in southeast Colorado.

The lower Arkansas Valley of Colorado has a rich agricultural history. Good water, climate, soils and seed were key elements historically for a successful farm economy. In recent years, however, a series of factors have put intense pressure on the farm and general economy. The area is experiencing persistent challenges related to the deterioration of the agricultural base, population decline, job losses as a result of plant closures (closures of the Bay Valley Foods and NEOPLAN bus manufacturers in 2006 amounted to a loss of 333 jobs in the lower Arkansas Valley), and recent natural disasters such as the blizzard of 2006, prairie fires in spring 2008, and advanced-stage drought in much of southeastern Colorado for 2012-13. Additionally, unemployment and poverty rates have consistently been above the state and national averages for many years.

A strategic and timely investment of \$47,500 was sought through the SCBGP to implement the Food Hub business plan during 2014. The results are expected to be job creation and retention, improvement of family farm income, and more availability of Lower Arkansas River Valley specialty crop products to the consumer public along Colorado's Front Range.

AVOG has been exclusively a specialty produce marketing and distribution business since its inception in 2008. This includes vegetables, small fruits and fruits produced by members and other local growers. Ground beef was the first non-produce item to be offered in 2013 by the cooperative. It is stored at the member's farm and supplied on an as-sold basis. Therefore, AVOG does not devote any cost to the meat's handling, nor does the cooperative actively market this product (as it is relatively short supply and is offered mainly as a service to CSA/buying club members).

## **Project Activities**

**Develop grower outreach materials and plan.** AVOG created new materials for potential grower-members. These included membership application, membership agreement, and a membership letter (see Appendix). The materials include information about becoming a member of the cooperative, benefits and services to members, production standards, GMO policy, farm food safety requirements, grower product availability, pricing, delivery, invoicing and competition.

**Implement grower outreach plan.** New materials led to the recruitment and confirmation of four new members in 2014. Each farm brought new and complementary products into the cooperative. Not only did the new growers diversity of products, but importantly, they brought improved volume of goods, which will be much needed to grow the business in future years. The following is a list of our new member farms and the products they provide.

Blue Raven Farm, Pueblo: honey, 3 different varieties of kale, and chard.

Oisto Orchard, Hotchkiss: cherries, grapes, apples, peaches, apricots, and plums.

Weathervane Farm, Buena Vista: cabbage, and carrots.

Ring a Ding Farm, Howard: baby salad greens, baby chard, baby kale, and baby mustard greens.

**Build core capacity by hiring and training 2 qualified staff members: marketing specialist and facility manager.** As part of this SCBGP project, AVOG hired and trained Sarah Cavanaugh as a marketing specialist. Sarah was primarily responsible for outreach to new wholesale buyers as well as for increasing sales to existing buyers. Her efforts contributed significantly to increasing sales by 65.9% (\$52,858) over the 2013 sales season.

Denny Stately was also hired as warehouse/facility manager during 2014. As AVOG had only recently moved into its new facility in the old Excelsior School in Boone, many systems needed to be developed and renovations undertaken. Mr. Stately was primarily responsible for receiving deliveries from growers, aggregating orders, and making sure deliveries were loaded and delivered properly. He also helped create systems to keep more accurate inventory control, organization within our facility, proper use of equipment such as fork lift, chile roaster and wash line. Mr. Stately became seriously ill in late summertime and had to resign. AVOG is currently seeking for someone to take over this position.

In order to adapt to Mr. Stately's absence, the rest of the staff (Deb Dunfee, Beki Guion and Sarah Cavanaugh) all took on added responsibilities for marketing, member outreach, and facility management.

**Develop marketing plans, materials and messages.** The first area of market planning and development that project staff devoted time to was market entry into Whole Foods. Beki Guion and Dan Hobbs met with Whole Foods new product specialist, Kenny Meyer, to determine where the gaps are in the 28 Whole Foods stores that comprise the company's Rocky Mountain region. The primary products identified were bagged colored carrots, fresh colored bell peppers, packaged roasted sweet and hot peppers, and cubed and julienned vegetables for roasting, such as butternut squash, carrots and other root crops, packaged in clamshell containers.

Additionally, Guion and Hobbs requested that Whole Foods devote an entire "set" (bin display in the produce department) to AVOG products. Whole Foods has tentatively agreed to this. This is a critically important development in that it will be easier for AVOG to promote its brand, story and products when they are grouped together. This is particularly important because, while all AVOG members use organic practices, only one member is currently certified. This has been a barrier to larger market entry in the past and will be solved through the dedicated "set" approach.

In order to facilitate entry into this important volume market, AVOG decided it was a major priority to re-brand itself. The reason for this is that that may people in Colorado's urban areas (where Whole Foods stores are located) have not heard of the Arkansas River Valley and there is a common perception that AVOG is from the State of Arkansas. AVOG therefore contacted La Montanita Cooperative of New Mexico to assist with design of a Headwaters Growers brand. La Montanita responded favorably and AVOG staff worked with their marketing team via e-mail, phone, and in-person to determine name, design, and materials. The name selected was "Headwaters Grower Co-op" and the tagline "Colorado Family Farms". A sample of the logo, rack card and brochures are attached to this report (See Appendix.)

The second area of market development was AVOG's multi-farm CSA. The marketing strategy included print and digital flyers, and postcards, as well as public radio ads, Facebook posts, and presentations to the Sustainability Forum at University of Colorado Springs and Colorado Farm and Art Market. The result was an increase in CSA membership from 77 in the 2013 calendar year to 261 shares in 2014 (185 summertime shares and 76 winter shares). This amounts to an average of ~\$3,400 sales per week. Please see CSA promotional materials in the Appendix.

**Implement marketing campaign with emphasis on native specialty crops of the lower Arkansas River Valley.** The implementation of AVOG's marketing campaign in 2014 concentrated on promotion and growth of the multi-farm CSA (described in preceding paragraph). The focus of the public radio advertisements were on native crops of the Arkansas Valley and Pueblo Chilé and cucurbits (squashes, melons, and pumpkins), in particular.

## **Measurable Outcomes**

As a result of this project, AVOG has increased purchases from local farms by over 75 percent and our sales to customers and CSAs by over 88 percent.

<b>Goal</b>	<b>Performance Measure</b>	<b>Benchmark</b>	<b>2014 projected</b>	<b>2014 actual</b>
Increase the number of producers selling through Food Hub	The number of farmers selling through Food Hubs	7	22	30
Increase cost of goods sold	The amount of produce sold through Food Hubs	\$100,000	\$240,000	\$152,000 (11/1/14)
Create jobs	Number of employees working in Food Hub	1	3	4
Expand multi-farm CSA program	Number of members	100	250	261
Increase availability of local food	Number of [non-CSA] customers	30	42	70

## **Beneficiaries**

Primary beneficiaries for this project were the 10 farmer members of the cooperative and another 12 non-member farmer vendors who increased sales through AVOG. Secondary beneficiaries were the 261 CSA families who received fresh local food throughout the growing season. Finally, the business created 3 new jobs, which benefitted the employees.

## **Lessons Learned**

A major illness of one of AVOG's key employees led to the necessity of the other three staff members taking on additional responsibilities and hours for project completion.

AVOG staff worked throughout the year to develop a relationship with Whole Foods Market in Colorado to identify opportunities for supplying Arkansas Valley-grown produce to the company's 28 stores that are served by its Denver Distribution Center. At the time of this report, it looks as though AVOG will concentrate on growing and supplying the following specialty items under the Headwaters brand in 2015: bagged colored carrots, bagged colored beets, turnips, watermelon radishes, black radishes, bagged, cubed root crops, chard and kale clam shell mixes, and varietal sweet and hot peppers. This will be a substantial opportunity for which additional operational and organizational capacity will need to be put in place. AVOG plans to apply to CDA for an additional Specialty Crops Grant in order to take fuller advantage of this.

## **Contact Person**

Daniel G. Hobbs  
Project Manager, AVOG member  
PO Box 411  
Avondale, CO 81022  
719-250-9835  
danghobbs@gmail.com

## **Final Report: Introducing and Emphasizing Specialty Potatoes (Non-Russet) at the PMA Trade Show – 2014**

**Partner Organization: Colorado Certified Potato Growers Association (CCPGA)**

---

### **Project Summary**

Colorado Certified Potato Growers Association (CCPGA) exhibited at the Produce Marketing Association (PMA) show in Anaheim, California in October, 2014. Our objective was to promote Colorado potatoes and our growers. We introduced buyers to 40+ different cultivars of Colorado potatoes and showcased the different characteristics of each cultivar and educated buyers on how these cultivars would enhance their business, in hopes of convincing them to buy our products.

The desire for specialty potatoes has never been greater. The russet market continues to decline, while the specialty market continues to grow. With Colorado harvesting over 200 different cultivars in 2012, there has never been a better opportunity to display our many potato cultivars than at PMA where buyers, growers, and the public from all over the world can see what Colorado has to offer. This will allow the potato industry to think “Colorado” when they need potatoes. The increase in sales of specialty potatoes will benefit over 35 Colorado seed potato growers along with numerous Colorado commercial growers. With an oversupply of the Russet potato, prices have dropped sharply, hurting our growers. Specialty potatoes have held their price better and it is critical that we grow this market.

### **Project Purpose**

The purpose of this project was to introduce to those that come to the CCPGA booth to the wide variety of specialty potatoes that Colorado produces and how those specialty potatoes can be used in their various businesses to increase their sales, and to demonstrate to the potato industry that Colorado is their one stop shopping for specialty potatoes. Colorado currently has over 200 different varieties of potatoes to offer to the industry.



## Project Activities

**Develop theme/concept for the trade show, incorporating any new design and/or promotional elements. Establish budgets and coordinate with the trade show organizer to finalize exhibit space needs and location.** Three months before PMA, Kent Price and the Promotion Committee, David Holm and Preston and Roxie Stanley planned how the booth would be set up and the number of potato cultivars that would be shown. The concept for our booth was developed and approved by the Promotion Committee under the direction of Chairman Kent Price. Many people played a part in this process. The budget was approved by the Promotion Committee and the CCPGA Board.

The exhibit space was organized by the Colorado Department of Agriculture. CCPGA was part of the Colorado Pavilion, a large space at the trade show encompassing 14 booth spaces, with 12 different specialty crop vendors



Preston Stanley, manager of the CCPGA, met with David Holm, potato plant breeder, at least a month before PMA and discussed in detail the type of specialty potato cultivars that would be displayed at the show.

One month before PMA, all the furniture was ordered, it was re-confirmed who would be staffing the booth, and CCPGA coordinated with the Colorado Department of Agriculture (CDA) as to the final touches. The budget was approved by the Promotion Committee and the CCPGA Board.

**Begin recruitment of producers for exhibiting at the trade show and begin work with contractor to build out display.** The building of the display was under the direction of the Promotion Committee and the CCPGA Manager along with the plant breeder, David Holm. The CCPGA manager asked at the June CCPGA Board Meeting if any of the growers were considering going to PMA. Doug Gunnels and Sheldon Rockey indicated that they would like to go and help at the booth. They are both specialty growers, and it was a great asset to have them at the booth to answer questions about specific cultivars. Between the two of them, they grow over 25 specialty potatoes including such cultivars as the Banana, Purple Majesty, Masquerade, Carola, Red Gold, Desiree, Yellow Finn, and many, many more.

The building of the booth display involved setting down with David Holm, our potato plant breeder and going over the hundreds of specialty potatoes that and grown on the research farm

and deciding which ones would be the best to display at PMA. The CCPGA manager, Preston, and his wife Roxie went over how the cultivars were to be displayed and what decorations would be used at the booth to make it attractive. New decorative table cloths were purchased along with additional baskets which the potatoes were displayed in.

**Build out of display by contractor and coordinate logistics with exhibitors.** The building out of the display was done by the CCPGA Manager and the logistics were again coordinated with the Colorado Department of Agriculture. As the CCPGA booth was part of the Colorado Pavilion, the larger structure around the booth was built by the contractor GES, and used panel depicting Colorado and displaying Colorado specialty crops.

The CCPGA manager went over the PMA agenda with Doug Gunnels, Sheldon Rockey, and Rob Davidson one week before the show as to when they needed to be there, what their job would be when at the booth, and how to evaluate the customers for the booth evaluation. Doug Gunnels had never been to a PMA before, so he needed additional in-service as to how to run a booth. Both Rob Davidson and Sheldon Rockey had previously attended PMA at several different locations.



**Finalize all show logistics and shipping of product and materials. Supervise trade show set up, conduct briefing for exhibitors, and attend to exhibitor needs during the show. Oversee the breakdown of the display and any return shipments.** The CCPGA Manager transported all products to the show by van. This transportation is done by van because other shipping methods have proven unreliable in keeping the potatoes at a stable temperature that prevents deterioration at the trade show.

Setup of the booth was accomplished by the CCPGA Manager and his wife, Preston and Roxie Stanley. Staffing of the booth during the show were Rob Davidson (potato researcher), Sheldon Rockey (potato grower), Doug Gunnels (potato grower), and Roxie and Preston Stanley, CCPGA Manager.

Before the opening of PMA, the CCPGA manager conducted a briefing of booth staff on what we were trying to accomplish at the booth and how to record the results of these customers inquires on the tally sheet. The booth staff was to educate the customer on the different types of specialty potatoes displayed, the strength and weakness of each cultivar, find out what brought them to the booth, take orders, let them know that all these cultivars were grown in Colorado and are available, and hand out our web-site card as to how to contact us. With five staff members manning the booth, it allowed everyone to take breaks as necessary and meet with interested individuals on a one to one basis as needed.

CCPGA did an excellent job educating the buyers about our specialty potatoes as we had two growers, Doug Gunnels and Sheldon Rockey, one researcher, Rob Davidson, and the CCPGA Manager and his wife, Preston and Roxie Stanley, who were all helping at the booth.

Most people who came to the booth said that they never knew that such a variety of specialty potatoes existed, especially in Colorado. The booth displayed over 50 varieties of potatoes displayed and 40+ of them were of the specialty variety.

The breakdown of the booth was completed by those that had staffed the booth, with the addition of Linda Wyers from the Colorado Potato Administrative Committee.

**Conduct follow-up survey of exhibitors and develop final report.**

The CCPGA manager interviewed each of the staff at the CCPGA Booth for an evaluation of PMA 2014. Doug Gunnels could not believe the diversification and number of people that were at PMA and what an opportunity it offered to the Colorado Certified Seed Growers. He commented that retailers were present, buyers, seed growers, and just public people interested in potatoes and the many varieties that are available came to the booth. The education of the public went a long way to bring the consumer back to potatoes.

Sheldon Rockey felt that show was extremely beneficial to him, his business, and CCPGA due to the number of contacts, both his and others, that came to the booth looking for the newest or hottest potato on the market and how they can use it to increase their business.

Rob Davidson, the Colorado State University Researcher, felt that PMA is a great place to educate the customer as to the specialty market of potatoes and let the people know that Colorado can be their one stop shopping for these specialty cultivars.

The manager, Preston Stanley, completed the Survey Monkey survey sent out by the Colorado Department of Agriculture along with presenting to the CCPGA Board the **final report** as to the success of PMA 2014, noting the comments of the staff listed above along with the pros and cons of the show. All staff members felt that if the booth had been more toward the middle of the show area, rather than on the end and near the flower section, attendance would have been better. The big building post in the middle of our display did cut visibility of the booth, but overall, PMA 2014 was very successful.

**Goals and Outcomes Achieved**

<b>Goal</b>	<b>Performance Measure</b>	<b>Goal</b>	<b>2014</b>
To educate companies on the varieties of potatoes grown and available in Colorado	Number of qualified leads generated and passed on to our growers.	20	20

Our measurable outcome was to educate buyers at the booth and move them from the interested category to the buying category, acquiring at least 20 new companies, buyers, or growers wanting to purchase Colorado Certified Seed Potatoes.

The benchmark we set was to have at least 20 qualified leads for our growers. This benchmark was reached on qualified leads. CCPGA Growers Sheldon Rockey and Doug Gunnels, who helped staff the booth, determined that we generated 20 leads and there is a great possibility that

a good amount of sales could result from these qualified leads. The amount of sales will only be known down the road as orders begin to come in.

We developed a tally sheet which recorded the number of people that attended our booth and what they were specifically looking for. We had recorded on the tally sheet over 553 people stopping at the booth, which gave us a chance to educate them and find out what their interest was with potatoes. There were some people were not recorded on this tally sheet, because were were so busy, but booth staff interacted with everyone and always asked them what their interest was in potatoes. Especially the first day, we were extremely busy with people at our booth. We estimated that we had at least 900+ people stop at the booth with questions, interest, and just curiosity. Many people stopped, took pictures, and asked questions about our potatoes which gave us a great opportunity to educate them. Many that came to the booth were not prospective buyers, but consumers of the product. Their interest and the education we were able to provide to them will benefit our industry over a period of time.

### **Beneficiaries**

The specialty crop beneficiaries of the project are all Colorado certified potato seed growers. CCPGA Doug Gunnels and Sheldon Rockey were at the booth and they both made several contacts for future specialty potatoes contracts. Not only did these two growers profit from this business, but the entire CCPGA Association profited by making the buyers aware of what Colorado has to offer on the specialty line, and the Colorado potato industry will benefit from increased demand. The economic impact will not be known for several months, but it looks like it could be considerable. A potato buyer from of the largest retailers in Canada has indicated that she will be purchasing many of our specialty lines for her stores.

### **Lessons learned**

PMA 2014 was definitely a success for the Colorado Certified Potato Growers Association. The exposure that we get at PMA cannot be duplicated anywhere due to the wide variety of countries, people, companies, buyers, and growers that attend. It is the only trade show where there is such a diverse audience.

One thing that could be improved at the booth is the recording of customers visiting and what brought them to the booth. We all felt that just having one person keeping the tally and information sheet and not having any other assignments would help keep track of the total number of people that attended our booth and the reason they came to the booth. So much of the time, especially the first day when we were very busy, we never thought to record the results on the tally and information sheet. Sometimes it was difficult to say exactly how many customers had visited in a specific time period, and an educated guess was made. Everyone working at the booth experienced this at some point in time when the booth had a great number of customers visiting.

The 2014 CCPGA booth at PMA Anaheim California was successful. We had many qualified buyers at the booth, and educated all visitors that came to the booth about Colorado Certified Specialty Seed Potatoes. When the customer left our booth, they had a very good knowledge about our specialty potatoes and how they can obtain them for their use.

**Contact Person**

Preston Stanley  
Colorado Certified Potato Growers Association  
PO Box 267  
Monte Vista, CO 81144  
719-274-5996  
ccpga151@gmail.com

**Final Report: Promotion of Colorado Specialty Crops Through Colorado Proud**  
**Partner Organization: Not applicable. The Colorado Department of Agriculture managed this project.**

---

**Project Summary**

The Colorado Department of Agriculture (CDA) continued its *Colorado Proud* television advertising aimed at helping consumers, restaurants and retailers identify and purchase Colorado produce. The campaign aired three 15 second TV ads which featured potatoes, lettuce, onions, cantaloupe, peaches and sweet corn. *Colorado Proud* also developed the “Choose Colorado” Tour public relations campaign that educated consumers across the state about Colorado specialty crops and encouraged them to “buy local produce.” *Colorado Proud* builds on current “buy local” trends, supports local market systems, and positions the Colorado specialty crops industry to expand distribution channels and increase sales.

The purpose of this project was to continue to educate consumers, retailers, and restaurants about the wide range and availability of Colorado specialty crops, resulting in increased purchasing of locally grown produce. This year’s project complemented previous years’ work by strengthening the Colorado Proud message as it pertains to produce and by adding a public relations component. Our project goal was to increase the consumer’s connection of Colorado produce and Colorado Proud. We reached our goal with 71% of Colorado consumers indicating they would purchase more Colorado produce if it was labeled with the Colorado Proud logo.

**Project Purpose**

Since its inception by the Colorado Department of Agriculture in 1999, *Colorado Proud* has served as the state’s primary program to promote food and agricultural products that are grown, raised or processed in Colorado. The program is a great fit with the Colorado consumer’s desire to buy local produce. Surveys, as recently as September 2014, have found that 90 percent of Colorado consumers would be more likely to buy food that was produced in Colorado than outside of the state.

The appeal for local produce also lies with restaurants, chefs and retailers. A National Restaurant Association survey conducted in 2013 found that 81 percent of chefs surveyed believe local produce is one of the “hot” new trends for restaurants. Chefs are looking to buy local produce to incorporate into their menus because they know that consumers want to experience local flavors when dining. At the retail level, increasingly higher percentages of retailer advertising expenditures are being directed toward the promotion of locally grown produce.

The purpose of this project was to continue to educate consumers, retailers, and restaurants about the wide range and availability of Colorado specialty crops, resulting in increased purchasing of locally grown produce. The project consisted of a television advertising campaign as well as a public relations campaign. This project built upon successes of previous advertising campaigns by adding a public relations component to promote specialty crops through the 27-day “Choose Colorado” Tour.

Specialty Crop funds provided the resources for the Colorado Department of Agriculture to implement a television advertising campaign during the summer of 2014 aimed at encouraging consumers to “Choose Colorado” and emphasizing Colorado’s fresh fruits and vegetables. SCBGP funds were only used for the television advertising that promoted specialty crops. Additional non-SCBGP funding was used to promote other products that are part of the *Colorado Proud* program.

The “Choose Colorado” Tour added a public relations component to the 2014 campaign. The Tour gave Colorado Proud the opportunity to interact directly with Colorado consumers, provide produce samples, educate the public about local produce and encourage them to buy local produce.

The total SCBGP project budget was \$152,624.70 (\$39.55 remained unspent) with matching funds (cash and in-kind) for the project totaling \$271,630.00.

### **Project Activities**

#### ***Television Advertising***

Colorado Proud contracted with KUSA-Channel 9 (NBC affiliate in Denver) to air television ads promoting Colorado Proud and local produce July-September 2014. In addition to the television ads, Colorado produce was promoted through online ads on [www.9news.com](http://www.9news.com) as well as through Channel 9’s social media outlets including Facebook and Twitter.

\$100,000.00 from the SCBGP was used for this portion of the project to air television ads that promoted Colorado fruits and vegetables. Cash and in-kind contributions totaling \$209,130.00 were utilized to promote non-specialty crop products and enhance the overall campaign.



*Kate Petrocco of Petrocco Farms in Brighton, CO speaks during the “Choose Colorado” Tour kick-off celebration in Denver on August 1.*

#### ***Public Relations***

Colorado Proud contracted with Philosophy Communication in Denver to develop a public relations campaign to promote Colorado produce to residents across the state.

The Choose Colorado Tour was a 27-day statewide road trip to celebrate specialty crops and produce grown in Colorado. The Tour began on August 1, 2014, the state’s birthday, at the History Colorado Center in Denver. Colorado Proud partnered with Safeway and local farmers’ markets to educate consumers about locally grown produce, the importance of buying local produce, and its positive impact on the

state's economy. The tour made 17 stops in 11 cities and traveled more than 2,400 miles over 27 days. More than 3,500 Palisade peach and Rocky Ford melon samples were handed out at 10 of the events.

The Tour culminated with a Commemorative Lunch for members of the media on August 27, 2014. The farm-to-table lunch was made entirely from local ingredients significant to each of the 11 cities visited on the Tour, including:

- Potatoes from Alamosa and the San Luis Valley
- Tomatoes and Rhubarb from Boulder
- Grapes from Burlington
- Green Chiles from Colorado Springs and Pueblo
- Sweet Corn from Denver
- Beets from Durango (Fields to Plate Produce provided the beets for the lunch and it is interesting to note that the beets were grown at another SCBGP project, the Fort Lewis College Garden Market Incubator.)
- Onions from Fort Collins and Northern Colorado
- Lettuce and Greens from Summit and Eagle counties (Frisco, Vail and Avon)

Governor John Hickenlooper and Commissioner of Agriculture John Salazar spoke at the lunch highlighting the importance of Colorado produce.

At several Tour stops, Colorado produce growers were available to answer questions from customers and help them pick the perfect fruits and vegetables. Farmer engagement was the most popular feature at Tour events.

\$52,585.15 from the SCBGP was utilized for the public relations component of the campaign. Matching funds (cash and in-kind) totaling \$62,500.00 covered additional costs associated with the Tour.

Although Colorado Proud promotes all food and agricultural products that are grown, raised or processed in Colorado, the focus of the television advertising and “Choose Colorado” Tour was on promoting Colorado produce. Costs associated with promoting non-specialty crop products were covered by cash and in-kind contributions. Specialty Crop Block Grant Program funds were used to solely enhance the competitiveness of specialty crops.



*Peach grower Harry Talbott of Talbott Orchards in Palisade, CO, helps a customer pick out the best peaches at the Grand Junction “Choose Colorado” Tour stop.*

## **Goals and Outcomes Achieved**

### ***Television Advertising***

Colorado Proud developed and executed a television advertising campaign featuring Colorado specialty crops from July through September 2014. Three 15 second “Choose Colorado” ads featured specialty crops including lettuce, sweet corn, onions, cantaloupe, potatoes and peaches. Colorado Proud aired 1,624 fifteen second ads, which reached 100% of households an average of 13 times and 99.9% of adults, 25-54 an average of 5 times. The campaign resulted in 21 million household impressions and 8.7 million adult impressions.

### ***Public Relations***

The “Choose Colorado” Tour events directly reached an estimated 7,000 Coloradans and indirectly reached an estimated 1,542,000 people. The campaign secured 62 media placements about the Tour, with an estimated media value of \$459,620.00. Media reached an estimated 30,508,464 viewers/readers.

<b>Desired Outcome</b>	<b>Performance Measure</b>	<b>Benchmark</b>	<b>Target</b>	<b>Actual</b>
To increase the consumer’s connection of Colorado produce and Colorado Proud.	Percent of consumers reporting desire to purchase Colorado produce with the Colorado Proud logo.	66%	71%	71%

## **Beneficiaries**

The television advertising and public relations campaign benefited the more than 200 Colorado Proud members that are specialty crop producers and the nearly 400 restaurant, retailer, school and farmers market members selling Colorado specialty crops. (No SCBGP dollars were used to promote non-SCBGP products.) Produce associations such as the Rocky Ford Growers Association, Colorado Fruit & Vegetable Growers Association and Colorado Potato Administrative Committee also benefited from this project. Overall, the program benefited all Colorado produce growers as consumers were encouraged to buy Colorado produce with the Colorado Proud logo when shopping.

## **Lessons Learned**

This project was an absolute success. We achieved our desired project goals and exceeded our expectations for the Colorado Proud program as a whole. Awareness of the Colorado Proud logo by Colorado consumers is now 85%, up from 78% in 2013.

One of the biggest lessons learned is the impact growers have in the community. Shoppers want to talk with the people who grow their food and they yearn for an opportunity to connect with farmers. Having produce growers tell the story or participate in events is extremely beneficial.

## **Contact Person**

Wendy White, Marketing Specialist  
Colorado Department of Agriculture  
303-869-9174  
[Wendy.White@state.co.us](mailto:Wendy.White@state.co.us)

## **Additional Information**

- [Melon/Peach “Choose Colorado” TV Ad](#)
- [Lettuce/Onion “Choose Colorado” TV Ad](#)
- [Potato/Sweet Corn “Choose Colorado” TV Ad](#)
- [“Choose Colorado” Tour Recap Video](#)

## **Final Report: Plant Something Colorado**

**Partner Organization: Colorado Nursery and Greenhouse Association**

### **Project Summary**

Using the foundation that CNGA has provided with the creation of the public facing website, and the expanded promotion of PlantSomething Colorado, this project built on the initial project previously funded that was the basic introduction of PlantSomething to the public. The FFY 2013 project was expanded to include additional enhancements to the website and expansion of the number of spots during the gardening season. As more retail locations participate in the program the awareness of the information provided will increase as well.

The lack of involvement in gardening by the younger generation and lack of education on how to successfully garden by many in the general population drives our project. Using animated television spots on cable, Spanish and PBS channels, we drove consumers to our public facing website, PlantSomethingco.org, for inspiration and education on successful gardening and how to find retail member locations. Television ads and print advertising across the state provided additional awareness of the resources provided on the PlantSomething Colorado website and will benefit any business involved with plants and landscapes.

By capturing the attention of the non-gardening or under-gardening population and new Colorado residents and teaching them the environmental, economic, and aesthetic value of landscapes, we hoped to expand the number of interested and engaged customers. By providing educational and easy to understand information for the public, we increased their interest and success, creating an increasing and sustainable customer base that will escalate the quantities of plant material sold.

### **Project Approach**

CNGA worked with the contractor and website specialist to update the website and increase the information provided to the public to increase the awareness of current water situations and successful gardening. We acquired a large media buy that incorporated several types of advertising, including 30- and 60-second television spots aired from May to August in the Denver, Colorado Springs, and Grand Junction markets. In addition, spots were aired statewide on Comcast and Rocky Mountain PBS. The spots were placed on stations tied to our market audience: HGTV, Lifetime, ESPN, etc. Our spots were run during the Avalanche Stanley Cup Playoff games. Because of the size of the media buy that was funded via the grant and co-op advertising with five member companies, we were able to secure an additional \$30,124 worth of bonus advertising which included digital billboard displays on I-25 in the northern corridor from Denver to Fort Collins and bus tails that were used in the Denver Metro area.

CNGA also collaborated with Altitude sports and participated in the Rapids Soccer Fest activity. Before one of the Colorado Rapids professional soccer games, we were also able to hand out seed packets, purchased by the association, to be given out to each attendee at two different games.

## **Goals and Outcomes Achieved**

### **In 2014:**

#### **Increase the number of website visits:**

83% of web visitors were new visits.

April 12-30: 546

May: 2,114

June: 1,152

July: 947

August: 963

#### **Increase number of retail locations participating:**

CNGA went from seven participating retail locations to 17 participating retail locations, which in turn measures the increase in awareness of the public. We did not reach our original goal of 25 participating retail locations but we did more than double our number of retail participants.

14 of the 17 participating retailers provided sales reports for the period of April to June, the prime buying period during which the campaign was running and the website promotion was online.

#### **Increase amount of Plant Sales:**

What is not included here is the impact that was realized by customers who were motivated by the messaging and secured a professional to improve their landscape. This group would have made their purchases at wholesale locations. The other non-quantifiable factor is the non-member companies who also benefited for the promotional campaign by increased sales.

The impact, to just these 14 companies was an increase in sales of \$3,420,676.

### **In 2015:**

**Increase the number of website visits:** In 2015, we focused on May-August. We did not measure activity in April. Mother's Day (mid-May) is typically the kick off of the gardening season in Colorado, which is why we started measurement in Mid-May.

During this time period the website received 12,690 visits, of which 81% of these visits were new users and 7,597 visits to the participant location page.

May 11-31 – 2,073

June – 6,588

July – 2,410

August 3-17 – 3,101

**Increase number of retail locations participating:**

There were 28 participating retail locations this year, up from the 17 we had last year. We had three member companies pay for sponsorships. Marketing pieces were made available to the association membership for marketing in their individual locations, and on their own websites and Facebook pages.

**Increase amount of Plant Sales:**

We were not able to get sales from all participating companies, but those we did receive show an increase of \$2,097,112.00 over last year. What cannot be measured is the impact to customers that were motivated by the PlantSomething campaign but secured a landscape professional to improve their landscape or purchased plant material from non-member companies. The professional landscapers would have made their purchases at various wholesale locations, the sales of which are not trackable.

**Beneficiaries**

The public, local retail nurseries and garden centers benefited with increased sales and consumer interactions. By driving the public to the PlantSomething website ([www.plantsomethingco.org](http://www.plantsomethingco.org)), the consumer had the ability to find local retail members in their areas, and to gather information quickly and easily directly from professionals on how to garden successfully, featured plants, monthly tips, and events at retail member locations.

By increasing the number of new gardeners each year, the sales for both the retail and wholesale industry should increase as the number of plant materials bought from year to year grows and thus increasing the supply needed.

**Lessons Learned**

Participating retailers are using PlantSomething Colorado in addition to their own marketing and as a tool to draw people into their locations.

The marketing pieces for the members, i.e. signs and plant stakes, don't seem to be as usable to the members as initially thought. We will be using a different marketing approach in the future as well as different marketing materials and possible the inclusion of social media as a marketing tool, based on the feedback we received from our participating retail locations.

**Additional information - graphics**

Here are some pictures and graphics that were used for the promotion of the program.



**Soccer fest participants making seed balls.**



**Bus Tail**



**Bill Board Ad**



**Seed packet, handed out by Rapids staff after two games.**



**PlantSomething banner for the Website to promote Soccer Fest.**

**Contact Person**

Allison Gault

Executive Director

Colorado Nursery and Greenhouse Association

303-758-6672

[agault@coloradonga.org](mailto:agault@coloradonga.org)

## **Final Report: Colorado Pavilion at the 2014 Fresh Summit Expo**

**Partner Organization: Not applicable. This project was implemented by the Colorado Department of Agriculture.**

### **Project Summary**

The Colorado Department of Agriculture (CDA) partnered with 12 produce associations, companies, growers and handlers in Colorado to exhibit at the Produce Marketing Association's (PMA) Fresh Summit Expo held in Anaheim, California, October 17-19, 2014. The Colorado Pavilion at PMA, which is the largest produce expo in the United States, increased exposure and sales potential of specialty crops for companies throughout Colorado. The CDA assisted 12 Colorado companies or associations to gain a national and international buying audience through attendance at the Fresh Summit Expo, thus increasing awareness of Colorado as a reliable supplier of fruits, nuts and vegetables.

### **Project Propose**

Formed in 2008, the Colorado Pavilion began with only two associations and three growers. The 2014 Colorado Pavilion had 14 growers and/or associations of cantaloupe, potatoes, seed potatoes, sweet corn, dry beans and pulses, onions, packaged nuts and specialty crop juices. All of the original 12 booth spaces originally obtained by the CDA were spoken for and two more were obtained in the summer of 2014, bringing our total number of booth spaces to 14. Past exhibitors have recognized that continuous participation in this show is critical to maintaining and expanding their market share in the produce sector. Also, continual participation as an exhibitor is imperative, as the show's location rotates to different regions of the United States, thus providing opportunities to reach new buyers on and off the show floor.

This project built on a previously funded SCBGP project. The CDA has partnered with Colorado companies for the Colorado Pavilion since 2008, and has requested SCBGP funding for many years. For the 2014 year, CDA continued to promote Colorado specialty crops by focusing on Colorado as the "theme" for the booth. The 2012 survey of attending exhibitors indicated that the exhibitors preferred that the CDA create a pavilion that not only reflects each exhibitor's style and business, but also promoted Colorado with a centralized "theme." The project focused not only on sales and increased customer base, but a positive experience rating from the exhibitors that cooperate with the CDA in the 2014 year.

This project not only shapes the success (sales) of previous PMAs funded through the SCBGP, but it helps Colorado specialty crop growers and shippers to stay competitive, which becomes more difficult in an economy where the cost of doing business is increasing and there are more competitors fighting to capture future dollars.

## Project Activities

**Develop theme/concept for the trade show, incorporating any new design and/or promotional elements. Establish budgets and coordinate with the trade show organizer to finalize exhibit space needs and location.**

Work for the 2014 show began in the 4<sup>th</sup> quarter of

2013, as the Marketing Specialist reviewed the surveys and discussed with CDA staff the success of the Pavilion concept. 2013 was the first year for the Colorado Pavilion concept, with a design display which encompassed all of the participating businesses and organizations. This pavilion concept was well-received, and it was decided to use it again the following year. The pavilion was also a significant cost to the project, so using it for another year would allow cost savings. This decision was factored into the budget for 2014. The Marketing Specialist participated in site selection during the 2013 PMA Expo to choose the space for the 2014 Pavilion.



**Begin recruitment of producers for exhibiting at the trade show and begin work with contractor to build out display. Design and promotional plans will be finalized.** These items were to be completed in the 2<sup>nd</sup> quarter of 2014. In May 2014, Casey Palmer, Marketing Specialist at the CDA, accepted another job opportunity outside of the CDA. Responsibility for the Colorado Pavilion at PMA was transferred to International Marketing Specialist John Addison and Intern Ashley Warsh. They both worked to recruit companies and producers for the show. This number was not finalized until later in the summer of 2014. A new Marketing Specialist, Glenda Mostek, was able to join CDA on July 21, and worked with John to work with the contractor who would be building the display, when the number of exhibitors was finalized.

By August 2014 it was obvious that the Colorado Pavilion needed more space, as one company had requested four booth spaces for their display. CDA worked with PMA to obtain two more booth spaces next to the existing space. CDA then worked with BrandWerks and GES (the show contractor who supplies the materials for the Pavilion and constructs the Pavilion) to develop a structure for those spaces that would unite them with the rest of the Colorado Pavilion. A brochure listing all of the Colorado organizations participating was developed, designed, and printed.

**Work with PMA coordinators and exhibitors to ensure all details are handled for CO Pavilion and maintain positive relationship with both parties.** CDA coordinated with all exhibitors to ensure that they were able to register, obtain badges for their personnel and order the needed booth furniture. CDA worked with GES (show facilitator for PMA) to ensure that the Pavilion would be constructed in a timely manner and would be ready to go for the show.

By September 2014, the CDA confirmed all exhibitors which included: Colorado Potato Administrative Committee, Colorado Certified Potato Growers Association, Aspen Produce, Farm Fresh Direct/Arthur Bartlett, Mountain Valley Produce, Rocky Ford Growers Association, Growers Organic, Bing Beverage, Olathe Sweet Corn, RiverTrail Foods, Big B's Fabulous Juices, and KC Trading and kept them up to date on PMA show deadlines, badge information, etc.. Each of these exhibitors maintained their own exhibit space during the show, are dedicated Colorado companies that participate actively to meet PMA deadlines, purchase and coordinate shipping and travel plans, and aid in customer service to attendees at the show.

**Finalize all show logistics and shipping of product and materials. Supervise trade show set up, conduct briefing for exhibitors, and attend to exhibitor needs during the show. Oversee the breakdown of the display and any return shipments.**

CDA staff coordinated final preparations with the exhibit company GES, shipped brochures and other materials. CDA staff Glenda Mostek and John Addison arrived early and supervised the show set up and assisted Colorado exhibitors in set up as they could. CDA staff held a meeting with exhibitors before the show opened to brief them and cover logistics, and checked in periodically with exhibitors during the show to see if they had any needs. CDA staff were present for the tear down of exhibits and coordinated return shipments on items that were not used.

**Conduct follow-up survey of exhibitors, discuss plan for next year's PMA and develop final report.**

In November 2014, each Exhibitor was sent a survey from Survey Monkey (an online survey company), where they were asked questions about the level of customer service provided by the CDA, how well they liked the design of the Pavilion, number of new and current contacts made and if there was an increase in qualified buyers made during the Expo. Unfortunately, only seven of the 12 participants responded to the survey.

**Goals and Outcomes Achieved**

<b>Goal</b>	<b>Performance Measure</b>	<b>Benchmark</b>	<b>Target 2014</b>
To increase the variety (different products) of private companies participating in the Pavilion	The number of private companies and their staff participation as determined from Expo evaluation	6	7

The target was six private companies participating in this year's pavilion. Nine private companies participated, including three new participants.

<b>Goal</b>	<b>Performance Measure</b>	<b>Benchmark</b>	<b>Target 2014</b>
-------------	----------------------------	------------------	--------------------

To increase satisfaction of exhibitors participating in the CO Pavilion	Post event exhibitor survey to show good or great rating when asked about CDA's customer satisfaction	Develop benchmark in the post event survey this year	Increase benchmark by 5%
---	---	--	--------------------------

In 2013, eight respondents answered this question on the survey. Five (62.5%) replied that they had an excellent experience, while three (37.5%) replied they had a good experience. In 2014, seven respondents answered this question on the survey. Four (57.14%) replied that they had an excellent experience, and three (42.86%) replied that they had a good experience. While CDA did not meet the goal of increasing the benchmark, no respondents indicated that their interaction with CDA staff was only "fair" or "poor."

Goal	Performance Measure	Benchmark	Target 2014
Number of new contacts	Post event exhibitor survey	2012 – 75	85

As only seven participants answered the survey, only twelve new contacts were reported. However, positive feedback was received via email when 2014 participants were asked if they wished to participate in 2015. Some of the responses were:

This year's show resulted in three new customers, and several new suppliers. Thank you for all your hard work we really appreciate all that the Colorado Department of Agriculture has done

We are in and thanks for everything.

I would like to put in an early request for a 2015 booth space, however request a larger space rather than our traditional 10x10. We are looking for a 10x30, ideally wrapped a corner.

Next year's survey will be sent out more quickly after the event itself, in hopes of capturing more responses.

Goal	Performance Measure	Benchmark	Target 2014
Number of contacts with current customers	Post even exhibitor survey	2012 – 65	70

As only seven participants answered the survey, only 20 contacts were reported, with one respondent answering "many." Three respondents said PMA was very helpful in helping them connect with current customers, three respondents said it was somewhat helpful, and one said it was not at all helpful.

## **Beneficiaries**

The Colorado Pavilion targeted two core groups who focus on Colorado specialty crops: the produce commodity associations and the individual produce shippers/growers. This year, 3 potato operations, 1 distributor, 1 dried fruit and nut distributor, 2 potato associations, 1 organic produce distributor, 1 corn grower, and 1 cantaloupe association/grower benefited directly from the CDA Pavilion project. Economic benefits of this activity included the garnering of new international and domestic customers, as well as reconnecting with existing customers. These participating companies report making contact with existing and new buyers this year and many exhibitors mentioned that their current customers expect their attendance at the show, and see it as a necessary business interaction.

There was not an increase in attending associations for this year, but those that were at the show stated that they were able educate attendees on Colorado produce, and give valuable information out about commodity suppliers and producers.

Also, although the direct beneficiaries are the exhibitors, the presence of the Colorado Pavilion does benefit Colorado Produce companies and the Specialty Crop industry as a whole. With the over 20,000 attendees walking past and through the Pavilion, looking up at the massive 16 foot Colorado scenery and producer photos, it brought attention to the Colorado producers as whole and increased interest within the produce industry.

## **Lessons Learned**

Having a personnel transition in the Marketing Specialist position during the planning of this event was covered by two other staff stepping up and accepting the responsibilities. This may have led to some participants not knowing which staff person would be assisting them with different aspects of the show. Consistency in staffing will provide more stability in the future, and may help to provide a “one stop shop” where participants may go with all their questions.

As the goal for participant satisfaction was not reached, communication will be a focus next year to ensure that needs are met during the conference, and that all participants will have an excellent experience. A pre-show survey or email may be sent out to determine how the CDA can best assist participants during the show.

To help participants maximize contacts at the Expo, CDA is considering offering to coordinate a promotion through physical mailing or emailing to reach attendees before the Expo and encourage them to visit our Pavilion. Some exhibitors felt they did not have as much traffic because of their location in the Pavilion, or the location of the Pavilion itself. CDA will do its best to rotate location of exhibitors within the Pavilion to make sure they maximize exposure. Location choices are limited by the size of the CDA pavilion and the fact that CDA selects its location in order of seniority at the Expo. CDA feels that the location of the Colorado Pavilion for 2015 will be attractive to exhibitors and attendees alike.

## Contact Person

Glenda Mostek, Marketing Specialist  
Colorado Department of Agriculture  
303-869-9173  
[Glenda.mostek@state.co.us](mailto:Glenda.mostek@state.co.us)

## **Additional Information**



## **Final Report: Screening of Potato Germplasm for Flavor as a Potato Breeding and Selection Tool**

**Project Partner: Colorado Potato Administrative Committee**

### **Project Summary**

Most plant breeding programs emphasize increases in yield, size, and abiotic or biotic resistance during early selection cycles. However, these foci may inversely affect the production of metabolites that generate product flavor. Several marketing research studies have indicated that consumers are generally dissatisfied with the flavor of fresh produce, and desire increased flavor, suggesting an opportunity to boost consumer appeal through breeding for flavor improvement. This project is designed to meet the need of providing potato varieties with improved flavor profiles for consumers.

Growers realized that in addition to agronomic traits, flavor and taste should also be criteria in the selection and breeding process. The primary beneficiaries of the flavor enhanced potato cultivars that will come from this research include all Colorado potato producers. Our project goal is to develop an authentic quantifiable method to measure flavor compounds in potato tubers and screen existing cultivars and develop a flavor rating system.

Flavor is a complex post-harvest trait that is difficult to evaluate with solely objective analysis due to its subjective nature. Sensory analysis is more indicative of consumer perception than chemical analysis, but sensory analysis is resource intensive and impractical for the evaluation of a large number of samples. The relationship between chemical flavor analysis and sensory analysis can be modeled using an artificial neural network, enabling sensory score prediction based on chemical input data.

### **Project Approach**

In this study, 15 potato clones were analyzed for flavor. The volatile compounds of cooked potato samples were analyzed using headspace solid-phase microextraction coupled with gas chromatography-mass spectrometry (HS-SPME/GC-MS). A panel of six men and five women with representative ethnic diversity were trained for potato sensory analysis. Panelists scored 15 potato clones for 15 attributes on a 9-point categorical scale. Clones were grown in the field at the San Luis Valley Research Center (Center, CO) during the 2014 growing season. Potato tubers were either baked or boiled and were presented to panelists in a randomized design. Sensory scores were analyzed by attribute using linear mixed-effects models.

Chemical analysis was conducted using HS-SPME/GC-MS based on previous methods (Ducreux et al., 2008) with a 7890A Gas Chromatography (GC) system coupled to a 240 Mass Spectrometer (MS) Ion Trap Quadrupole (Agilent Technologies, Santa Clara, CA). Sample volatiles were adsorbed for 20 minutes at 50°C onto a StableFlex 23 gauge, 85 µm carboxen/polydimethylsiloxane (CAR/PDMS) fiber (Sigma-Aldrich Co., St. Louis, MO), followed by desorption for 2 minutes at 280°C with helium as a carrier gas at a constant flow rate of 1.5 mL min<sup>-1</sup>. A VF5 ms 5% phenyl-methyl capillary column (Agilent Technologies, Santa Clara, CA) was used for volatile separation for 38 minutes with temperature ramps from

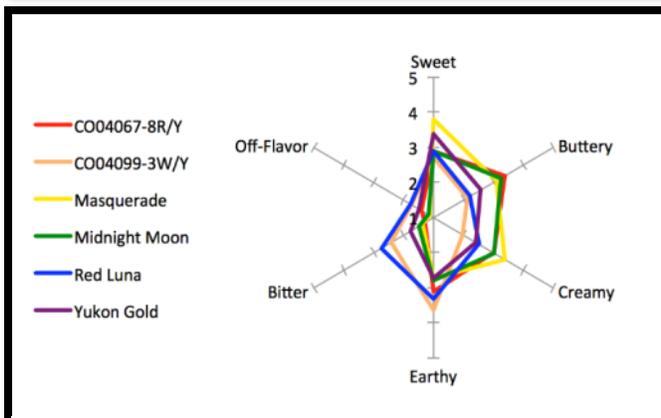
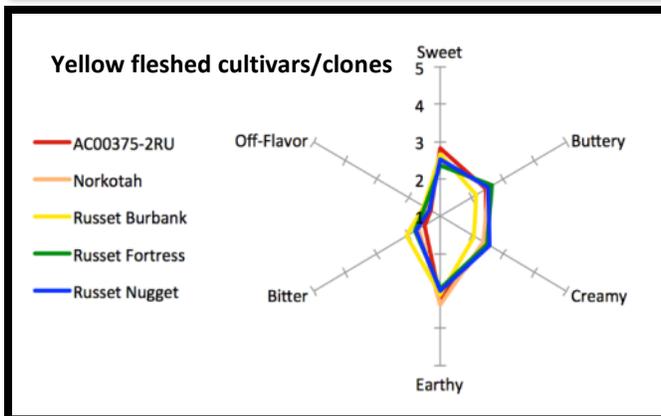
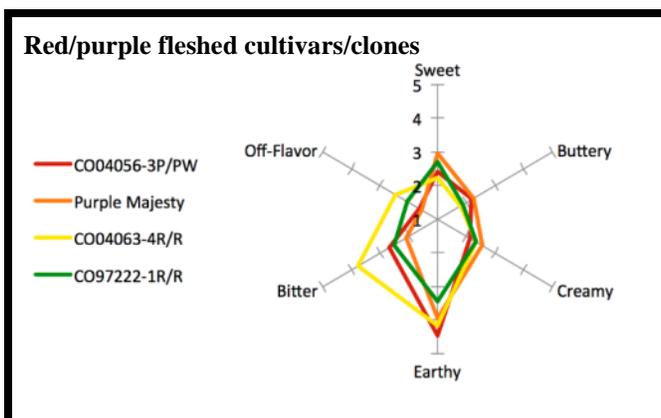
35°C to 280°C. The MS was run in full electron ionization (EI) mode at 70 eV for detection of 29-400 m z<sup>-1</sup> at a scan rate of 0.45 sec scan<sup>-1</sup>. Significant compounds were determined by ANOVA.

A three-layer feed-forward artificial neural network (ANN) was constructed using the Neural Network Toolbox 8.3 in MATLAB R2015a (8.5.0.197613) (The MathWorks, Inc., Natick, MS). A sigmoidal activation function and a linear transfer function were used for training. Mean peak area counts from HS-SPME/GC-MS analysis across replicates for each clone by cooking method and targeted reference compound were used as the input layer. Mean sensory scores for each clone by cooking method were used as the output layer. Samples were randomly divided into a 65% training set, 15% validation set, and a 20% testing set.

### Goals and Outcomes Achieved

The overall goal for the project is that all potato genotypes named by the Colorado Potato Breeding Program, after implementation of this project, will be given a flavor rating. While this goal is obviously long-term, we developed flavor ratings for 15 genotypes, and reached our targets for 2014 of doing the initial screening and establishing a relationship with taste panel and chemical analysis, and for 2015 of validating the correlation between taste panel results with biochemical analysis.

1. We conducted six taste panel sittings and evaluated potatoes that were cooked by boiling and baking. Same samples were tested using HS-SPME/GC-MS instrument.
2. Based on sensory analysis with the taste panel we identified significant differences between different cultivars. In order to present those differences, we grouped 15 cultivars that we tested based on their flesh color and skin type. They are purple/red cultivars/clones, yellow fleshed clones/cultivars and russet cultivars/clones.



3. We identified a chemical signature for the different flavor notes by correlating the taste panel sensory analysis with mass spectrometer analysis.
4. The flavor ratings on six different sensory flavor attributes were plotted on spider web diagrams for each group of cultivars (Figure 1).
  - Six sensory flavor attributes were found to differ significantly among clones. Some red and purple clones showed more bitterness and yellow flesh cultivars/clones showed more butter, creamy and sweet notes.
  - Potato-like flavor, aroma intensity, and mealy texture differed significantly by cooking method (Figure 2).

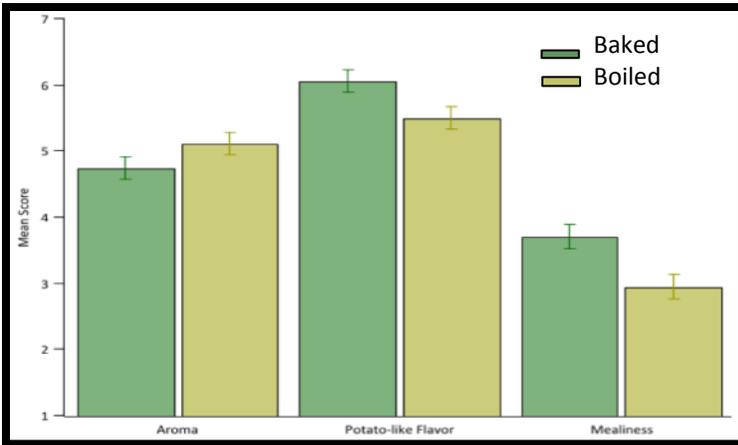


Figure 2. Attributes with a significant effect between sensory scores for baked or boiled potatoes according to linear mixed-effect model pair-wise comparisons ( $\alpha=0.05$ ); Error bars represent model error estimates

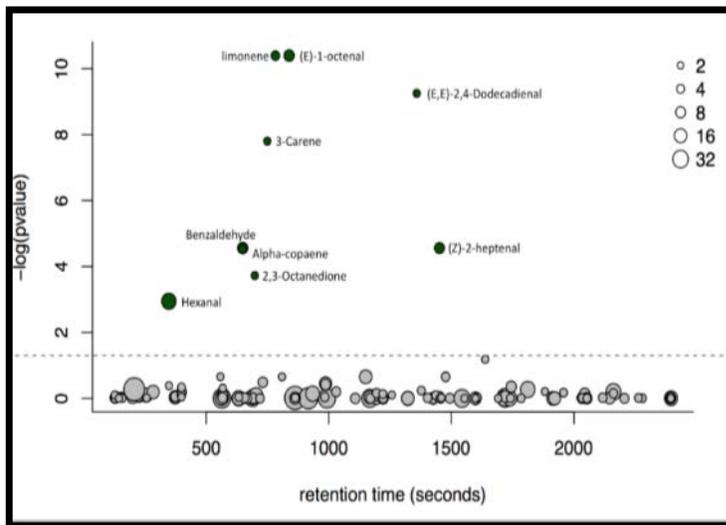
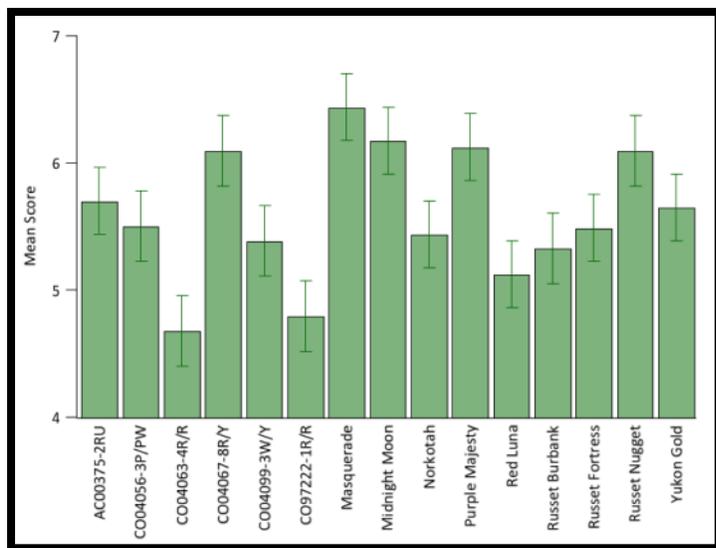


Figure 3. Overall quality sensory scores by clone; There is a significant difference between cultivars that do not have overlapping model error bars ( $\alpha=0.05$ ).

method (Figure 2).

- There were some differences between overall quality by clone (Figure 3).
  - 9 volatile compounds varied among clones and were identified via a NIST library search and standards (Figure 4).
  - Optimal results were achieved with 4 nodes in the hidden layer of the ANN.
  - The ANN model had an  $R^2$  value of 0.62 for the training set (mean square error=0.073) and 0.29 for the testing set (mean square error=0.34).
  - Though the resulting ANN model had small coefficients of determination, mean square errors were also small. The addition of data from the 2015 growing season is expected to increase the  $R^2$  values, which would confirm the use of an ANN model for sensory score prediction based upon the chemical input. Still, the flavor profiles generated by the sensory analysis alone will provide beneficial information to CSU's potato breeding program and potato producers to make informed decisions regarding flavor quality.



5. The outcome measures are long term, but we achieved in identifying the key correlations and significant compounds related to each characteristic flavor note. We collected the same material from 2015 harvest and will repeat the same analysis

6. The biochemical tests will be used in identifying the parent material for potato breeding programs. Generally it takes 15 years after making a cross to develop a potato cultivar for commercial use. Our data that has been gathered to date is showing the progress needed toward achieving set targets and implementing the sensory analysis in our potato

breeding program in the future.

### **Beneficiaries**

Implementing flavor as a one of the selection tools in germplasm screening will benefit the breeders, consumers and overall industry. A prediction model for sensory analysis will enable germplasm screening and selection for potato flavor improvement during the breeding process.

Selection for flavor improvement in a breeding program will most likely increase consumer appeal of a particular horticultural product, which may effectively facilitate market expansion.

There are approximately 175 large-volume potato growers in Colorado. New cultivars that are released with improved flavor will support consumer-oriented marketing efforts. Ultimately the consumers that demand improved produce “quality” in its various forms will also benefit. Conservative estimates indicate that new potato cultivars and clonal selections increase the value of the Colorado fall potato crop by \$14 million annually due to improved yield and quality. It is estimated that a new potato cultivar could potentially add \$2-4 million to the value to the potato crop.

### **Lessons Learned**

Compared to past studies, the number of positive identifications of volatiles in the chemical analysis was small. The HS-SPME GC/MS method should be further optimized, including the use of a SPME fiber with an additional phase to effectively capture more sublime compounds.

Sensory analysis of the wild *Solanum* accessions from the potato gene bank, Sturgeon Bay Wisconsin, was postponed for the lack of enough material from the 2014 harvest. This is due to

problems associated with germinating wild-type germplasm. We will be accessing the material from this year's harvest as they are growing in the green house and also in the field.

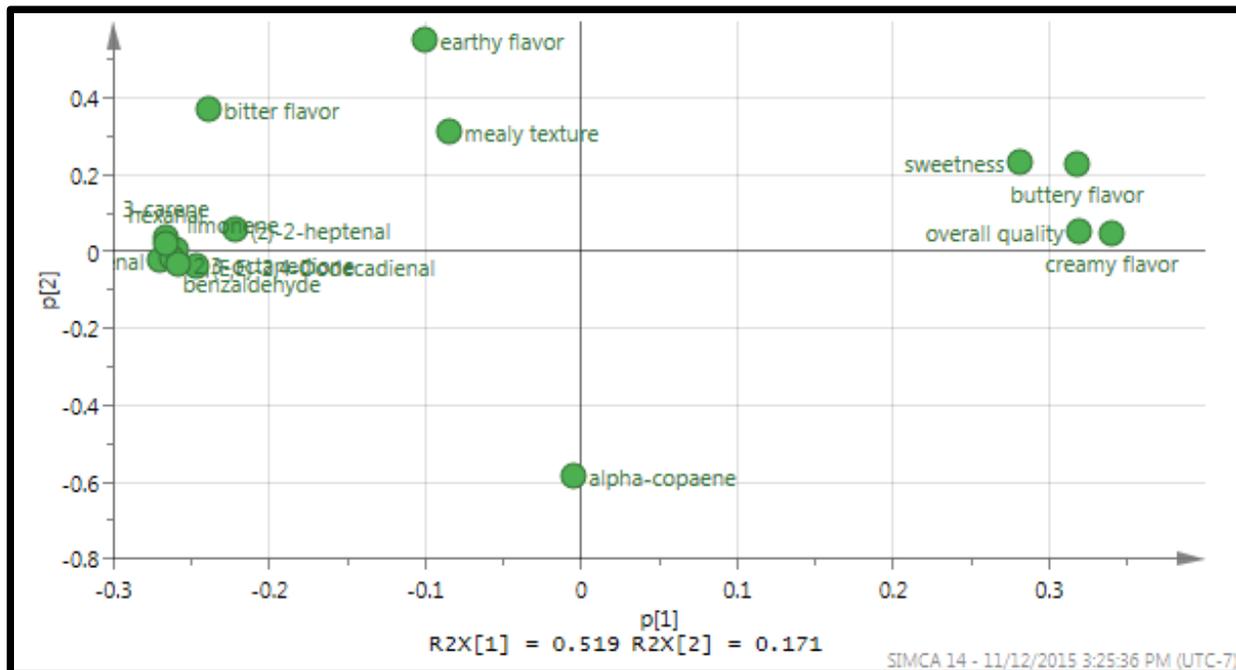


Figure 5. Correlation of specific chemical compounds with the flavor attributes. Alpha-coapene is negatively correlated with earthy and mealy texture. The bitter flavor is positively correlated with 3-carene, limonene, 2-heptenal and benzaldehyde but negatively correlated with sweetness, buttery and creamy flavor.

### Contact Person

Sastry Jayanty, Ph.D.  
 Associate Professor & Extension Specialist, Postharvest Physiology  
 San Luis Valley Research Center  
 Department of Horticulture and LA  
 Colorado State University  
 Tel: 719-754-3594 ext 11  
 sastry.jayanty@colostate.edu

### Additional Information

1. Developing flavor profiles for Colorado potato cultivars. Sastry S. Jayanty\*, Raven A. Bough, and D.G. Holm. Presentation at Open House November 20<sup>th</sup> 2014.
2. Flavor profiling of potato clones using HS-SPME/GC-MS and sensory analysis to establish a germplasm screening method for flavor improvement. Oral Presentation at annual The Potato Association of America Conference at Portland Maine, July 19-23 2015.

3. ANN modeling of HS-SPME/GC-MS and sensory analysis of potato clones as a potential flavor prediction tool during selective breeding. Raven A. Bough\*, Jayanty S.S. and D.G. Holm. Poster presented at American Society for Horticultural Sciences, New Orleans, August 4-9<sup>th</sup> 2015.
4. Flavor profiling of potato clones using HS-SPME/GC-MS and sensory analysis  
Raven A. Bough\*, Jayanty S.S. and D.G. Holm. Presentation at graduate student competition at CSU November 11<sup>th</sup>, 2015



**Taste Panel Sensory Testing at SLVRC**



**Sample Preparation and testing**



**Final Report: Denver's Horse Barn Farmers' Market: Promoting Specialty Crops, Small Farmers, and Community Health**  
**Project Partner: Denver Urban Gardens**

**Project Approach**



**Cooking demo: roasting veggies**

The Horse Barn Farm Stand was developed to meet the food access needs of the Curtis Park neighborhood in which Denver Urban Gardens (DUG) has its headquarters. DUG believed that by making local fruits and vegetables (specialty crops) and nutritious cooking demonstrations available, we could improve the health of our food desert community. In addition, we made sure to advertise that SNAP benefits would be accepted at the farm stand, and that produce was priced so as to be affordable to all.

**Project Summary**

Over the course of this two-year grant, DUG hosted a total of 29 farm stands at our headquarters, called the Horse Barn, located on the northeast corner of 33rd and Arapahoe Streets in the Curtis Park neighborhood. The markets were held every Thursday from 3:00 to 6:00 PM from mid-July to mid-October. Over the course of the 2015 season, we sold more than 595 pounds of food to 253 customers (or a weekly average of nearly 2.5 pounds per person per week).

In 2015, we hired Miguel Martinez as our Horse Barn Farm Stand Coordinator Intern. He was responsible for all market operations, including set-up and take-down, tracking all sales, and running the wireless EBT terminal. Mr. Martinez grew up and attended school in the Five Points neighborhood where the Horse Barn Market is held. He has held positions in food service and retail customer service. As a student, he participated in Denver Urban Gardens' gardening and nutrition education program, which sparked his interest in organic food, nutrition, and food access. He was supervised by our Farm Stand Manager, Shawnee Adelson.

DUG distributed flyers advertising the market and our acceptance of SNAP benefits throughout the neighborhood, which has been classified as a food desert by the USDA. These flyers were distributed before the season started and twice during the season to remind neighbors of the dates and times of the farm stand. Healthy cooking demonstrations using fresh produce from the market occurred during four markets.

This year, DUG worked with seven farms: Granata Farms, Produce Denver, Ela Family Farms, UrbiCulture, The GrowHaus, Forté Farms, Sakata Farms, and Fresh Food Connect. Fresh Food Connect is a project piloted by DUG, Denver Food Rescue, and Groundwork Denver that allows home and community gardeners to donate excess produce to be sold affordably in food deserts to low-income customers. We will expand Fresh Food Connect in 2016.

## Goals & Outcomes Achieved

Goal	Performance Measure	2015		Total (2014-15)	
		Target	Actual	Target	Actual
To increase the amount of specialty crops sold in Five Points Neighborhood.	Amount of specialty crops (in dollars) sold at the Horse Barn Farmers' Market.	\$6,400	\$1,442	\$11,200	\$3,309
To increase the amount of SNAP benefits spent at the Horse Barn Farmers' Market.	The amount of SNAP (and incentive funds) spent in dollars at the Horse Barn Farmers' Market.	\$900	\$157	\$1,500	\$246
Increase the number of farmers providing direct sales of specialty crops.	Number of farmers participating in the Horse Barn Farmers' Market.	6	8	6	8
Reach low-income residents.	Number of customers from the neighborhood.	200	22	350	64
Cooking demonstrations.	Number of cooking demonstrations.	8	4	12	7

As we discussed in our previous report, sales were lower than anticipated. We underestimated the time it would take to be adopted by the community, even with significant marketing and outreach activities. Our benchmark was based on our Youth Farmers Markets, which are typically on school grounds and, therefore, better known by neighbors, and have a captive customer base of parents, teachers, and students. Despite the difference in scale, on average we sold 75% of the produce provided by the partner farmers.

Again, the number of customers who were directly from the neighborhood and the amount of SNAP dollars spent at the market were lower than anticipated. However, our 2015 sales in SNAP dollars doubled from the previous year, and we realized that many of these customers were travelling from other neighborhoods to take advantage of our market. This tells us that farm stands that clearly advertise their acceptance of SNAP are needed throughout the Metro Denver area. We had over 10 customers travel from other neighborhoods throughout Metro Denver to use their SNAP benefits. We have found that the longer the EBT machine is at a farm stand, the more popular the service becomes.

At the beginning of the season, DUG scheduled monthly healthy cooking demonstrations to be performed by Whole Foods Market that would take place immediately next to the market, using produce that customers could buy that day. Unfortunately, after our first demonstration, our contact left Whole Foods and was not replaced. We were able to reschedule some of these dates with community members, such as Mo' Betta Greens, but were not able to fill all dates.

In late October, Horse Barn Farm Stand Coordinator Intern, Miguel Martinez, was invited to speak at a Johnson & Wales University class on food systems and strategies for combating food deserts. Mr. Martinez is seeking his high school diploma and after his presentation, two professors at the university have offered to support his application to the culinary program when he is eligible to apply. Besides this obvious benefit, Mr. Martinez has said that the Horse Barn Farm Stand internship “opened a lot of doors” for him and exposed him to the diversity of the local food movement where he hopes to build his career.

## **Beneficiaries**



**Customers peruse vegetables at the Horse Barn Farm Stand**

Over the two-year course of this grant, DUG has sold local specialty crops to approximately 506 customers. Some of these customers lived in the nearby neighborhood, some worked in or near our headquarters, and, as we mentioned above, some travelled to our neighborhood for the express purpose of purchasing produce with their SNAP benefits.

One of our customers came to the Farm Stand after hearing about it at a compost demonstration at his local DUG community garden. He bought more than \$40 worth of produce with his SNAP benefits, and returned the following weeks. Another customer was a local mother who lives across the street, and who regularly shopped for fruit for her three young children as an after-school snack.



**Farm Stand Intern, Miguel Martinez, with a helper from the community**

The local farms with which we worked also benefited from the farm stand. Unfortunately, due to the closing of nearby Sustainability Park, two of our farmers (Produce Denver and Granata Farms) need to find alternative space to grow. From our conversations with them, it is unlikely that they will remain near enough to the Horse Barn Farm Stand to make them possible partner farmers in 2016. However, the Fresh Food Connect program has the potential to source a variety of local produce for the 2016 season.

## **Lessons Learned**

Generally, DUG’s biggest lesson from this two-year grant is about the length of time needed to establish a flourishing, independent farm stand. Internally, we have discussed how the scheduling of the farm stand may have impeded greater adoption by the local neighborhood. We are considering weekends or later evening hours for those who work outside of the neighborhood



**Cherry tomatoes and purple tomatillos for sale at the Horse Barn Farm Stand**

during regular 9-5 hours. In order to continue the program, we are in discussions with Groundwork Denver to hire local youth to run the market, as we have modeled with our intern this year.

The greatest challenge that DUG faced this year was the disruption of our cooking demonstration schedule. We chose a corporate partner with which we had a standing relationship in order to avoid inconsistencies of this kind,

however, we were not able to anticipate a change in corporate strategy that would eliminate

positions to support programs like ours. If we had more advance notice, we would have been able to schedule more demonstrations with other partners, but by the time we knew of the difficulty, many of them were already scheduled to do other activities. We learned to cast a broader net for partners at the beginning of the season so as not to rely on one source for demonstrations.

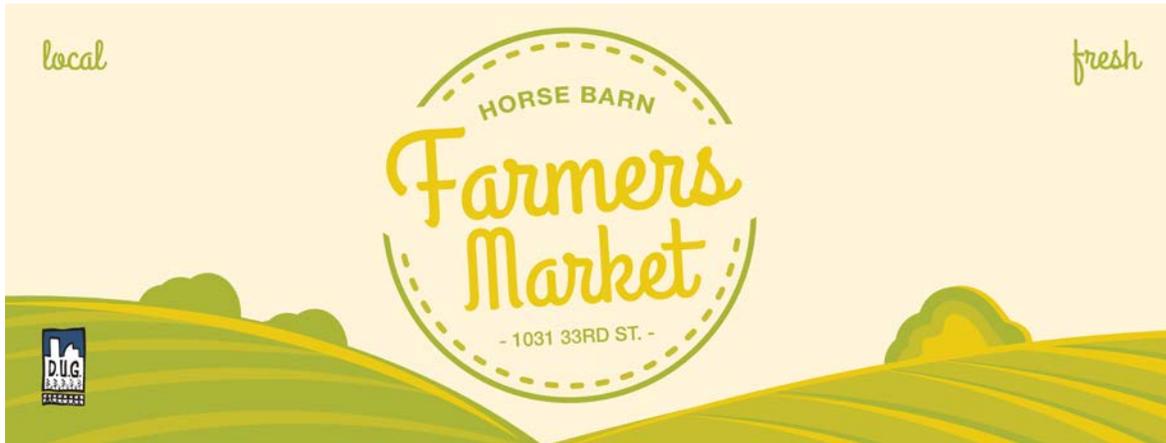
**Contact person:**

Rebecca Andruszka  
 Denver Urban Gardens  
 rebecca@dug.org  
 303-292-9900

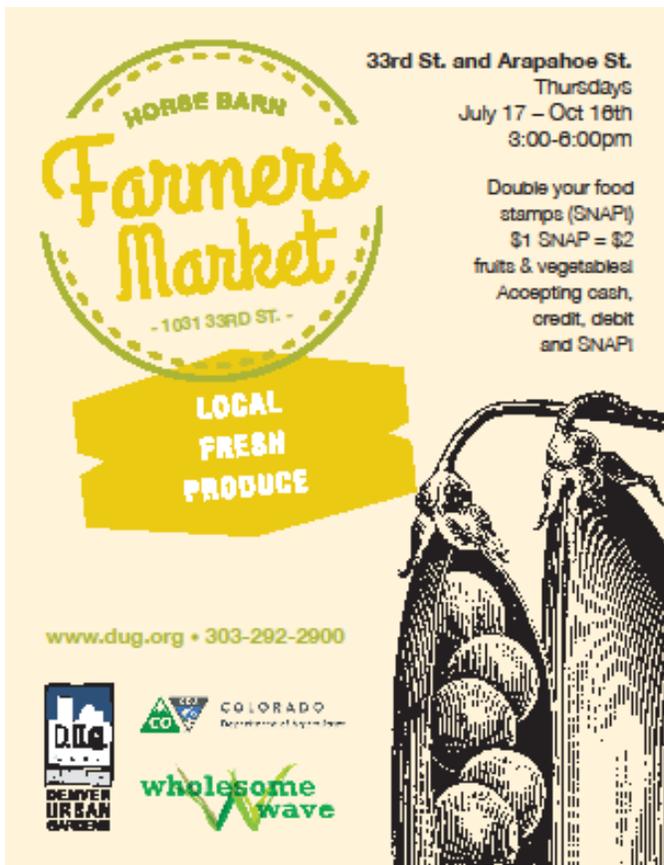


**Advertising SNAP benefits at the Horse Barn Farm Stand**

**Additional Information:**



**Banner for farm stand.**



**Farm stand flyer.**

**Final Report: Essential Marketing & Design Components in Support of the Plant Select®  
Brand Initiative**  
**Project Partner: Plant Select**

**Project Summary**

In 2013, Plant Select board-licensed propagators, retailers and other stakeholders took part in Phase I of a branding refinement process with Sector Brands and Rassman Design. Since its inception, Plant Select has had the good fortune of having established a reputable brand among horticulturists, growers and retailers but shifting demographics, emerging competition and on-going opportunities to sell the product in new markets spurred the organization to take this formal and more strategic look at the current brand so that its members can better capitalize on these emerging opportunities and adapt to shifting trends and competition. This project funded Phase II of our rebranding process.

**Project Approach**

Develop a strategic marketing plan.

Create a new or “refreshed” logo mark and graphic standards guidelines to communicate those goals to consumers at professional and consumer levels to drive sales.

Create marketing materials (website, ad & brochure templates, copy) to graphically and textually communicate the benefits of the products produced by the participants to increase sales for collaborators.

**Goals & Outcomes Achieved**

Sector Brands, the company that worked with us in Phase I to develop our refined brand, held a variety of meetings and conference calls with members and stakeholders to come up with a marketing plan enabling Plant Select members to sell more native/environmentally friendly plants while educating consumers on the importance of the Plant Select brand and purchasing choices (see Appendix I). This strategic plan was shared with Board members. Items still in progress are marked with an asterisk (Appendix I).

Rassman Design created a new logo design which captures the look and feel of the old logo, but with a more contemporary font and design. The logo itself now represents a sun within a flower. Rassman Design finalized the brand board the following week (see Appendix II).

Marketing materials were developed. Booklets, brochures, “about us” cards, buttons, and fact sheets were distributed to garden centers, public gardens, and Colorado Master Gardeners. New ad templates were developed and used in Rocky Mountain Gardening magazine (quarterly) and the Colorado Gardener (five inserts). New trade show banners were produced and used at five events: ProGreen Expo, National Western Stock Show, Colorado State Fair, the High Plains Landscape Workshop and the Colorado Native Plant Society annual conference (see Appendix III).

The website was completely re-designed to be more user friendly, easy to navigate and mobile responsive. It launched on April 15, 2015. Please visit [plantselect.org](http://plantselect.org) to view. Screen shots are provided in Appendix IV.

## **Goals & Outcomes Achieved**

<b>Goal</b>	<b>Performance Measure</b>	<b>Benchmark (2012)</b>	<b>2014 target</b>	<b>2014 actual</b>	<b>2015 target</b>	<b>2015 actual</b>
Increase sales reported by Plant Select licensees	Quantity of reported sales	1.673 million units	1.75 million	2.146 million	1.838 million	2.164 million
Increase website visitation	Number of unique website visitors	35,940	38,000	46,883	40,000	53,070 ytd
Increase website use	Number of website page views	272,876	285,000	301,001	300,250	303,555 ytd

## **Beneficiaries**

Colorado wholesale growers, nurseries, retail garden centers, landscape professionals, online sellers and one Colorado seed seller benefited directly from these efforts. Sales are tracked only from our licensed growers – we do not have any method to track the other sales.

## **Lessons Learned**

Websites take much longer to prepare for launch than ever expected. We were still able to launch in time for spring sales, however. And we were able to include most of the features mentioned in the marketing plan the first year. We currently have plans to implement additional features for 2016 and beyond.

Professional branding service companies can come up with a wonderful list of things to accomplish in one year, but with limited resources not all things can be managed. We prioritized the tasks we felt had the highest return for the industry and focused on those for 2015.

In our increase social media efforts, we had better engagement with more “touchy-feely” posts than those that were more factual. Our most popular Facebook share reached 3500 people and it was on how gardening makes people feel: <http://www.nytimes.com/2013/10/17/garden/the-good-for-nothing-garden.html?pagewanted=all& r=0>.

## **Contact Person**

Pat Hayward  
Executive Director  
director@plantsselect.org  
970.481.3429

## Appendix I: Plant Select Marketing Priorities, October 20, 2014

### Priority #1: Prepare for and conduct brand launch

**Prepare for external brand launch and roll-out by developing key marketing materials/vehicles; make them more engaging and compelling**

#### **T1: Incorporate *Plant Smarter* theme into brand identity and collateral**

Brochures, flyers and collateral materials

Plant tags

Point of Purchase materials

Print ad templates

Trade Show/Event banners

Letterset/business cards/stationary

Email signatures

#### **T2: Redesign website to have more ‘consumer’ appeal and to reflect *Plant Smarter* brand platform**

*The new website was officially launched April 15, 2015.*

#### **Revamp overall look, feel and messaging of website**

Redo website to make it less trade oriented and better organized from consumer perspectives, i.e., plant choices by color, size, conditions, pots, etc.

Redesign ‘About Us’ with new brand messaging (your history, model, cultivation process, your people, your ‘beliefs’)

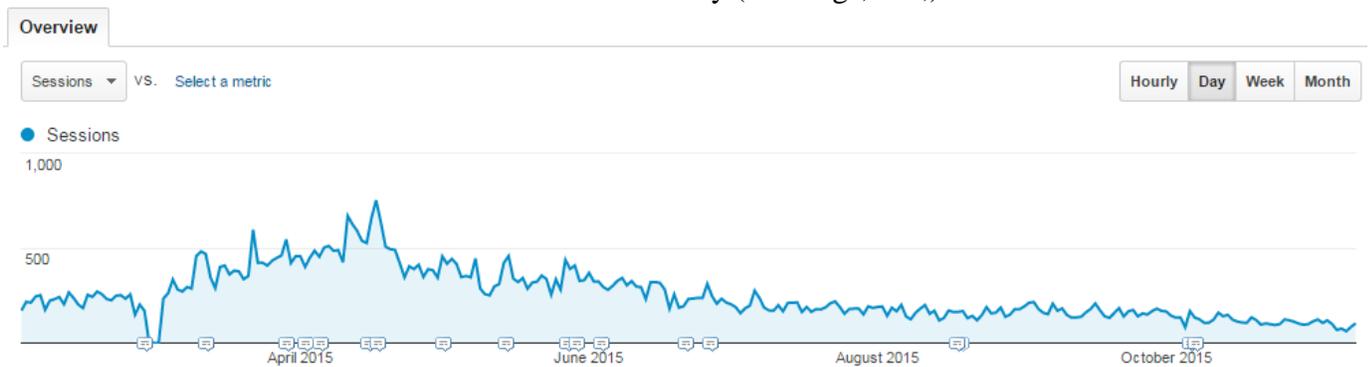
\*Highlight ‘industry endorsements’ of CSU, DBG and industry professionals throughout site

Highlight your ‘smart features’ and ‘smart benefits’ throughout site

\*Have separate section for ‘Professionals’ and tailor messages to various audiences, i.e., retailers, growers, landscape architects

\*Create areas for more ‘partner’ profiles and ‘consumer’ profiles

\*Create areas for more social media functionality (i.e. blogs, etc.,)



### **Conduct a formal launch of the new brand with external audiences at ProGreen Expo *Jan 2015***

**T1: Host formal event to unveil the new Plant Select campaign at the ProGreen event in January (this will be more detailed in Brand Launch Plan)**

Identify key targets among retailers, growers, landscape architects, municipalities

Distribute e-announcement teaser in advance of show to key targets  
Unveil Plant Select campaign and *Plant Select Partner Marketing Program*  
Distribute new brochures, flyers  
Distribute give-away items  
Distribute press release on new brand  
Highlight new brand in newsletter  
Highlight new brand on website

**Priority #2: Leverage resources of key partners including Denver Botanic Gardens, and CSU more effectively**

**S1: Enhance partnership opportunities with Denver Botanic Gardens**

**T1:** Work with Jennifer Riley-Chetwynd at DBG on joint promotion efforts

***Jan 2015 – Dec 2015***

Provide Jennifer with DBG editorial calendar of upcoming news and story ideas **that are more consumer friendly** and discuss how DBG can support

**T2:** Work with DBG on expanding Plant Select mentions/presence on DBG **website** and establishing cross-links

***Jan 2015 – Dec 2015***

Example: Jennifer has now added a link to Plant Select as part of the Darlene Radichel Plant Select garden page on the website.

**T3:** Work with DBG on expanding Plant Select mentions on DBG social media  
Jennifer is open to promoting Panayoti and his connection to Plant Select via social media vehicles as long these are consumer focused.

**T4:** Work with DBG on enhancing promotion of Plant Select plants at **annual plant sale**; introduce more of the ‘consumer’ brand at these events

**Priority #3: Leverage Plant Select Membership to Become Brand Ambassadors and Promoters**

**T1: Create a Plant Select cooperative marketing program with retailers**

***Jan – Dec 2015***

Develop a ‘*Sell Smarter*’ **training kit** for retailers to use to promote Plant Select  
Create a **video** that retailers can use to **train employees** on Plant Select- posted here  
<https://www.youtube.com/watch?v=aN2htWJ5lJc>

Create a Plant Select FAQ sheet

**Introduce new in store displays to energize in store promotion**

**Create buttons** for employees to wear: Ask me how to Plant Smarter

Create **flyers** on “How to Plant Smarter”

Create new Plant Select **banners** for in-store use

Develop **newsletter items** about Plant Select that retailers can insert into their consumer newsletters

**Encourage them to promote Plant Select on their website** through use of Plant Select logo and links to Plant Select website

**Encourage social media opportunities such as blog contributions, Facebook features, Twitter feeds**

**Priority #4: Cross Fertilize with Other Associations**

**T1: Contribute Plant Select articles in association newsletters  
Jan 2015 – Dec 2015**

**\*Encourage them to promote Plant Select on their website** through use of Plant Select logo and links to Plant Select website

**\*Submit articles about Plant Select to these newsletters**

Garden Centers of Colorado (GCC) – we provided 8 newsletter items for their members  
Colorado Nursery and Greenhouse Association (CNGA) – we provided 5 newsletter items

Associated Landscape Contractors of Colorado (ALCC)- we were featured in 8 of their Tip of the Week enewsletter

**\*American Society of Landscape Architects (ASLA)**

**Priority #5: Leverage Social Media**

**T4: Leverage Social Media to create a broader community of followers  
Jan- Dec 2015**

**\*Hire a part-time marketing assistant or intern** to assist with social media tactics

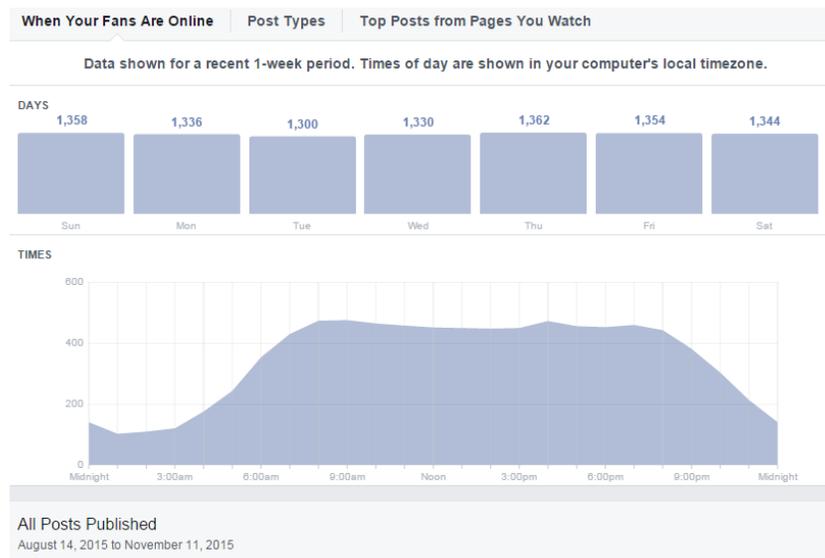
Increase frequency and variety of Facebook posts

Make social media more conversational

Engage people through more than Facebook likes

Ask questions/conduct small polls

Evaluate Facebook on a monthly basis – we did not convert to a “page” until middle of August when analytics could be gathered. We now have 1642 likes



*Above: facebook analytics April 14, 2015 – November 11, 2015*

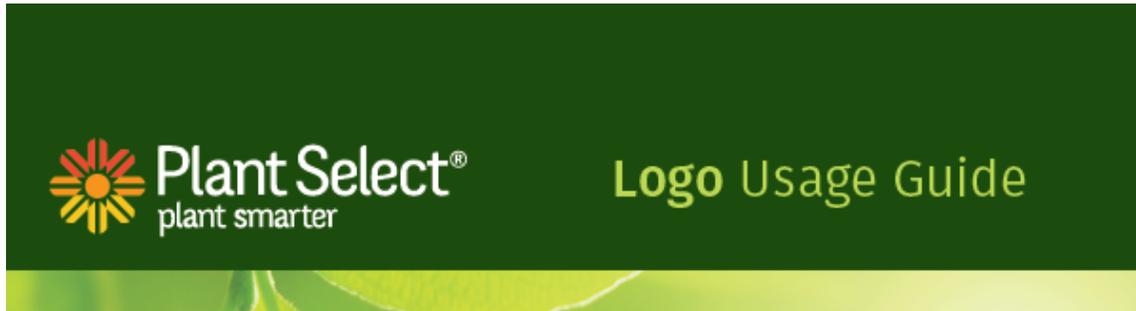
Check website analytics to track referring traffic  
 Engage members in social media through *Partner Marketing Program*  
 Likes on Facebook  
 Blog entries  
 Tweets

**Appendix II: Rassman Design – brand board**



Colorado State University DENVER BOTANIC GARDENS

## Appendix III: Rassman Design – Logo Usage Guide and Color Standards



### PRIMARY LOGO

The Plant Select logo consists of three main elements: the burst icon, PLANT SELECT® and the tagline, plant smarter.

Each of these elements has been custom-created and should never be recreated or re-typeset. To maintain consistency and create a strong visual identity, the Plant Select logo should only be used from existing digital files.



### STACKED LOGO

When the primary version of the Plant Select logo will not work with your space or design requirements, the stacked logo can be used.

Both logos can be used in color, black and white or reversed where appropriate.



### CLEAR ZONE

The Plant Select logo should always have an area of open space or "clear zone" around it. No other graphic elements should fall within this area around the logo.

Where "x" is equal to the height of the small "a" in Plant Select, leave at least X amount of clearance on all sides of the logo.



### MINIMUM SIZE RECOMMENDATIONS

The Plant Select logo should always be used at an appropriate size to make sure it is legible.

The logo should not be used smaller than the recommended minimum size.



**FULL COLOR REVERSE USAGE**

A reverse version of the Plant Select logo has been developed for use when the logo appears on black or other dark, contrasting colors.

In this application, the logotype and tagline are white instead of brown to increase legibility but the burst icon does not change.

This version of the logo should not be used on light- or mid-range colors that lack sufficient contrast.



**ONE-COLOR USAGE**

The solid one-color version should only be used when all other elements on the page appear in one color or 100% black.

**One-color reversed usage**

When only one color is available and the logo appears on black or another dark color, a one-color reverse logo should be used. In this version, the entire logo is reversed to white out of the background color.

<b>PANTONE</b> # 7631	<b>PANTONE</b> # 1797	<b>PANTONE</b> # 716	<b>PANTONE</b> # 7406
<b>CMYK</b> 50, 67, 57, 48	<b>CMYK</b> 1, 87, 90, 0	<b>CMYK</b> 0, 50, 100, 0	<b>CMYK</b> 0, 20, 95, 3
<b>RGB</b> 87, 60, 62	<b>RGB</b> 237, 73, 49	<b>RGB</b> 247, 148, 30	<b>RGB</b> 247, 198, 31
<b>HEX</b> # 573c3e	<b>HEX</b> # ed4931	<b>HEX</b> # f7941e	<b>HEX</b> # f7c61f

**LOGO COLORS**

It is important to remember that printing processes can vary. When producing printed materials, please refer to printed samples to accurately reference and adjust color.

The PANTONE and CMYK colors selected are for printing on uncoated paper unless otherwise noted.

When viewing color on screen, please remember that monitor color settings can vary.

**RECOMMENDED FOR HEADLINES**

**Fira Sans Bold**  
**ABCDEFGHIJKLMNOPQRSTUVWXYZ**  
**abcdefghijklmnopqrstuvwxyz**  
**1234567890**

**RECOMMENDED FOR BODY COPY**

Fira Sans Light  
 ABCDEFGHIJKLMNOPQRSTUVWXYZ  
 abcdefghijklmnopqrstuvwxyz  
 1234567890

Fira Sans Regular  
**Fira Sans Medium**

**TYPEFACES**

The primary typeface used to accompany the Plant Select logo is Fira Sans.

The Fira Sans family of fonts may be used for Plant Select branded materials.

**RED COMBINATIONS FOR UNCOATED AND COATED SHEETS**



UNCOATED  
CMYK  
11, 94, 35, 31



UNCOATED  
CMYK  
22, 90, 40, 40



COATED  
CMYK  
15, 100, 37, 45  
RGB  
134, 31, 65  
HEX  
# 861f41



COATED  
CMYK  
20, 100, 40, 58  
RGB  
95, 0, 42  
HEX  
# 5f002a

**GREEN COMBINATIONS FOR UNCOATED AND COATED SHEETS**



UNCOATED  
CMYK  
81, 5, 95, 32



UNCOATED  
CMYK  
81, 10, 95, 47



COATED  
CMYK  
90, 12, 95, 40  
RGB  
4, 106, 56  
HEX  
# 046a38



COATED  
CMYK  
81, 21, 79, 62  
RGB  
44, 82, 52  
HEX  
# 2c5234

**BLUE COMBINATIONS FOR UNCOATED AND COATED SHEETS**



UNCOATED  
CMYK  
100, 50, 1, 15



UNCOATED  
CMYK  
100, 50, 2, 34



COATED  
CMYK  
94, 57, 4, 18  
RGB  
0, 90, 150  
HEX  
# 005a96



COATED  
CMYK  
97, 57, 5, 45  
RGB  
0, 58, 112  
HEX  
# 003a70

**PURPLE COMBINATIONS FOR UNCOATED AND COATED SHEETS**



UNCOATED  
CMYK  
49, 74, 9, 10



UNCOATED  
CMYK  
52, 76, 34, 22



COATED  
CMYK  
47, 94, 0, 36  
RGB  
110, 43, 98  
HEX  
# 6e2b62



COATED  
CMYK  
32, 75, 0, 64  
RGB  
93, 55, 84  
HEX  
# 5d3754

**ACCENT COLORS**



CMYK  
30, 0, 100, 5



CMYK  
5, 3, 10, 3



CMYK  
75, 10, 0, 0



CMYK  
0, 5, 35, 0

**SECONDARY COLOR PALETTE**

Although the main logo is comprised of four colors, additional colors in the expanded palette may be used for two-toned brochures and other materials.

The expanded palette includes four secondary color combinations and four accent colors.

When secondary colors are used in CMYK printed materials, uncoated and coated build formulas have been provided based on paper selection.

**Two-toned red combination example**



Lighter Red background

Darker Red background

# Appendix IV: Rassman Design – New Materials

## “About” card & tags

**Plant Select®**  
plant smarter

Inspired by the Rocky Mountain Region.

**WIND. HAIL. SNOW. SUN  
BRING IT ON**

We offer gardeners the right plants for the right places that are unique, beautiful, durable, sustainable and successful.

### Why Plant Select®

*Because we believe the right plants in the right places matter!*

As the country's leading brand of plants designed to thrive in high plains and intermountain regions, we have refined the art and science of discovering, selecting and distributing plants that flourish in dramatically changing climates.

Our plants provide gardeners with smart, stunning and successful gardens that use less water and fewer resources with less environmental impact.

Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque rer sie laudantium natus error si.

- Sit amet, consectetur, adipisci velit quia non tuncquam eius.
- Modi mollitiae consequatur.
- Etiam qui doctorem enim fugiat quo voluptas nulla pariatur.
- Dolorem enim fugiat quo voluptas.
- Sit amet, consectetur, adipisci velit sed quia non tuncquam eius.

**Plant Select®**  
plant smarter

Explore [plantsselect.org](http://plantsselect.org)

Colorado State DENVER BOTANIC GARDENS | Plant Select® is a 501(c)(3) nonprofit collaboration of Colorado State University, Denver Botanic Gardens, local growers, landscape professionals and garden centers.

**Plant Select®**  
plant smarter

**Desert Beardtongue**  
PERENNIAL

Inspired by the Rocky Mountain Region

**Plant Select®**  
plant smarter

**Penstemon pseudospectabilis**  
(Desert Beardtongue)

HEIGHT	WIDTH	ZONES
2'0"	1'0"	5-9

BLOOMS: May to August    WATER: Dry to fair

SUN: Part to full sun    CARE: Clear and wet tea (2x/yr. best)

Mounts of deep blue-green, toothed foliage are topped with waves of vibrant purple-magenta trumpets for much of the growing season. This long-lived perennial thrives in water-thrifty gardens where it attracts hummingbirds in daylight and swarms of bees at dusk. Heavily erode through and eventually cut back in spring.

**WIND. HAIL. SNOW. SUN  
BRING IT ON**

Recommended by Denver Botanic Gardens and Colorado State University

## Ads

### Smart & beautiful.

eco-conscious plants for fall & winter gardens.

Great sacaton    Manzanita  
Duck-leaved rose    Theropitaxa rufy-minky

**Plant Select®**  
plant smarter

Explore [plantsselect.org](http://plantsselect.org)

BRUGHT TO YOU BY DENVER BOTANIC GARDENS | Colorado State

### Smart & Beautiful.

eco-conscious plants for fall & winter gardens.

Find your local grower!

**DENVER METRO**  
Benson Nursery, Inc.  
City Floral Garden Center  
Country Fair Garden Center  
County Fair Garden Center  
at Westlands  
Cave Saks Gardens  
Edler's Garden Center  
Forest Range Gardens  
Growth-Oven Greenhouse  
Highlands Garden Center & Nursery  
Jolly Day Gardens  
Jared's Nursery & Garden Center  
Jensen's Flower and Garden Center  
Nick's Garden Center  
Pavilion Gardens  
Plan Like Nursery  
Tigra's Gardens  
Timberline Gardens  
Urban Roots  
Waldy Garden Center  
Whimsy Nurseries

**NORTHERN COLORADO & NEBRASKA**  
Bath Garden Center & Nursery  
Cotton Grove Nursery  
Edwards Flowerland  
The Flower Box  
Fort Collins Nursery  
Frank's Cave Nursery  
Hartquist's Garden  
Hawthorne Garden  
Jani's Greenhouse  
Jordan's Floral Gardens  
Lambert Garden Center  
Pogo Farm Produce & Garden Center  
Sturtz & Copeland  
The Windy Gardener

**SOUTHERN COLORADO & NEW MEXICO**  
Botanical Concepts Garden Center  
Blady's Garden Center  
Cotton Gardens  
Durango Nursery & Supply  
Good Earth Garden Center  
Harting Nursery  
Lexus Sun & Shade / S&S Landscape Supply  
Mountain Gardens Nursery  
Native Roots Garden Center  
Perennial Favorites

**WESTERN COLORADO**  
Bookoff Gardens  
Chelsea Nursery  
Cagle Creek Nursery  
Newman's Gardens  
Sage Mountain Farm  
Valley Green Nursery

**MAIL ORDER**  
Brimstone Perennials  
High Country Gardens  
Ligette James Nursery  
Snooze Plant Care  
Sausage Rare Plant Nursery

**Plant Select®**  
plant smarter

Explore [plantsselect.org](http://plantsselect.org)

# Booklet

Smart plant choices for tough environments.

Inspired by the Rocky Mountain Region.

WIND. HAIL. SNOW. SUN  
BRING IT ON

**Plant Select®**  
plant smarter

PERENNIALS

SPERMATOPHYTES

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Sandy loam | Zone 4-6

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Sandy loam | Zone 4-6

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Dry clay sandy or loamy soil | Zone 4-6

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Dry clay soil

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Sandy or loamy soil | Zone 4-6

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Sandy or loamy soil

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Sandy loam | Zone 4-6

**Plant Name Here**  
Scientific name here

Al vero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

2' x 10" | Sandy loam | Zone 4-6

PERENNIALS & BOURNBOONES

TENDER PERENNIALS / ANNUALS

PETITES

VINES

SPRINGS

TREES

GRASSES

**KEY TO ICONS**

- Full Sun
- Partial Shade
- Full Shade
- Moderate
- Dry
- Hardy
- Deer Resistant
- Attracts Bees

**Plant Select®**  
plant smarter

Explore: [plantsselect.org](http://plantsselect.org)

Colorado State University  
GARDENS

Plant Select® is a 501(c)(3) nonprofit collaboration of Colorado State University, Denver Botanic Gardens, local growers, landscape professionals and garden centers.

# Annual brochure

Smart eco-conscious plants. New for 2015

Inspired by the Rocky Mountain Region.

WIND. HAIL. SNOW. SUN  
BRING IT ON

**Plant Select®**  
plant smarter

**Scientific name here**

CONFERENCES: ROCK GARDENS | DRY SHADE: TENDER

ero eos et accusamus et justo odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias exceptur sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedit distinctio nam libero tempore cum soluta nobis

**RECOMMENDATION:** Perennial  
**HEIGHT:** 1-4"  
**WIDTH:** 8-12"  
**COLORS:** Red, summer

**SUN:** Part shade  
**WATER:** Moderate to dry  
**HARDINESS:** USDA zones 5b-9  
**CULTURE:** Clay, loam or sandy soils

**Scientific name here**

RECOMMENDATION: Perennial  
**HEIGHT:** 15"  
**WIDTH:** 12-15"  
**BLOOMS:** Pink, summer

**SUN:** Full sun to part shade  
**WATER:** Moderate  
**HARDINESS:** USDA zones 4-6  
**CULTURE:** Clay, loam or sandy soils

**KEY TO ICONS**

- Full Sun
- Partial Shade
- Full Shade
- Moderate
- Dry
- Hardy
- Deer Resistant
- Attracts Bees

**HIGHLIGHTS**

- CONFERENCES
- DRY SHADE
- TENDER
- ROCK GARDENS
- WEEK ENDER

**Plant Select®**  
plant smarter

Explore: [plantsselect.org](http://plantsselect.org)

Colorado State University  
GARDENS

Plant Select® is a 501(c)(3) nonprofit collaboration of Colorado State University, Denver Botanic Gardens, local growers, landscape professionals and garden centers.

## Business card

---



	<p><b>Pat Hayward</b> Executive Director</p>	<p>c/o Colorado State University 1173 Campus Delivery Fort Collins, CO 80523-1173 <b>phone</b> 970-481-3429 <b>email</b> <a href="mailto:director@plantselect.org">director@plantselect.org</a> <b>web</b> <a href="http://plantselect.org">plantselect.org</a></p>
		<p><b>Our Goal</b> Our goal is to create smart plant choices for a new American Landscape inspired by the Rocky Mountain Region.</p> <hr/> <p><b>Plant Select®</b> is the country's leading source of plants designed to thrive in high plains and intermountain regions; a nonprofit collaboration of Colorado State University, Denver Botanic Gardens and horticulturists from around the world.</p>

Large trade show banner

 **Plant Select**<sup>®</sup>  
plant smarter

Smart plant choices for tough environments.

WIND. HAIL. SNOW. SUN  
**BRING IT ON**

Explore > [plantsselect.org](https://plantsselect.org)

Small trade show banners



**Plant Select**<sup>®</sup>  
plant smarter

Smart plants for stunning,  
successful gardens.



WIND. HAIL. SNOW. SUN  
**BRING IT ON**

**Explore** > [plantselect.org](http://plantselect.org)



**Plant Select**<sup>®</sup>  
plant smarter

Our Seven Point Selection  
process for proven success in  
tough growing environments.

rigorously tested

1. Thrive in broad range of conditions.
2. Flourish with less water.
3. Tough & resilient in  
challenging climates.
4. One of a kind.
5. Disease & insect resistance.
6. Long-lasting beauty.
7. Non-invasive.

**Explore** > [plantselect.org](http://plantselect.org)

IN PARTNERSHIP WITH:

DENVER BOTANIC  
**GARDENS** | **Colorado**  
State  
University

## Appendix IV: Rassman Design – Website screen shots

The screenshot shows the Plant Select website homepage. At the top left is the Plant Select logo with the tagline "plant smarter". To the right is a search bar with a "GO" button and two login buttons: "Propagator Login" and "Press Login". A navigation menu includes "Plants", "Where to Buy", "Design", "Learn", "About", "News", "Events", and "Contact". The main banner features a close-up of bright pink flowers with the text "New for 2015 Meet the years' smartest plants." Below the banner is a green bar with the text "LEARN WHY our plants thrive in changing climates." The content area is divided into three columns. The left column features a video thumbnail titled "Plant Select ornamental grasses with Dan Johnson" showing a man speaking, with a play button icon and the name "DAN JOHNSON" below. The middle column has a heading "New plant guide now available!" and a thumbnail for a booklet titled "A Plant Select guide to plants" with the text "BRING IT ON" and "Plant Select plant smarter". The right column has a heading "Design Ideas" and a thumbnail of a garden plan. Below these are three more content boxes: "New smart plants for 2015" with a photo of red flowers and text about annual introductions; "Carolyn's Hope Pink Penstemon" with a photo of pink flowers and text about its fundraising purpose; and "Design Ideas" with text about free garden designs.

Plant Select®  
plant smarter

Search GO Propagator Login Press Login

Plants Where to Buy Design Learn About News Events Contact

# New for 2015

Meet the years' smartest plants.

LEARN WHY our plants thrive in changing climates.

### Plant Select ornamental grasses with Dan Johnson

DAN JOHNSON

### New plant guide now available!

A Plant Select® guide to plants

Need a quick guide to finding plants for a garden that flourishes longer using fewer resources? This 50-page, pocket-sized booklet can help. It includes 124 plants promoted through 2015, each illustrated with a color photo, short description and information on cold hardiness, size, cultural needs, deer resistance, pollinator attraction & more.

### Design Ideas

Dozens of free designs, created by regional professionals, are available for your use and inspiration.

### New smart plants for 2015

New plants are introduced each year – learn about the 2015 winners here. Plants are selected through trialing and testing at Denver Botanic Gardens, Colorado State University and public and private gardens.

### Carolyn's Hope Pink Penstemon

Gardening is about hope, and purchasing Carolyn's Hope pink penstemon will not only make your garden more beautiful, it will help raise funds for breast cancer research.

## Our Plants

Export Plants to Excel



**HOT WINGS® Tatarian Maple**  
*Acer tataricum* 'Gashin' PP 15,023



**CORONADO® Red Hyssop**  
*Agastache 'Pistebene'*



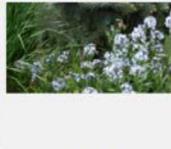
**CORONADO® Hyssop**  
*Agastache aurantiaca* 'P9125'



**SONORAN SUNSET® Hyssop**  
*Agastache cina* 'Sinning' PP 13,071



**Sunset hyssop**  
*Agastache rupestris*



**Colorado desert blue star**  
*Amsonia jonesii*



**Cape-forget-me-not, Summer-forget-me-not**  
*Anchusa capensis*



**WINDWALKER® big bluestem**  
*Andropogon gerardii* 'P96915'



**Silky rock jasmine**  
*Androsace sarmentosa* 'Chumbly'



**Filigree Daisy**  
*Artemis marschalliana*



**REMEMBRANCE® Columbine**  
*Aquilegia 'Swan Violet & White'*



**DENVER GOLD® Columbine**  
*Aquilegia chrysantha*

## Where to Buy

Name	Address	City	State	Phone
AJ's Greenhouse	60 East Owen Road	Durango	CO	970-247-0757
Alpha Nursery & Garden Center	12 Alpha Lane	Cascade	ID	208-382-5742
Bath Garden Center & Nursery	2000 East Prospect Rd.	Fort Collins	CO	970-484-5022
Bluestone Perennials	7211 Middle Ridge Road	Madison	OH	800-852-5243
Bonsai Nursery, Inc.	3790 South Federal Blvd.	Englewood	CO	303-761-3066
Bookcliff Gardens	755 26 Road	Grand Junction	CO	970-242-7786
Botanical Concepts Garden Center	3478 N. Main Ave	Durango	CO	970-799-4237
Canyon's Edge Plants	1401 5th Avenue	Canyon	TX	806-670-5736
Chelsea Nursery	3347 G Rd.	Clifton	CO	970-434-8434
City Floral Garden Center	1440 Kearney St.	Denver	CO	303-399-1177
Cliffrose, Inc.	27885 Highway 160	Cortez	CO	970-565-8994
Country Fair Garden Center	2190 South Colorado Blvd.	Denver	CO	303-757-4949
Country Fair Garden Center at Westwoods	17201 West 64th Avenue	Anvada	CO	303-209-4394
Durango Nursery & Supply	271 Kay Cee Lane	Durango	CO	970-259-8800
Eagle Crest Nursery	0400 Gillespie Dr.	El Jebel	CO	970-963-1173
Eaton Grove Nursery	35901 CR 31	Eaton	CO	970-454-3856
Echter's Garden Center	3150 Garrison St.	Anvada	CO	303-424-7979
Edward's Flowerland	1201 East Platte	Fort Morgan	CO	970-867-3959
Flower Bin, The	1805 Nelson Road	Longmont	CO	303-772-3454
Fort Collins Nursery	2121 East Mulberry Street	Fort Collins	CO	970-482-1984
Fossil Creek Nursery	7029 South College Ave.	Fort Collins	CO	970-228-4924
Front Range Gardens	10195 Wadsworth Blvd.	Broomfield	CO	303-469-3369
Gardening With Altitude	1114 Dusty Road	Cheyenne	WY	307-231-4184
Glover Nursery	9275 S. 1300 West	West Jordan	UT	801-562-5496

## Demonstration Gardens

**Gardens Map**

**Gardens List**

**Map Icon Legend**

- Demonstration Garden
- Showcase Garden
- Be a Habitat Hero winner

**Resources**

- ▶ 2014 Demonstration Garden Performance Survey Summary
- ▶ 2013 Demonstration Garden Performance Survey Summary
- ▶ 2012 Demonstration Garden Performance Survey Summary
- ▶ 2011 Demonstration Garden Performance Survey Summary
- ▶ Guidelines on Becoming a Plant Select® Demonstration
- ▶ Application to become a Plant Select® Demonstration Garden

## News

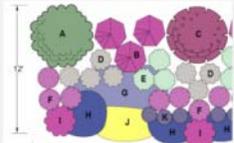
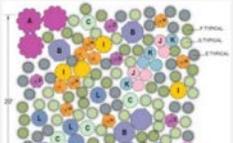
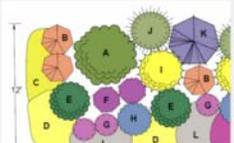
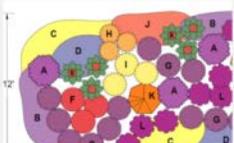
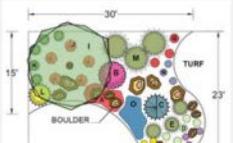
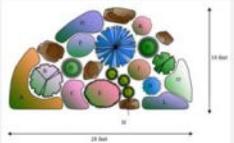
### Sign Up to Receive Updates

Enter your email address to follow us and receive notifications of new posts by email.

<p><b>2015 winners announced!</b> April 6th, 2015</p> <p>Each year new plants are chosen from official trials at Colorado State University and Denver Botanic Gardens ...</p>	<p><b>New plant guide available online</b> April 4th, 2015</p> <p>Plant Select includes all winning plants, including perennials, groundcovers, shrubs, trees, grasses, vines and Petites.</p>	<p><b>Plant exploration flourishes at Colorado State</b> February 2nd, 2015</p> <p>From 2009-2014 Plant Select has provided over \$150,000 for new plant trials at Colorado State University.</p>	<p><b>2014 Partner Award Winners Announced</b> October 9th, 2014</p> <p>We are pleased to announce the 2014 Partner award winners. The awards were given ...</p>
<p><b>2014 winners announced!</b> April 4th, 2014</p> <p>You'll be certain to want to try many of the 2014 winning plants. Here's the list - look for them at ...</p>	<p><b>2013 Partner Award Winners Announced</b> June 14th, 2013</p> <p>We are pleased to announce the 2013 Partner award winners. The awards were given ...</p>	<p><b>2013 winners announced!</b> December 4th, 2012</p> <p>Learn more about the 2013 Plant Select winning plants. Tried and tested - we've done the ...</p>	<p><b>2012 Partner Award Winners Announced</b> July 4th, 2012</p> <p>Meet the 2012 award-winning gardens, individuals and organizations.</p>

## Garden Ideas

Looking for design ideas for your own garden or landscape? These designs were donated by some of the region's finest designers for a wide range of situations and needs. Feel free to copy the design entirely, or to try out some of the great plant combinations recommended. If you try one of these designs, we'd love to see your pictures, too!

 <p>Waterwise Cottage - Lauren Springer Ogden Collection</p>	 <p>Prairie-Inspired - Lauren Springer Ogden Collection</p>	 <p>Chaparral/Xeric Mixed Border - Lauren Springer Ogden Collection</p>
 <p>Butterfly Hummingbird Garden - Lauren Springer Ogden Collection</p>	 <p>Colorado Watersmart Native Border design by The Horticulture Consultant</p>	 <p>Designs with Water in Mind: Discover Xeriscape, City of Fort Collins</p>
 <p>Dry Shade Garden design from Garden Thyme, Inc.</p>	 <p>Four Season Sensation garden design from Colorado Vista Landscape Design, Inc.</p>	 <p>Xeriscape Rock Garden design by Shalene Hiller, City of Westminster</p>

## Video Series

 <p>Kirk Fieseler Landscape Architect, Rocky Mountain</p> <p>Rock Gardening with Kirk Fieseler</p>	 <p>Kirk Fieseler Landscape Architect, Rocky Mountain</p> <p>Gardening with Hypertufa Troughs with Kirk Fieseler</p>	 <p>Plant Select® plant smarter</p> <p>Plant Select - smart plant choices for challenging climates</p>
 <p>Plant Select® plant smarter</p> <p>The what, why &amp; how of selling more plants with the Plant Select brand.</p> <p>Plant Select Message Training, Spring 2015</p>	 <p>Greg Foreman Senior Manager, Landscape Design Studio</p> <p>Garden Building for Western Landscapes with Greg Foreman</p>	 <p>Mike Kintgen Senior Landscape Architect</p> <p>Water-Wise Groundcovers with Mike Kintgen</p>
 <p>Plant Select® plant smarter</p> <p>Plant Select® Groundcovers with Pat Hayward</p>	 <p>Sonya Anderson Senior Landscape Designer</p> <p>Pollinators and Plant Select® with Sonya Anderson</p>	 <p>Panayoti Kelaidis Senior Landscape Architect</p> <p>South African Ice Plants with Panayoti Kelaidis</p>
		

**Annual Report: Marketing, Research and Technical Support for Colorado's Small Acreage, Socially Disadvantaged and Beginning Specialty Crop Producers – FFY 2013**  
**Project Partner: Colorado State University**

**Project Summary**

Colorado State University (CSU) provided marketing, research and technical support to Colorado's small acreage, socially disadvantaged and beginning specialty crop producers. Through continued support for a Specialty Crops Coordinator, as part of CSU's broader Specialty Crops Program (SCP), producers benefited from continued research conducted by CSU addressing needs of specialty and small farm producers. CSU's SCP provided Grower Research and Education Grants for on-farm projects, provided technical support and facilitated outreach efforts that broadened the impact of these on farm projects to wider audiences of growers, educators and consumers.

**Project Purpose**

The purpose of this project was to effectively develop local food systems by supporting producers with on-farm research, allowing them to supplement and/or build on research conducted by CSU, and providing producers with access to technical support and other resources available across CSU's state-wide academic, research and extension networks. This work was done by the funded Specialty Crops Coordinator and through Grower Research and Education Grants (GREG) and through targeted on-farm research projects at CSU.

This project was timely and important because developing local food systems has become increasingly prevalent across the United State, and particularly so in Colorado.

The overall purpose for the Specialty Crops Coordinator was to conduct and facilitate research in specialty crop production and utilization, including the application of organic methods, especially for organic and small farm producers. The Coordinator's focus is on solving problems with current crops and on the identification and development of new specialty crop opportunities. Primary emphasis was on vegetable and small fruit crops because of the state's need in this area, and especially because such producers are relatively underserved by current research programs. Research results were delivered to growers through demonstrations, field days, workshops, written and electronic communications and farm visits.

SCBGP funds from this grant were utilized to implement a research and marketing grant program targeted to small acreage, socially disadvantaged and beginning specialty crop producers. Grants were awarded on a competitive basis for purposes of conducting on-farm production and enterprise feasibility studies, and research to complement prior and ongoing research conducted by CSU. Grants were also awarded for the development and implementation of direct marketing and farm-to-market demonstration projects. Producers seeking these grants worked in cooperation with CSU research and extension experts to develop project proposals.

This project built on specialty crop research and grant programs that have been part of prior CDA SCBGP applications. More specifically, specialty crop funds allocated to Colorado in

2001 as part of a supplemental agriculture appropriations bill were targeted to a grower grants program in cooperation with CSU. More recently though, cultivar trials, season extension, hops and small fruit projects were included in CDA's SCBGP applications, and CDA's FY08 SCBGP-Farm Bill application included a project establishing the Specialty Crops Coordinator. The Coordinator position was continued in the FY09-13 SCBGP applications and included beginning farmer and socially disadvantaged producer grants. To date, 26 small-acreage, beginning farmer and socially disadvantaged producer grants have been awarded, of which 3 were granted in 2013.

### **Project Approach**

**Develop grant program guidelines and application; announce the grant program; finalize results from previous years' research; post research results to CSU Specialty Crop website and initiate planning for research.**

Grant program guidelines and application were updated from previous years.

A call for proposals was announced on the SCP website and through the SCP GREG Facebook page in early 2014 for the Specialty Crops Grower Research and Education Grants (GREG) program with a targeted audience of small farmers, beginning farmers, and socially disadvantaged farmers.

Results from previous years' GREG grants were posted on the website as they became available - <http://hortla.agsci.colostate.edu/research-programs/specialty-crops/greg/>.

Planning for 2014 research was initiated by interim staff and other CSU staff. Research at the CSU Horticulture Field Research Center (HFRC) under the guidance of the guidance of the interim Specialty Crops Coordinator/interim staff included high tunnel production of vegetable crops (for the purpose of season extension), production and use of cyanobacteria in crop fertilization, organic vegetable seed production research, research and demonstration on the use of alfalfa and various cover crops as an organic approach to insect pest management and evaluation of plastic mulches for weed control.

**Review new grant proposals; select projects for grant program; develop agreements for grant projects; present previous year's research at the Colorado Big & Small Conference; conduct field day event; and finalize research plan.**

In early 2014, a panel of CSU faculty reviewed seven applications and awarded three GREGs. The Colorado Department of Agriculture Marketing Specialist for Specialty Crops participated in this panel as well.

The committee reviews the application question(s) that asks the sub-grantee to describe how the project solely enhances specialty crops. The committee uses an evaluation form approved by the CDA's Specialty Crop Program that asks each committee member to gauge/rank how each project will increase/enhance specialty crops. If the project did not appear to solely enhance

specialty crops, it would rank poorly among the committee and ultimately would not be chosen to be funded. Three proposals were selected in 2014.

In 2015 the SCP interim coordinator communicated due dates for invoices and reports to the 2015 GREG recipients.

Outreach in 2014 included a field day September 2, which was attended by approximately 50 people. In 2015 a field day was held September 11 and September 12. Twenty-seven attendees came to learn about on-farm breeding methods and toured the HRC facilities and existing research projects. The SCP coordinator attended the 2015 Colorado Fruit and Vegetable Growers Association (CFVGA) conference and held a round table discussion which included research from FFY 2013. The CFVGA conference has replaced Colorado Big & Small conference.

Research plans for 2015 were finalized by interim coordinator Leila Graves in 2015.

### **Provide technical and management support for grant program and manage research plan**

The CSU Community Supported Agriculture (CSA) was re-established in 2014 under the guidance of the interim Specialty Crop Coordinator. The small (50-member) enterprise growing specialty crops used a student/intern business model. The CSA was continued in 2015.

Variety trials were conducted in the high tunnels for tomatoes and mini-cucumbers. The tomato variety trial was in collaboration with Vitalis Seed Company and it included five entries, three Marmande type tomato entries and two Coeur de Boeuf type tomato entries. A taste test held during the September 2, 2014 field day revealed that consumers preferred the appearance of all of the Marmande entries and one of the Coeur de boeuf. Measures taken revealed that the Marmande type tomatoes were higher in general yield and marketable yield (numbers) and marketable weight, though both varieties produced equal numbers of non-marketable fruit. The mini-cucumber trial was also in collaboration with Vitalis Seed Company. Four varieties (Picolino, Katrina, Socrates, Diva) were trialed and a public taste test occurred on September 2, 2014. The variety Socrates was identified as the highest marketable quantity of fruit and Katrina was identified as the highest marketable yield with regard to weight. This information not only helps a producer decide which variety to sell but whether or not to sell based on quantity or weight. Picolino ranked highest in the taste test. This is also helpful information for developing breeding lines suitable to Colorado growers. The high tunnel trails were completed by the end of September 2014 and all findings were published to print by the CSU Specialty Crops Department for reference for vegetable crop producers. In 2015 the tomato variety trial was continued. Data on tomatoes grown in 2015 was completed October 14<sup>th</sup>, 2015. It will be analyzed and available via the SCP website in 2016.

In 2014 a multi species cover crop study was started. Soil samples taken February 21, 2014 and March 23, 2015 revealed an increase in organic matter and nitrate in soils that were previously cover cropped. The plot that was utilized for the 2014 CSA was under cover crop in 2015 but will be tested in spring 2016 to investigate the continued impact of multi species cover crops. The SCP hosted a trial of winter squash and peppers as part of the Northern Organic Vegetable Improvement Collaboration (NOVIC). This trial collaborated with the SCP and CSU to host an

‘On-Farm Plant Breeding Course’ free to the public and to CSU students and faculty on September 11 and 12, 2015. Nationally-renowned breeders from Oregon State University, Cornell University, University of Wisconsin, and Organic Seed Alliance came together to teach a free two-day workshop on the basics of plant breeding at the Horticulture Research Center (HRC). Twenty-seven participants came from Colorado, Wyoming and California, and included farmers, gardeners, agricultural professionals, undergraduate students, graduate students, and university faculty and staff. Outdoor sessions at the HRC included observing the NOVIC pepper, acorn and delicata squash trials, pollination demonstrations and discussing plant traits unique to organic agriculture.

Tomato, cucumber, melon, corn, kale and lettuce crops were all produced under protective covering in 2015. These crops had on average a 75percent higher yield than their field-grown counterparts. Hail netting was trialed this year in the open field as a mitigation method for hail but weather did not permit a proper trial of the material as no hail events were recorded at HRC in 2015. However, the netting was found to reduce insect damage by 50 percent. The hail netting required extra man hours to install and maintain as it was susceptible to collapse under high winds. Developing a better method of installing and managing the netting is recommended. In 2014 the use of thicker plastic (1.5mm) was thought to resist puncture by hail but it proved more difficult to remove at the end of the season. Thinner plastic (1mm) was used in 2015 and it proved sufficient at suppressing weeds and was much easier to remove at the end of the season. Technical advice and assistance was provided to growers and grant recipients throughout late 2013 and in 2014 by interim coordinators and graduate assistants. CSU SCP also fields a steady stream of telephone and e-mail requests for specific information about specialty crop production and marketing. Little support was requested by GREG recipients in 2015. SCP communicated due dates for reports and invoices.

### **Goals and Outcomes Achieved**

- 1. Desired Outcome:** To facilitate specialty crop production innovation as well as direct marketing opportunities among small acreage, socially disadvantaged and beginning specialty crops producers.

**Performance measure:** The number of on-farm research, demonstration and marketing project grants awarded to small acreage, socially disadvantaged and beginning specialty crop producers.

**Baseline:** From 2002 thru 2006 CSU awarded 60 grants to specialty crop producers. From 2010 to 2013, 23 small acreage, socially disadvantaged and beginning specialty farmers were awarded Grower Research and Education grants.

**Goal for 2014 and 2015:** Identify and award 5 to 6 SCP GREGs

**Outcome:** This goal was not fully met. Only 3 farms were awarded grants in 2014 on a competitive basis for purposes of conducting on-farm production and enterprise feasibility studies, and research to complement prior and ongoing research conducted by CSU. No new grants were awarded in 2015. 2014 grants were awarded to the following projects:

Green Dog Farms - Karl Talbot -\$23,850 - Forming a Multifarm CSA Cooperative. Local farms cooperating to increase profit and sustainability.

Sunspot Urban Farm - Rod Adams and Amy Yackel Adams - \$10,000 - High tunnel strawberry production in suspended versus in-ground beds: can a suspended growing system be a profitable addition to the high tunnel?

Osito Orchard - Frank Stonaker, Beth Karberg - \$9,999 - Evaluation and demonstration of organic sweet cherry production using precocious dwarfing root stock, the super spindle axe training system and high tunnels.

- 2. Desired Outcome:** To provide information to Colorado specialty crop producers about the results and recommendations from CSU's research programs relating to specialty crops.

**Performance measure:** For results and recommendations to be presented to producers through Agriculture Experiment Station Bulletins, Cooperative Extension Fact Sheets, E-extension webinars and at Field Day events and conferences targeting specialty crop producers, as well as made available online.

**Goal for 2014 and 2015:** Each year produce three print publications, two webinar presentations, present findings at three conferences and maintain similar Field Day attendance as previous years.

**Outcome:** This goal was only partially met in both 2014 and 2015. Two print publications were made from data collected on both the cucumber and tomato trial in 2014. One field day was held on September 2, 2014 and data collected was shared with the approximately 50 attendees. In 2015 one field day event was held over September 11 and September 12. One print publication was handed out during this field day with information for attendees covering the basics of on-farm vegetable breeding. Findings from research in 2014 were presented at the Colorado Fruit and Vegetable Growers Association conference in 2015.

- 3. Desired Outcome:** To position CSU as a credible source of information and research relating to specialty crops

**Performance measure:** Percent increase in the number of annual visitors to CSU's Specialty Crops Program website

**Goal for 2014 and 2015:** 5% increase both years

**Outcome:** It appears that, in the original proposal, the number of web page hits (29,000) was for the entire Horticulture department website, because web hits for the SCP are not in that range. However, from October 30, 2013 to October 30, 2014 the SCP webpage received 2,976 page views. From October 30, 2014 to Oct 20, 2015 the SCP webpage

received 3,315. This increase is greater than 5% and thus the goal was met, considering the new, more appropriate numbers.

- 4. Desired Outcome:** To facilitate the development of emerging specialty crop grower and marketing associations.

**Performance measure:** Develop strong relationships with emerging specialty crop grower associations and facilitate their development.

**Goal for 2014 and 2015:** One grower association to final stage each year.

**Outcome:** In 2014 interim SCP coordinator Leila Graves was an active member in the newly formed Colorado Fruit and Vegetable Growers Association (CFVGA). Though she was an active member CFVGA reached the final stage of its association without needing help from CSU. No new associations were identified in 2015 and therefore none were helped by the SCP coordinator.

### **Beneficiaries**

The beneficiaries of these research projects and grants are small acreage, socially disadvantaged, and beginning specialty crops growers in Colorado that received grants, that attended field days and that utilized the information published to the SCP website.

### **Lessons Learned**

Due to the loss of Specialty Crops Coordinator in 2011, the temporary nature of an interim coordinator, and the awaited arrival of the newly hired permanent coordinator, much data and cohesiveness in the program has been hard to achieve. Goals set by previous coordinators were often confusing or hard to fulfill for current coordinators which led to unfulfilled or partially met goals. Though this time of change led to missed targets, specialty crops growers were still aided and the interim staff and students maintained a general public interest in CSU's involvement in specialty crops in Colorado.

### **Contact Person**

Natalie Yoder  
1173 Campus Delivery  
Colorado State University  
Fort Collins, CO 80523  
210-744-3762  
[natalie.yoder@colostate.edu](mailto:natalie.yoder@colostate.edu)

## Additional Information

**Photos from 2014 and 2015:**



**SCP Field Day 2015: Vegetable Breeder Michael Mazourek from Cornell University teaching participants how to breed their own winter squash varieties.**



**2015 Farm Stand by the CSU CSA**



**SCP Field Day 2015: Breeder Bill Tracy from Wisconsin State University and Organic Seed Alliance executive director Micaela Colley teach participants how to breed sweet corn.**



**September 2014 taste test of trial cucumbers and tomatoes.**



**HFRC research: Cucumber production in high tunnels.**



**2014 Tomato Trial, 2 Marmande Types in trial.**



**Osito Orchard GREG: Evaluation and demonstration of organic sweet cherry production using precocious dwarfing root stock, the super spindle axe training system and high tunnels.**



**Sunspot Urban Farm GREG: High tunnel strawberry production in suspended versus in-ground beds: can a suspended growing system be a profitable addition to the high tunnel?**

**Final Report: A New Approach to Blending CO Wines and Consumer Response**  
**Project Partner: Colorado Wine Industry Development Board**

**Project Summary**

As stated in the project proposal, “by documenting verifiable, measurable and hopefully positive consumer response to hybrid grape wines and blends from Colorado wineries this project intends to provide evidence and justification to wineries and growers that Colorado wine consumers will embrace locally-grown and produced wines with names the consumers may not recognize.”

Colorado grape planting has been stagnant for several years, holding at roughly 1,000 acres of wine grapes. Since the 2009-2010 vintage, and continuing through 2014’s harvest, severe winter damage, compounded by late spring frosts, drastically curtailed grape production. With the exception of the 2012 harvest, Colorado’s grape harvest was down 40-60% from normal capacity in each year, even and especially, in the Grand Valley American Viticultural Area (AVA) along the Colorado River between Grand Junction and Palisade, which is the most consistent and protected grape growing area in the state. That forced many wineries, even those with a long standing policy of using only Colorado fruit, to seek grapes from outside our state. And it caused many frustrated grape growers to rip out grapes and replant to peaches or other crops.

Even if more acreage were to be planted to grapes in the suitable growing areas –namely the Grand Valley AVA, the West Elks AVA along the North Fork of the Gunnison, Montezuma County and other areas –the issue of increasingly severe winter weather limits the potential of planting more *vitis vinifera*, the European wine grape varieties. Although growers and winemakers have been very hesitant to plant more cold-tolerant grape varieties, such as the French hybrids or new varieties developed by the University of Minnesota or Geneva, NY, those varieties would offer a more reliable alternative to *vitis vinifera*. This project never envisioned converting all *vinifera* plantings to cold-tolerant varieties. Rather, the goal was to provide new models for marketing, branding and incorporating cold-tolerant grapes into the Colorado wine industry’s collective existing business model based solely on *vinifera* grapes.

Cold-tolerant grapes will offer the Colorado wine industry two major benefits if the pattern of damaging winter events continues: 1) planted in existing growing areas, they will increase the likelihood of some grapes surviving winter damage, mitigating crop losses, so that wineries will have some Colorado grapes to work with even in bad years; and 2) expand the planting areas for grapes in Colorado into areas that are currently considered inhospitable for *vinifera*, namely the Eastern Plains, which are similar in climate to established grape growing areas in neighboring Nebraska, Kansas and Wyoming, but which currently host very few grapes.

This project provides some verifiable consumer preference data that will encourage growers and winemakers to include cold-tolerant grape varieties in their products and planning. It will expand the potential of grape production within Colorado in good harvests and will minimize loss in bad harvests. This project was proposed and initiated in 2013 after only two disastrous harvests caused primarily by extreme temperature swings in late fall and early winter. As there have been two additional crop disasters during the course of this project, 2013 and 2014, there is even more

interest now in finding alternatives to grapes susceptible to what seems to be a new and very damaging weather pattern for Colorado.

However, from the very beginning of work, the grape and wine industry's resistance to considering hybrid and other lesser-known cold-tolerant varieties hampered the implementation and rearranged the time-line for this project. These obstacles were noted and detailed in the interim report from December 2014.

Nevertheless, the project partners and the project manager were able to adapt the work plan to fully address the intentions and purposes of the project while circumventing the industry's reluctance to adopt or even consider these varieties.

### **Project Approach**

1. *Recruit wineries to participate in this process.* The initial request only drew two interested and eligible applications in December of 2013. The lack of responses delayed the implementation of many subsequent elements of the project, as the CWIDB spent time attempting to recruit other wineries to participate.

The reasons given for not participating primarily focused on the wines made from hybrid grapes or cold-tolerant varieties being in relatively short supply. As noted previously, Colorado suffered four out of five years of severely curtailed grape yield between 2009 and 2014. So wineries became very guarded about their inventories, preferring to sell wines to consumers rather than selling them to a research project.

By the end of the project, four wineries participated in the brand development work with BrandWerks, the company selected to lead the market development portion of this project. Due to the delays, the initial two wineries created their products more or less on their own, without input from the brand developer. However, the State Enologist did consult with both wineries on the progress in making the wines incorporating hybrids.

2. *Create a manual and training for blending procedures.* Although the manual was never produced, the State Enologist put on multiple blending seminars in this period. Further explanation for the failure to produce a manual is under **Problems and Delays** below.
3. *Winemaking by cooperator wineries and*
4. *Wines blended and created using flavor profiles in existing wine literature.* As noted above, the two wineries that initially applied to participate in the project, Guy Drew Vineyards in Cortez and Kingman Estates Winery in Denver, both developed products on their own incorporating hybrid grapes: Guy Drew Vineyards Baco Noir and Kingman Estates Mysterium, 50% Riesling and 50% La Crescent. Kingman also added a new Marquette into the brand development process after beginning work with BrandWerks in 2015.

Ultimately, by the summer of 2015, Turquoise Mesa Winery in Broomfield signed on for the brand development support for their varietal Frontenac, which they were producing at

the inception of this project but could not commit any for research. Also in that period, Talon Winery in Palisade joined the project to develop a brand strategy for their Chambourcin, a new product that is not yet in the market.

It is significant to note that the La Crescent, Frontenac and Marquette grapes come from Worden Farms, a grower in Burlington, CO, fifteen miles from the Kansas border. That is an area of the state in which grapes were unheard of until the last few years. And Worden Farms has frequently had trouble finding a home for their hybrids. With increased sales of products like those mentioned here, there is more reason for growers in relatively untapped and very affordable areas, such as the Eastern Plains, to look at grapes as a potential source of revenue.

5. *Identify marketing consultant.* As a result of a request for proposals sent in October 2014 to six select PR and branding companies who have worked with the wine industry or have a history with the CWIDB, BrandWerks Group in Golden, CO was selected. They offered the best palette of services available to participating wineries, made best use of the \$10,000 budget for this portion of the project, and have extensive experience working with wine industry marketing and difficult agricultural branding issues. John Recca, the principal of BrandWerks, created the Bartles and James wine cooler ads in the 1980s. More recently he has worked extensively with the Colorado Department of Agriculture (CDA) and Colorado Rocky Ford cantaloupe growers after the listeria outbreak to rebuild confidence in that product.

Since BrandWerks was doing unrelated work for other projects within the Markets Division of the CDA, contracting with them required fiscal waivers and approvals from the various project managers and BrandWerks had to delay work on this project from January 2015 until April 2015. That limited the amount of time BrandWerks had to work with the participating wineries. BrandWerks spent the first couple of months recruiting the other wineries, Turquoise Mesa and Talon. Even then we had to modify the original intentions for the brand development work to apply to Talon's as-yet unreleased Chambourcin. Nevertheless, this portion of the project was completed successfully and provides some very sound examples and foundational consumer insight for other wineries to employ when they undertake products using hybrids or cold-tolerant grapes.

6. *Develop marketing proposals to accompany the blends.* In view of difficulties recruiting wineries and wine for this project noted above coupled with the delays in getting BrandWerks funded by the CDA, the brand development work focused on wines in development instead of wines already made under the umbrella of this project. As stated above, project organizers relaxed the rules for winery participation in this project to allow BrandWerks to support Talon Winery in the product planning for its yet to be released Chambourcin. While wines such as the Talon Chambourcin, and the Kingman Marquette were not available for use in the focus groups in upcoming work plan steps, the branding discussions and focus reported by BrandWerks will be useful as a model to other wineries developing similar products.

7. *Compilation of generalized marketing strategy handbook for selling nonstandard blends.* This element of the work plan had to be pushed outside the deadlines for this project due to the delays in recruiting wineries and contracting with BrandWerks due to CDA internal controls. As there are plenty of resources to compile from the work done on this project, an on-line resource will be forthcoming in the three to six months following this report.
8. *Seminars and training session on blending and marketing of hybrids and nonstandard vinifera.* Once again, due to delays in the above segments of the work plan that also caused delays and a reorientation of the consumer surveying portion of the project, these seminars will be pushed beyond the deadlines for this project. However, the initial report of findings from this project will be presented during VinCO, the Colorado wine and grape industry's conference, January 19-21, 2016 in Grand Junction and in more depth later in 2016.
9. *Consumer focus groups sensory evaluation of blends created by participating wineries as well as marketing proposals.* The first consumer survey was conducted by a team from Colorado State University's Department of Agricultural and Resource Economics at the Colorado Mountain Winefest in Palisade, September of 2014. Only Kingman Estate was able to provide wine for that consumer blind tasting, so the project organizers assembled a group of other Colorado hybrids and/or cold-tolerant blends to be tasted blind by self-selected consumers at a wine festival beside one *vinifera*, a Merlot.

The CSU team and project organizers were fully aware that the attendees of a Colorado wine festival would not be an indicative group for assessing a typical wine consumer's willingness to try an unfamiliar wine, since they are already disposed to drinking wine from a lesser-known wine region. Nevertheless, this survey provided some very good insight into how to better approach the next round of surveying done in liquor stores in Fort Collins and Boulder in the summer of 2015.

The results of this survey were also critical to selecting the wines used in the subsequent in-market surveys. Although the comments voiced by participants during the 2014 blind tasting were critical of the sweetest of the wines in the tasting, the written preferences were by far for the sweetest of the six wines in the blind tasting. Subsequently, consumers indicated they were willing to spend more on the wine they liked the best on paper, but which they also criticized the most out loud. Additionally, the sweetest wine in the 2014 Winefest blind tasting was a last minute substitution for a wine that did not arrive for the event. It was placed in the same tasting order the missing wine would have been in the lineup, and due to its sweetness it undoubtedly influenced the preferences for the Merlot, the lone *vinifera* and supposedly familiar wine, downward significantly.

As a result of this first survey, the wines selected for the subsequent blind tastings in liquor stores were limited to all reds and all essentially dry to eliminate the influence of the consumer's prejudice for or against reds, whites, dry or sweet wines.

Also as a result of the September 2014 surveying, the CSU Economics team felt that it

would be best to survey consumers about their preference for unfamiliar wines in the context of liquor stores instead of in a clinical situation such as a classroom. Since the wines and the marketing strategies from the previous portions of the work plan were not available for this portion of the project, the CSU team and the project organizer developed a strategy of tasting four similar wines in each venue: one familiar red varietal from California and from Colorado plus one unfamiliar (hybrid, cold-tolerant or otherwise unknown) grape of similar style from California and Colorado.

The subsequent consumer surveys and blind tasting were done at Wilbur's Total Beverage in Fort Collins on May 23. Attempts to do the same at other liquor stores fell through for various reasons until Boulder Liquor Mart agreed to participate on August 29, 2015. Plus, the CSU Economics team did the same format of the consumer blind tasting and survey at the Colorado Mountain Winefest on September 19, 2015 once again in Palisade.

Reports from both rounds of consumer surveys are included below.

10. *Final report*. Assembled by the team in December 2015.

### **Comparison of Actual Accomplishments to Project Goals and Outcomes/Outputs**

1. *To increase winery willingness to incorporate hybrids or climactically suitable and lesser known Vitis vinifera grapes in their product lines.*
  - a. Only **two** wineries signed up to participate initially, and there was no second round of sign-ups as envisioned in the original proposal. However, the number of participating wineries doubled to **four** after concerted recruiting efforts by the brand development partner BrandWerks and project organizers.
  - b. As noted earlier, a written handbook or blending manual was not created during this process, but several seminars, workshops and presentations have been conducted for the Colorado industry from fall of 2013 until December of 2015. Attendance has not been strong and has not increased:
    - i. Enology seminars and workshops led by CSU State Enologist Stephen Menke, PhD:
      1. Berry sensory training with blending component, 9/28/13: 5 attendees
      2. Varietal blending workshop, 12/16/14: 10
      3. Cold hardy grape variety winemaking workshop, 2/9/15: 8
      4. Cold hardy grape variety winemaking workshop, 4/27/15: 12  
[Note: the Feb. 9 and April 27 seminars were the same material repeated in Denver and in Grand Junction. In that respect, this subject matter attracted 20 attendees total. That is a far cry from the 50% of wineries mentioned in the application targets; however it suggests a doubling of interest in the topic of cold-hardy grapes.]
    - ii. Viticultural seminars given by CSU State Viticulturist, Horst Caspari, PhD:

1. “Performance of cool-climate grape varieties in Delta County” at VinCO, 1/15-16/14: 80
  2. “[Evaluation of cold-hardy, disease-resistant grape varieties for Front Range locations](#)” (see link for content) at VinCO, 1/15/15: 60
  3. “[Performance of cool-climate grape varieties in Delta County](#)” at VinCO, 1/15/15: 60
2. *To create blends from Vitis vinifera and hybrid grape varieties for consumer tasting panels*
    - a. Although these wines were not ready for use in the consumer tasting panels, we began this project with **two** wines and ended it with **five**. CSU’s Rams Point Winery ended up not participating in this project due to internal CSU financing and logistical issues.
  3. *To obtain information on consumer perception of hybrid wine characteristics and marketing potential*
    - a. Comparison of consumer preferences:
      - i. Prior CSU Viticulture and Enology surveys show consumer preferences for a blended Syrah based wine (21.2% as favorite) vs. a 8.2% for the blend as least favorite compared with the straight Syrah (53.9% as favorite but 19.8% as least favorite). Comment from this survey series: “Younger (21 to 35 years) and/or less experienced wine drinkers seemed more likely to choose the blend or even the straight Chambourcin over the Syrah than older and/or more experienced wine drinkers.”
      - ii. High-level results from 2014 Winefest consumer survey showed that 60-70% of consumers rated as good or better the blended wines (Chardonnay/hybrids, Riesling/La Crescent, sweet Frontenac/Merlot) as opposed to 40% for the straight varietal wines. Twenty-thirty percent rated the straight varietal wines as poor while only 10% rated the blends the same.
      - iii. Results from 2015 consumer trials indicate that consumers may actually be more willing to try unfamiliar varieties from Colorado, a state with less winemaking reputation and tradition, than from California. The suggestion from the data is that Colorado may actually have more success selling an unknown style or variety of wine than selling a familiar variety. See detailed report below.
      - iv. The findings from the consumer surveys done by the CSU Department of Agricultural and Resource Economics in this trial parallel the findings from the Viticulture and Enology from before this project: experienced consumers or perhaps consumers with prior experience with a grape variety or a region’s flavor profiles, are less likely to try something unfamiliar. But younger or less experienced consumers as well as those less familiar with a region may be more disposed to trying something new.
  4. *To provide support for wineries wishing to utilize hybrid varieties in their business plan*

- a. As noted above, the attendance for the wine industry seminars did increase, if attendance at the repeated seminar in February and April 2015 is added together. That increase does not match the 50% winery participation rate we set as a final goal, but it does meet the 2.5 times increase in volume.
5. *To provide evidence that Colorado wine consumers will accept and embrace locally grown, non-vinifera wines, encouraging grape growers and winemakers to embrace non-vinifera grapes and products*
- a. Results of the consumer surveys for both acceptance and willingness to pay for hybrid, cold-tolerant and blended wines are encouraging but show that much work focusing the marketing of Colorado wines in general need to be done. See the report below for details, but the high level takeaways include:
    - i. Consumers prefer the flavor profiles of known varieties of wine from California, most likely because of familiarity and comfort with the California character.
    - ii. Consumers seem to be willing to accept and pay more for an unfamiliar grape variety from Colorado than from California, which suggests a new strategy in branding Colorado wines.
    - iii. Taste preference which implies a certain degree of quality is the number one determining factor when establishing willingness to pay. That means that quality is an essential component of a new or unfamiliar product.
  - b. From the acreage baseline in the proposal, 66 acres of non-vinifera grapes planted (36 reported and additional 30 acres estimated) as of 2012 report, the State Viticulturist estimates that Colorado has close to 150 acres of non-hybrid grapes at the end of 2014. The goal stated in the proposal was a **120%** increase and the reality is more like **220%** increase or more. Although the numbers from 2015 are not yet finalized, Dr. Caspari is confident the rate of increase has continued this year.

Whether the increased attention CSU's Enologist and Viticulturist coupled with the CWIDB's frequent mention of cold-tolerant grape varieties had any impact on this increase, or if the increase was simply a grower response to recent disastrous harvests, is impossible to tell. Undoubtedly though, the increase in acreage of cold-tolerant grape varieties indicates a corresponding increase in the grape and wine industry's willingness to incorporate these unfamiliar varieties into their product mix, making the marketing resources created by this project more applicable and beneficial.

#### *Contributions and Role of Project Partners*

1. *Colorado Association for Viticulture and Enology (CAVE)* donated exhibitor space for surveying at both the 2014 and 2015 Colorado Mountain Winefest and provided festival passes for the CSU Economics team conducting the surveys.
2. *BrandWerks Group* really stepped up to fill the void left by poor winery participation in the project. Contractor John Recca personally contacted about ten wineries to see if they had any interest and could benefit from the brand development services that he was

offering as part of this project. He successfully doubled the number of participants, one of which had originally declined participation due to a lack of product.

BrandWerks put in way more time and energy with each winery than the \$2500 allocation per participant would normally buy. He provided invaluable label design assistance to two wineries that will help their non-vinifera wines jump off the retail shelves. And the brand strategy work he did with the other two wineries will lay a foundation for other wineries to approach the release of non-vinifera products.

3. *Colorado State University Department of Ag and Resource Economics* was able to transform a consumer survey/focus group plan into a research study that will not only lead to some significant publishable conclusions but will also help shape the future branding not only of the Colorado wine industry but also wines unfamiliar to consumers.

Marco Costanigro, PhD, and Rebecca Jablonski, PhD, very astutely realized that conducting the blind tastings and consumer surveys in the normal retail context of a liquor store would be much more revealing than trying to recruit a group of consumers to give up some personal time to attend a focus group in a lab or classroom. Although holding the blind tasting in licensed liquor stores and even at the Colorado Mountain Winefest, licensed as a wine festival, required a lot of negotiation and compromise to comply with the Colorado liquor laws and rules, they were willing to put in the work to find solutions for every legal and logistical roadblock they encountered. Furthermore, they were very cordial and understanding when working around the quirks of liquor stores and liquor laws. Their team did virtually all the contact with the liquor store owners and managers, and left a very favorable impression.

### Problems and Delays

As noted above, several factors combined to create obstacles and delays to the original work plan for this project. The first factor was poor harvests due to severe winter damage, coupled with spring frosts beginning in the 2010 harvest through 2014, with 2012 being an exception. That meant that going into this project wineries were short on inventory and very hesitant to take any finished product out of potential retail sales to devote to research, even though the project offered to pay for the wine.

That explains why only two wineries applied to be part of this project by the end of 2013. We were not able to recruit as many wineries as originally envisioned to participate in the marketing consultations until this past summer. That meant the marketing specialist was not able to complete his work with those four wineries until November 2015 instead of the original November 2014, and was unable to compile a generalized marketing strategy handbook by the deadlines for this report. Consequently, wines and labels developed in that portion of the project were unable to be included in the consumer surveys as originally intended. The consumer surveys then had to readjust by looking at consumer's willingness to pay and sensory preferences for familiar and unfamiliar varieties with no connection to the marketing consultation portion of the project.

In some ways that strengthened the focus of the consumer surveys, allowing them to focus on familiarity in general rather than specific wines with specific characteristics. Unfortunately, it also out of necessity severed the connections and overlap between the marketing strategy and the consumer survey portions of the project.

The CSU Enologist was not as heavily involved in this project as originally intended. Beginning in 2013 until the beginning of this fiscal year in July 2015, the funding for his position from both the industry and the University was in question and was ultimately cut in approximately half. He was not able to work closely with this project, but did put on the workshops and seminars noted above that were very helpful. No on-line blending manual was created; however, the contents of Dr. Menke's presentations are available on-line:

- **Wine from Cold Hardy Grapes:** <http://bit.ly/1OAZcYv>
- **Colorado Wine on the Cusp:** <http://bit.ly/1YqmAx8>

By and large, consumer surveys followed the timeline laid out in the proposal, with the first trial survey happening at Colorado Mountain Winefest in September of 2014. CAVE cancelled the Urban Winefest that was to have occurred in June 2015, throwing more weight onto the in-store surveys that CSU undertook. And the results from the in-store surveys with customers there for products other than Colorado wine, also revealed a better sense of the average wine consumer's preferences and willingness to pay. But given the difficulty recruiting liquor stores to host the consumer survey, since doing so required them to forfeit one of the limited in-store tasting days allowed them by Colorado liquor laws, the final store survey was not completed until the end of August 2015.

The findings from this project will be presented during the Colorado wine industry's annual conference, VinCO, in Grand Junction on January 20, 2016 and will be placed on [coloradowine.com](http://coloradowine.com). This will provide the Colorado wine industry, both growers and winemakers, an opportunity to review the data suggesting there is a promising opportunity for our industry to adopt unfamiliar and more cold-tolerant grape varieties.

## **Conclusions: Beneficiaries and Lessons Learned**

As the Colorado wine and grape industry seeks solutions to the recent and recurring crises of extensive winter damage to grape vines, this project offers foundations for creating solutions that involve the increased use of cold-tolerant grape varieties to mitigate crop loss due to cold weather, to expand the viable planting areas for grapes into new climates and regions of Colorado and to create new branding strategies for distinguishing Colorado wines.

Colorado grape growers will ultimately be the beneficiaries of this information: as wineries incorporate more cold-tolerant grape varieties into their product lines both to mitigate the scarcity of *vinifera* after bad winters and to expand production using Colorado grapes, grape growers in existing areas will have the economic incentive to plant cold-tolerant varieties to shield them from the loss of *vinifera* varieties in cold winters. Furthermore, potential grape growers in areas that have not been thought suitable for *vinifera* grapes will be able to plant cold-tolerant varieties to expand the range of this specialty crop in Colorado.

Colorado wineries will have a more consistent supply of Colorado-grown grapes with the increased planting of cold-tolerant varieties. But they also need to be convinced that they can successfully market and sell wines made from less familiar grapes in order to find a home for the increased production of cold-tolerant grapes. The consumer survey results and the marketing/branding consultations offer many new and encouraging strategies for selling wines that many wineries dismiss as impossible to sell to consumers.

The consumer survey results reveal several very encouraging trends in consumer preferences and marketing/branding strategies:

1. As consumers are willing to pay more for local products and to try unfamiliar products when they shop at farmers' markets or wine festivals, these retail venues may be the most strategic places to introduce and establish new brands, products or styles of local wine.
2. "Taste is the strongest determinant of respondent willingness to pay." That means that no matter how creative the marketing and the label design, the consumer is not willing to buy a wine they don't like or that doesn't taste good. Maintaining standards of high quality wine cannot get lost in the attempt to incorporate unfamiliar or cold-tolerant grape varieties into a winery's product line. Another way of saying this is that "If you make good wine, you can sell it, no matter what style or grape variety."
3. "In liquor store settings, respondents were significantly more likely to be willing to pay more and rank the overall taste higher for Colorado wines with unknown varietals compared to known varietals." This means that consumers may well be more inclined to try a Colorado wine in an unfamiliar style or made with unfamiliar grape varieties before they will pay the premium to buy a familiar Colorado Grown *vinifera* product. It certainly does not mean that the Colorado wine and grape industry should abandon growing *vinifera* in an attempt to offer more "experimental" wines in liquor stores. Although it may indicate that Colorado's wineries are hampering their marketing efforts by relying on familiar *vinifera* grapes to establish the Colorado brand.

But it also shows that Colorado winemakers should not shy away from creating a proprietary blend using cold-tolerant grapes or a hybrid wine and labeling it as such. If liquor store buyers reject a Colorado wine because their customers “will never buy something labeled Chambourcin,” this study’s data will give Colorado wineries ammunition to challenge the retailers’ experience.

The marketing and branding consultation work with participating wineries provides different marketing models and strategies for wineries seeking to create a product incorporating cold-tolerant grapes:

1. For label design and product appearance, it is not necessary to shy away from acknowledging the unfamiliar grapes on the front label. The more information a consumer has about the grape variety, the ancestry and the flavor profile of a variety, the more the consumer will be attracted to a product.

Following up on conclusion #3 from the consumer surveys, since the average consumer will not know the difference between Baco Noir or Frontenac and Valdigüé or Grüner Veltliner (i.e. hybrid varieties vs. lesser known *vinifera* varieties), it might be more difficult to introduce a familiar varietal wine from an unfamiliar location (for instance, a Colorado Merlot) or a proprietary blend that does not name the grapes used (“Cortez Crimson”) than to introduce a wine made from or including cold-tolerant varieties from an unfamiliar location, such as Colorado Baco Noir.

2. Incorporating new and unfamiliar grape varieties, such as cold-tolerant grapes, creates an opportunity for very outside-the-box branding to be very successful. Unfamiliar grapes open the door to innovative packaging. New products from grapes outside a winery’s past branding efforts allows the winery to undertake new marketing strategies and introduce new product lines without being constrained or otherwise tied to previous products or marketing efforts.

As Colorado’s grape growers are turning more and more to unfamiliar cold-tolerant grape varieties to address their recurrent losses in the last 5-6 years, Colorado winemakers now have more validated tools to incorporate these new grapes into new and creative products and to successfully expand the Colorado wine market.

## **Contact Person**

Doug Caskey, executive director  
Colorado Wine Industry Development Board  
c/o Colorado Department of Agriculture  
305 Interlocken Parkway, Broomfield, CO 80021  
303.869.9177  
[doug.caskey@state.co.us](mailto:doug.caskey@state.co.us)

## **Additional Information**

Reports from the Contractors

1. Marketing Consultation
2. Consumer Surveys

## Cold Hardy Project Summary: Marketing Consultant/Expert John Recca, BrandWerks Group

### Project Goal:

To provide support for wineries wishing to utilize hybrid varieties in their business plan. The selected firm will work with 3-4 wineries across the state to develop marketing strategies for a blended wine or one using cold-hardy grapes, developed under the protocols of SCBGP\_5854.

### Work Plan:

Development of marketing proposals to accompany the blends including label designs, market placement, pricing strategies, etc.

Marketing Consultant: John Recca, BrandWerks group  
Consulting Timeframe: May-December 2015  
Participating Wineries:  
1) Guy Drew Vineyards  
2) Turquoise Mesa Winery  
3) Kingman Estates Winery  
4) Talon Winery

### 1) Guy Drew Vineyards, Cortez, CO

**Background:** Guy Drew Vineyards (GDV) owns and maintains its own vineyards and winery operations. It recently planted Baco Noir, hybrid red wine grape variety. Initial crush was 2015, and expected initial wine release will be sometime in 2017 (2015 vintage). When fully mature, the acreage may yield approximately 1,500 cases of Baco Noir. GDV may blend the Baco Noir or market as a stand-alone varietal wine.

**Cold-Hardy Grape Type:** Baco Noir

**Cold-Hardy Grape Description** (Source: Wine Geeks): Hybrid grape made from the famous Cognac grape Folle Blanche and the native American *Vitis riparia*. A hearty and vigorous grape that is able to withstand cold temperatures (-20°F) the Baco Noir is planted extensively in the cooler winegrowing regions of North America, particularly around the Great Lakes region. Wines made from Baco Noir are known to be rustic, wild and great for staining teeth because of their heavy

pigment. This varietal takes well to oak and can be very long lived if made properly. Look for aromas and flavors of red fruits, cedar and wildflowers as well as toasty oak.



**Type of Work:** Label Design

**Work Description:** Consultant conducted a review of GDV strategic goals and existing product line/current label design system, and also, a category review of competitive Baco Noir products. Consultant, along with contract designer, Jeff Petersen, recommended and executed a new die-cut label design system and color scheme for the Baco Noir label, including changes to front and back label layout, communication hierarchy, and improvements to typography and graphical elements. Consultant researched Baco Noir grape (description, wine styles and taste profiles) and provided back label copy description. Once approved by GDV, consultant provided final art to label printer for future printing and label application to the new Baco Noir wine.

**Current (Portfolio) Label Design:** Range of wine varietals and front label background colors. Rectangular labels with no die-cut.

**Output/Results:** New front and back (die-cut) labels for Baco Noir 2017 market introduction.



## 2) Turquoise Mesa Winery, Broomfield, CO

**Background:** Turquoise Mesa Winery (TMW) produces several varietal wines, including cold-hardy/hybrid blends that it markets primarily through its own tasting room and a few retail locations. The winery recently won two Colorado Governor's Cup gold medals. The winery needed a label for its 2014 Frontenac, a cold-hardy hybrid grape it purchases from a grower located in eastern Colorado. Rather than utilize the winery's existing design system, the consultant recommended a new design, which TMW could potentially extend to its entire wine portfolio as it transitions to new vintages. A new design might provide a high quality image (consistent with the company's award winning wine quality), improved shelf impact, and imagery more closely aligned with the brand's "turquoise mesa" positioning.

**Cold-Hardy Grape Type:** Frontenac

**Cold-Hardy Grape Description** (Source: Wikipedia): Frontenac is an interspecific hybrid grapevine that is a result of research and cross-breeding by the University of Minnesota. It was grown from a crossing of the complex interspecific hybrid Landot 4511 and a very cold hardy selection of *Vitis riparia*. It was released in 1996. The vines produce loose clusters of dark, highly acidic, high sugar berries. Frontenac is quite vigorous, extremely cold hardy (below -30C), highly resistant to downy mildew, and resistant to powdery mildew and botrytis. Frontenac grapes are much smaller than traditional grapes and grow in tight clusters. Frontenac grapes produce a mild grape flavor.

**Type of Work:** Label Design

**Work Description:** Consultant conducted a "visioning" session with the owners of TMW to review the future vision and portfolio strategy of the winery, the Frontenac introduction, and current label design system. Consultant recommended a complete label redesign for the Frontenac product introduction. Working with contract designer Lisa Padgett, consultant provided several unique label design concepts (see "Design Explorations," below). With input from farmers' market and tasting room consumers and additional design edits, TMW selected one final concept.

Consultant finalized the design system including front and back label layouts, typography, graphical elements, and edits to (client-supplied) back label descriptive copy. Consultant worked with TMW's designated printer to identify color and foil paper stock options and specs, and

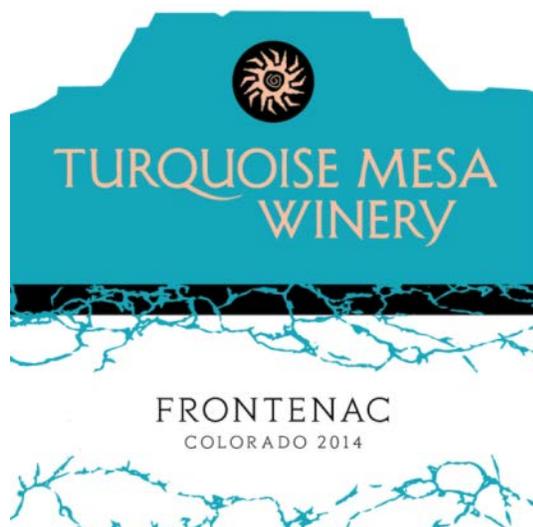


outputted final designs to TMW for TTB label submission.

**Current (Portfolio) Label Design:** Black typography on gray gradient background, with silver-grey metallic “swirls” make for dull, difficult to read front label. Blue metallic “mesa” is not turquoise.

**Design Explorations:** Consultant provided several design options. These included different layouts workable for (Bordeaux and burgundy) bottle shapes, foil color treatments, die-cut shapes, and recommendations for capsule foil colors.

**Output/Results:** New front and back labels for Frontenac, scheduled for a 2016 market introduction, provided to TMW for TTB label submission:



A French hybrid, our **FRONTENAC** is grown by Worden Farms in Burlington, Colorado. This is a full bodied, bold wine with a rich, ruby color that has been aged in Hungarian Oak barrels. Enjoy this wine with roast meats, barbecue, and mushroom risotto, as well as cheddar and Gorgonzola.

Ancient Peoples considered turquoise to be a sacred stone with the power to help one find good and loyal friends. We hope our Turquoise Mesa wine will be shared at your table in good fortune among such friends.

Produced and Bottled by Turquoise Mesa Winery  
11705 Teller Street, Unit C, Broomfield, CO 80020  
303.653.3822 • [www.TurquoiseMesaWinery.com](http://www.TurquoiseMesaWinery.com)

**GOVERNMENT WARNING:** (1) ACCORDING TO THE SURGEON GENERAL, WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS. (2) CONSUMPTION OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS.

ALC 12.5% BY VOL 750mL CONTAINS SULFITES

### 3) Kingman Estates Winery, Denver, CO

**Background:** Kingman Estates Winery (KEW) purchases grapes primarily from Colorado’s Grand Valley. KEW produces and markets a portfolio of wines ranging from single varietal and blends, including use of cold-hardy/hybrid grapes.

**Cold-Hardy Grape Types:** Marquette (Red Blend), La Crescent (White Blend)

**Cold-Hardy Grapes Description** (Source: University of Minnesota): **Marquette** is a cousin of Frontenac and grandson of Pinot noir. It originated from a cross of MN 1094, a complex hybrid of *V. riparia*, *V. vinifera*, and other *Vitis* species, with Ravat 262. Marquette's high sugar and moderate acidity make it very manageable in the winery. Finished wines are complex, with attractive ruby color, pronounced tannins, and desirable notes of cherry, berry, black pepper, and spice on both nose and palate. As a red wine, Marquette represents a new standard in cold hardy viticulture and enology. **La Crescent** combines St. Pepin and a Swenson selection from *V. riparia* x Muscat Hamburg. With this hardy heritage, trunks have survived a frigid -34°F when well cared for in good vineyard sites. La Crescent's intense nose of apricot, peach, and citrus lends itself to superior quality off-dry or sweet white wines. Produced in a Germanic style, La Crescent wine is reminiscent of Vignoles or Riesling. The grape's high acidity provides good structure for excellent dessert or late-harvest style wines.

**Type of Work:** New brand development (*Company visioning, portfolio strategy, new brand identification, focus group, and creative strategy*)

**Work Description:** There were two phases to the project. In Phase 1, consultant conducted a visioning and strategy session with the owners of KEW to review the future vision and portfolio strategy of the winery, and to determine the specific products and packaging for a cold-hardy/hybrid product line. Based on this initial visioning session, it was decided to develop a new box wine (new brand or line extension).

In Phase 2, consultant conducted a focus group with six moderate-to-frequent wine drinkers. The focus group included a variety of ideation exercises, including review of the existing KEW brand and product line and its perceptions, a competitive packaging/positioning sort, and a wine tasting of current La Crescent and Marquette blends. The purpose of the tasting was to determine likely “fit” with the identified box wine concept direction of a *premium/higher priced, 3.0L, KEW-branded reserve blend – one white, and one red*.

**Output/Results:** Once Phase 1 and 2 were completed, consultant recapped findings and provided a BrandVision™ summary, which included creative direction for future design and packaging development:

 <b>Kingman</b> Fine Colorado Wines <i>Brand Summary/BrandBrief™</i>	
<b>ASSIGNMENT</b>	Assist in the development of a new (Kingman-branded or proprietary-named) wine utilizing Colorado-grown cold hardy/hybrid grapes.
<b>OBJECTIVES</b>	Determine brand strategy and creative direction.
<b>STRATEGIES</b>	<ol style="list-style-type: none"> <li>1. Define the brand strategy and communication platform</li> <li>2. Help identify products, blends, package size, target</li> </ol>

**BACKGROUND**

- (frontline) price, consumer target
- 3. Identify distribution, sales, and marketing opportunities
- 4. Identify the brand’s creative strategy (for future/TBD package development)

Kingman Estates Winery is owned by Doug and Karen Kingman, and is based in Denver, Colorado. The Company produces premium, vintage dated, single varietal and blended wines sourced from Colorado and California grapes ranging in price from \$21-\$75. The Company’s wines are segmented (based on price) into three categories: 1) Select, 2) Reserve, and 3) Library.

Wines are branded, “Kingman,” with descriptors that include, “Fine Wines,” “Fine Colorado Wines,” and where appropriate, designated AVA, specifically, “Grand Valley.”

Kingman blended wines include proprietary names such as, “Nefarious Red,” “Marv’lous,” “Felicity,” and “Mysterium.” The Grand Valley AVA Nefarious Red blend is comprised of Cabernet Franc and Merlot (70%), and Marquette (30%), a red cold hardy hybrid. Mysterium is a 50/50 blend of Riesling and La Crescent, a white cold hardy hybrid. Both of these wines have proven consumer acceptance and sales.

Kingman’s wines are sold through its tasting room, online/wine club, and via local wine/spirits retailers and on-premise accounts. The Company would like to expand its distribution profitably and is considering adding additional products and or packaging sizes.

In June 2015, and funded by the Cold Hard/Hybrid Specialty Crop Block Grant awarded to CDA/CWIDB, the Company began working with the BrandWerks Group with the objective of developing a strategic plan for the introduction of a new wine utilizing Colorado-grown cold/hardy hybrid grapes. In June, BrandWerks conducted an initial **visioning and planning session** to review Kingman’s goals, strengths/capabilities, consumer/trade opportunities, and to identify the *specific development opportunity for the cold hardy/hybrid product(s)*. The outcome of this session was that Kingman would plan a new box wine (brand or line extension) introduction.

On July 8, BrandWerks’ John Recca and Doug Kingman visited Topsy’s Liquor World to review (package size, pricing, positioning, imagery, etc.) competitive box wine brands. This provided good learning and initial direction. As a result, we agreed to focus on a 3.0L package size, likely two blends (red, white), and a targeted price point of \$20+.

The box wine category has broad consumer appeal. Key drivers are: adequate to premium quality, convenience/ease of use, longer shelf life, and value. The category is highly segmented by (popular to super-premium) price points and country of origin. The Wine Group (Franzia, Jewelry Box, Fish Eye, etc.), Gallo (Carlo Rossi, Peter Vella), Delicato

	<p>(Bota Box), and Constellation Brands (Black Box, Almaden) dominate the category.</p> <p>Online and in-store research indicates that the category continues to grow, primarily in the premium and super-premium segments. New entrants such as Jewelry Box and Black Box Platinum are selling at \$25 (3.0L). This would seem to indicate an opportunity for Kingman, based on current cost economies/margin requirements, and certainly if “Kingman” branded, given the brand’s equity/perceptions at its established \$21+ 750 ml price level.</p> <p>On November 15, BrandWerks conducted a <b>focus group</b> with six (<i>experienced, frequent wine drinkers and past/current box wine users</i>) consumers at the Kingman Winery. Our objective was to determine the most viable/optimum box wine opportunity consistent with Kingman’s product line, positioning, and owners’ vision.</p>
<p><b>SESSION 1 (Visioning)</b></p> <ul style="list-style-type: none"> <li>• Assessment</li> <li>• Goals</li> <li>• Development Focus</li> </ul>	<p><b>Strengths/Capabilities (Brand)</b></p> <ul style="list-style-type: none"> <li>• Wines: Quality. Better than most Colorado wines. Unique blends</li> <li>• Kingman brand image: Art/artistic, unique, proprietary names elicit feeling, emotion, and a sense of edginess, wonder and adventure. <ul style="list-style-type: none"> <li>○ <b>Mysterium:</b> “Mystery,” “Wonder”</li> <li>○ <b>Nefarious:</b> “Wicked,” “Dark Side”</li> <li>○ <b>Felicity:</b> “Happy,” “Summer”</li> <li>○ <b>Marv’lous:</b> “Incredible Experience”</li> </ul> </li> </ul> <p><b>Weaknesses:</b></p> <ul style="list-style-type: none"> <li>• Sales and distribution <ul style="list-style-type: none"> <li>○ Currently 80% of sales are direct to consumer</li> <li>○ Not much time to develop on- and off-premise distribution.</li> </ul> </li> </ul> <p><b>Box Wine (opportunity, rationale):</b></p> <ul style="list-style-type: none"> <li>• High volume, good margin: Lower price grapes, stainless (no oak aging required), new consumer/consumption (little/no cannibalization)</li> <li>• Could be separate brand, or Kingman branded if targeting higher, premium box wine consumer</li> <li>• Can use out-of-state grapes (in addition to CO vinifera and cold hardy/hybrid)</li> <li>• Start with one red, one white blended wine. Could be variation on Mysterium, Nefarious Red.</li> </ul>

## SESSION 2

### (Focus Group)

- Brand Strategy
- Product Direction
- Marketing Development

### Agenda/Discussion Guide:

- Purpose/Introductions
- Kingman Estates Winery Sort
  - Perceptions, Image
  - Compare Estate Wines vs. Proprietary
- Box Wine perceptions, usage
- Brand Sort
- Tasting (*Nefarious Red, Mysterium*)
- Kingman Ideation
  - Product type, description
  - Size, Pricing
  - Imagery, Personality
  - Features, Benefits
  - Brand Name

### Participants:

- Six participants (3 female, 3 male)
- Ages (approximately, observed): 30-65 (Average @45)
- Wine experience: Drinking wines 4-40 years
- Level of experience: Above average. These were wine enthusiasts
- Type of wines consumed: Broad, mostly drier style table wines. Primarily Vinifera, but some (limited) experience with hybrid varieties.
- Country/region: Primarily CA (e.g., Napa), but some imports.
- Colorado wine consumption: All drink Colorado wines on occasion, e.g., Canyon Wind, Carlson, Grand River (three are regular Kingman customers). One participant works for Republic National Distributing Company (Colorado distributor).
- Package sizes: Primarily 750ml glass bottles, but all had purchased, or occasionally purchase box wines.
- Consumption frequency: 1-2 bottles (per person) per week.
- Purchase price: \$10-\$40/bottle. Average @ \$25 (approximate).

### Kingman Estates Winery (perceptions):

- **Reserve Wines:** “Special occasion, higher experience, notch above, rich/complex, attention to detail (heavier weight bottle, punt, logo art), TLC, limited quantity”
- **Select Wines (white label):** “Clean, no clutter, good contrast/shelf impact, die-cut detail, quality, more for everyday drinking”
- **Select Wines (proprietary names, artist illustration label):** Custom, abstract, artistic, Mouton Rothschild, sophisticated, shows AVA, unique, fresh, appealing, younger consumer, artisan/small batch, more casual/patio/BBQ, impulse, discovery”

### Box Wine Perceptions:

- Just like bottled wine (quality can run the gamut)
- “Cheap” perception, but there are premium wines like Black Box
- Some cost as much as \$28

- Really depends on the brand
- It's convenient. We take on camping/boating trips
- Good value. Quantity discount vs. same number of bottled wines.

**Box Wine Sorting Exercise** (review select box wine brands for positioning, communication, and potential competitive targeting):

- **Peter Vella:** "Unknown, low quality, for parties/gatherings, big/5L, \$20 probably on high side, probably targeted to beginning wine drinkers, says 'delicious' white, which is probably not true, they're trying too hard, don't need to see the refreshing glass of wine on box, that says it's for beginning/value-conscious wine drinkers, doesn't look premium at all"
- **Franzia:** Same as Vella.
- **Almaden** (two versions): Black/gold version looks more premium and doesn't have 'refreshing' glass on package"
- **Fish Eye:** More premium and higher quality, has vintage date and location/appellation, names like Chardonnay are familiar, colors are too bright, looks like soda pop or live savers, probably too sweet, fun, refreshing, summer, beach"
- **Bota Box:** Looks like something generational, I remember the 'bota bag,' recyclable, organic/sustainable, limited appeal, generic, what's the wine like?"
- **Black Box (Red Elegance):** High quality, design is clean, for wine enthusiasts, black and gold looks premium, rich tasting, a good drinkable wine"
- **Black Box (Platinum):** Specific region Central Coast, vintage dated, Appeals to more knowledgeable drinkers, higher price, @\$28, a nice dinner wine, something I'd serve at a dinner party, rich, premium"
- **Jewelry Box:** "Premium blended wine, more information on package-tells you what's in it, brand story sounds like a premium wine back label, talks about how it tastes and what it pairs with, good useful information I need, vintage dates, appellation, no hype, visually appealing, looks very premium, feminine-appeals mostly to women". Along with Black Box Platinum-the most premium of all the box wines"
- **Corbett Canyon:** Middle of the road in terms of quality, uses actual photography, I like the mountains but photography reminds me a little of Franzia/Vella"

**Wine Tasting:** Doug led the group in a tasting of Mysterium and Nefarious Red, both of which contain Colorado-grown cold hardy/hybrid grapes (see "Background," above). Observations, learning:

- The participants seemed to enjoy both wines.
- Estimated value at \$20-\$25/bottle
- General unawareness of La Crescent and Marquette grapes. Neutral perceptions; neither good/bad.

**Recommendations on Product, Pricing, Packaging, Marketing** (group

Participants):

**Product:**

- Red and White blends. Blends are just as good as varietal designations as long as the actual blend is specified.
- Current blend works well and very suitable for a box wine. Participants recommended keeping existing blend, but could be variation.

**Packaging:**

- 3.0L only
- 100% Colorado would be ideal, but not critical
- Must indicate location/appellation, vintage date
- Show blend on front of package (primary display panel)
- Tell a compelling brand story
  - Discuss the “why” of the blend, e.g., Colorado suitability, terroir, growing conditions, etc.
  - Don’t hide the hybrid composition. Make it a story.
  - Describe the taste in wine terms; provide food-pairing suggestions (back/side of box).
- Graphics. Avoid photography. Stick with illustration, e.g., existing Kingman graphics

**Pricing:** TBD, premium

**Branding:**

- Keep as Kingman. No need for a new brand.
  - Already equity/awareness in Kingman
  - Higher price, margin potential
- Possible naming conventions for red and white blends, e.g., “Kingman Reserve Red,” “Winemaker’s Blend,” etc.
  - Doesn’t have to be too “creative”
  - But do not use “Nefarious” or “Mysterium.” Keep those names separate for the 750 ml.

**Target Audience:**

*Demographics:*

- Consumers: Male/female (skew female)
- Age: Broad, generally 25-54
- Income: Equivalent to average wine consumer
- Higher education

*Purchase behavior/usage:* Existing (premium+) box wine consumers. Consumers who (currently or would like to) purchase local, Colorado wines. Usage generally the same as bottled wines, but more opportunities as convenience package. Consumed before, during, or after meals. Served room/cellar temperature, chilled, and over ice. Enjoyed/shared with others.

**Marketing Opportunities** (discuss further if needed):

- Public Relations: Communication, awareness
- Sales/Distribution: Box wine section, outside of Colorado section

**BrandWerks Group Recommendations on Brand & Creative Strategy  
Kingman Estates Winery Box Wine**

<b>BRAND DIFFERENCE</b>	Colorado’s first (and highest quality) box wine
<b>DESIRED PERCEPTIONS</b>	A premium quality, local Colorado wine you can enjoy anytime, anywhere.
<b>BRAND BENEFIT</b>	A new, innovative wine experience
<b>DIFFERENTIATORS</b>	Local/Colorado, unique blends (winemaker’s art), art/artistic (packaging)
<b>BRAND IMAGE</b> <i>(Visual Imagery)</i>	<ul style="list-style-type: none"> <li>• Premium, super-premium</li> <li>• Artistic, art</li> <li>• Contemporary art (abstract, impressionistic)</li> <li>• Clean, inviting</li> <li>• New, different (but comfortable; no “fear factor”)</li> </ul>
<b>BRAND PERSONALITY &amp; CHARACTER</b> <i>(Personification)</i>	<ul style="list-style-type: none"> <li>• Open, approachable, welcoming, honest</li> <li>• Knowledgeable, experienced</li> <li>• Artisan</li> <li>• Innovative, experiential</li> <li>• Elegant, but not too “sophisticated”</li> <li>• Healthy, natural, glowing</li> <li>• Friendly, outgoing, social</li> </ul>
<b>ART DIRECTION</b>	<p><b>Look/Feel</b></p> <ul style="list-style-type: none"> <li>• Clean, purposeful graphics, w/open space, good contrast/shelf impact</li> </ul> <p><b>Graphics:</b></p> <ul style="list-style-type: none"> <li>• Illustration, no photography. Contemporary art (package “suitable for framing” or at least beauty on the counter or dinner table)</li> </ul>
<b>PACKAGING CONSIDERATIONS</b>	<ul style="list-style-type: none"> <li>• <b>3.0L Box Wine</b></li> <li>• <b>Shape:</b> Similar to Black Box, Jewelry Box (tall, narrow, wine bottle-like)</li> </ul>
<b>COMMUNICATION HIERARCHY</b>	<p><b>Front/Primary Display Panel:</b></p> <ul style="list-style-type: none"> <li>• Kingman branded (potential enhancement/variation on current graphics)</li> <li>• Product Name (e.g., “Red Reserve Blend”)</li> </ul>

- Source/Appellation
- Vintage
- Blend composition
- Size, ABV

**Back Panel/Side panels (TBD):**

- Brand Story (Positioning: what makes this wine different, why these specific grapes, features/benefits)
- Government Warning Statement, Contains Sulfites
- UPC
- Company info (contact, website)

#### 4) Talon Winery, Palisade, CO

**Background:** Talon Winery (TW) purchases grapes primarily from Colorado’s Grand Valley. TW produces and markets a portfolio of Vinifera single varietal and blended wines, priced approximately \$15-\$20 per 750 ml bottle.

**Cold-Hardy Grape Type:** Chambourcin

**Cold-Hardy Grapes Description** (Source: Appellation America): Little is known about the exact parentage of Chambourcin. It was a hybrid developed by Joannes Seibel in the Loire Valley of France, based on a number of undetermined native American species and Seibel hybrids. It is not surprising that this high-yielding, cold hardy cultivar has made its way across the pond to the cooler-climate areas of North America. It has been planted in America since the 1970s, where it is found mostly in the Northeast and Midwest, as well as in Canada. It is extremely vigorous and disease-resistant. Chambourcin wines offer expressive herbaceous aromas, combined with excellent structure, a result of their thick skins, high tannins and good acidity. This grape is catching on in the New World, suggesting a promising future.

**Type of Work:** New brand development (*Company visioning, portfolio strategy, product development consulting, new brand/product identification, internal ideation, and marketing/creative strategy*)

**Work Description:** There were two phases to the project. In Phase 1, consultant conducted a visioning session with the owners of TW to review the future vision and portfolio strategy of the winery, and to determine the specific direction for a cold-hardy/hybrid wine. During this phase, consultant worked with the winemaking team and owners to advise on product development. Based on this initial visioning, it was decided to develop a new super-premium blended wine utilizing (100% Colorado Grand Valley AVA) cellared and oak-aged Vinifera grapes and the cold-hardy, disease resistant hybrid, Chambourcin.

In Phase 2, consultant developed the brand strategy, creative direction, and sales and marketing approach/plan. Work included competitive brand research to review and determine potential branding and naming conventions, packaging options (e.g., bottle shapes/colors/styles, ACL applications, capsule options, etc.), and pricing strategies. Consultant developed a list of potential (brand/sub-brand) names and conducted an initial trademark search to assess availability.

**Output/Results:** Once Phase 1 and 2 were completed, consultant recapped findings and provided a summary, below, which included creative direction for future design and packaging development:

	
<b>Product/Brand Summary and Creative Direction</b>	
<b>PRODUCT DESCRIPTION</b>	Red wine blend, including Vinifera “mixed black” grapes and cold-hardy/hybrid Chambourcin
<b>APPELLATION</b>	100% Colorado Grand Valley
<b>VINTAGE</b>	Initial vintage: 2010. Subsequent vintages: 2011, 2012, 2015

<b>POSITIONING</b>	Super premium, Talon Winery branded (but communication hierarchy could/might be secondary to proprietary name)
<b>NAMING</b>	Pending trademark review and application
<b>PRICING</b>	Super-premium (Colorado), \$30 or possibly more
<b>PACKAGING</b>	Bordeaux/Claret bottle, potentially tapered, dark/black, heavy weight, deep punt, ACL, likely one-color.
<b>BRAND BENEFIT</b>	A new, premium Colorado wine experience
<b>DIFFERENTIATORS</b>	Unique blend, Colorado innovation, bold wine tasting experience
<b>BRAND IMAGE</b> <i>(Visual Imagery)</i>	<ul style="list-style-type: none"> <li>• Premium</li> <li>• Minimal</li> <li>• Bold, dark</li> </ul>
<b>BRAND CHARACTER</b> <i>(Personification)</i>	<ul style="list-style-type: none"> <li>• Traditional, maybe “Old World”</li> <li>• Artisan</li> <li>• Male</li> </ul>
<b>SALES &amp; MARKETING</b>	<ul style="list-style-type: none"> <li>• Sales Targets: Tasting room, Off-Premise (SHV, preferred customers and high-end bottle shops), On-Premise: High-end/WTC</li> <li>• Marketing: PR-driven, focusing on industry leadership (unique blends, winemaking technique, allocation, etc.</li> </ul>

**Title: A New Approach to Blending Colorado Wines and Consumer Response  
Final Report from Consumer Surveys by Marco Costanigro and Becca Jablonski**

**Activities Performed:**

The goal of this project is to provide Colorado (CO) grape growers and wineries with information regarding consumer's perceptions of Colorado wines blending *vitis vinifera* and hybrid grapes or wines made exclusively from hybrid varieties.

Following preliminary results from an exploratory survey that was administered during the 2014 Winefest in Palisade, CO, Dr. Marco Costanigro and Dr. Becca Jablonski (Department of Agricultural and Resource Economics, Colorado State University) designed an experiment that captured sensory evaluation and willingness to pay information for Colorado wines using known and unknown grape varieties. [At the start of the experiment, Colorado had a limited number of commercial wineries blending *vinifera* and hybrid grapes or making wines exclusively from hybrid varieties. Accordingly, the experimental design was adopted to capture sensory information and consumer willingness to pay for known and unknown varieties.] They recruited participants during three tastings, once each at two different stores – Wilbur's Total Beverage in Fort Collins, CO (5/23/2015) and Liquormart in Boulder, CO (8/29/2015) – and once at the CO Mountain Winefest in Palisades (9/19/2015). Store and Winefest customers were invited to participate in the tasting when they entered the store or the wine festival on the day of the experiment. They were told that for participating, they would receive a coupon to purchase anything they would like at the store or Winefest for either \$8 or \$12 (randomly drawn). As soon as the shoppers/attendees agreed to participate and answered the demographic questions at the beginning part of the survey, they received their coupon. All participants were told that the coupon was compensation for their time and that they **did not** have to use it in the study. This information also appeared in written form on the survey.

All questions were administered using iPads in the above-mentioned Colorado wine stores and at Winefest. All survey questions were pre-programmed into qualtrics software so that respondents could respond directly online. The qualtrics survey consisted of three parts: demographic information, sensory evaluation, and willingness to pay. The demographic questions included basic information about: age, gender, household income, the importance of different attributes when purchasing food or wine, whether or not the participant came to the store to purchase beer/liquor/wine, when and how often they drink wine, what types of wine they usually consume, usual expenditure on wine, and familiarity with different grape varieties and wine regions.

After the demographic questions, wine store employees poured 1 oz. of four wines for each participant to sample (at Winefest, pouring was done by a member of the Colorado State University team). In the store setting, these wines included a California *vinifera* (known or familiar grape types), a California unfamiliar variety, a Colorado *vinifera* (the same known or familiar variety as from California), and a Colorado unfamiliar variety. At Winefest, there were also four wines, but all were from Colorado and included two familiar *vinifera* and two unfamiliar varieties.

In the experiment, the wines were placed in brown paper bags so that no information on the wine bottle was revealed. Only simplified information about each wine was shared (region and/or variety) so that wine graphics or other non-essential information would not bias response. The goal was to isolate the wine label attributes that are the focus of the experiment – i.e., the origin of the wine, and type of grape. Accordingly, participants in the first half of the experiment knew information only about the grape variety (varieties). Participants in the second half of the experiment were told about both the grape variety (varieties) and the region of origin. Participants were requested to cleanse their palate with water and crackers to take away the taste of the wine in between tastings, and they were not required to consume all of the wine. As participants sampled the wines, they completed the wine evaluation questions (using a simplified Davis scoring sheet) via the qualtrics system using the provided iPad.

For the last part of the survey, participants were asked what they would be willing to pay for each of these wines (here and now). They were asked to express a valuation for the wines they sampled, and told that they would have an opportunity to purchase the wines at these prices.

Using a type of experiment referred to as a multiple price list (MPL), interval dollar amounts were displayed on the qualtrics system. (see figure 1). The MPL is a relatively simple, well-established procedure used to elicit willingness to pay. For each wine, participants see an array of ordered prices in a table, one per row, asking a subject to indicate whether they would pay (“yes” or “no”) such amount for the wine. Prices varied between \$2.99/\$4.99 and \$29.99, with six intervals.

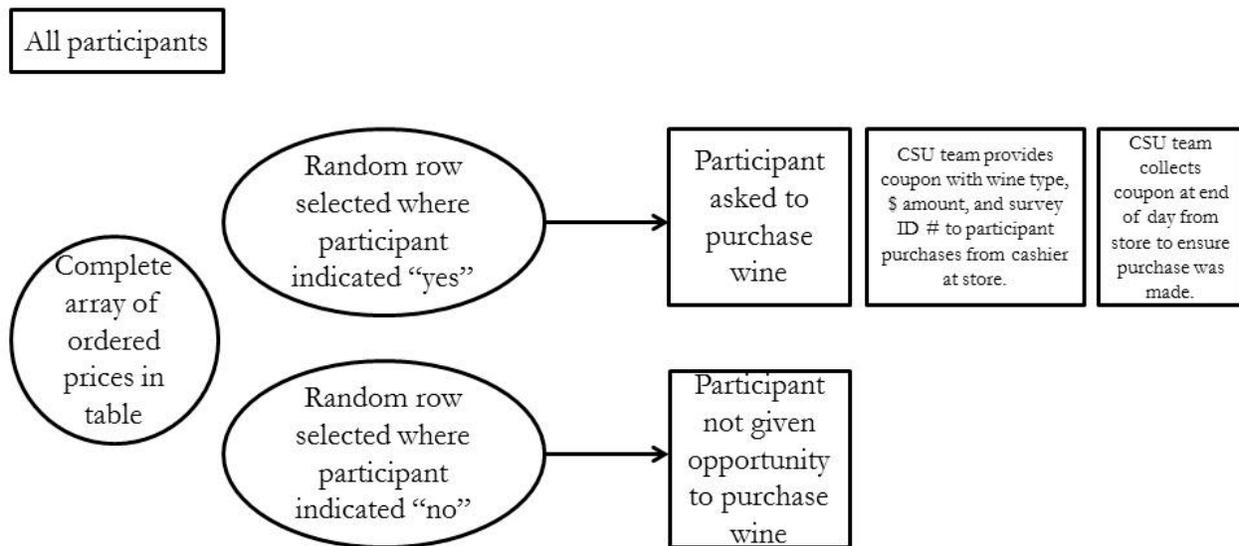


Figure 1: Multiple Price List (MPL) Experiment

Participants were asked to roll two dice. One die was four-sided (each side representing one of the sampled wines), and other die was six sided (each representing one of the price intervals). Whatever combination the participant rolled was implemented – i.e., if the participant rolled wine 4, number 5, and the appropriate box in the table was marked “yes”, they were asked to purchase the wine for the corresponding amount. If the box was checked “no”, the participant did not have the option to purchase the wine as part of the experiment. If the box checked said yes, the participant purchased the wine at the stated prices. The whole procedure was clearly

explained by a member of the Colorado State University team at the beginning of the valuation part of the experiment and then participants were reminded once again about how the procedure worked before they rolled the dice in case they wanted to change their selections

For participants purchasing the wine, the Colorado State University team marked the price on a sealed brown paper bag containing the wine. All transactions were made by the store cashiers at the wine store tastings, or by Colorado Department of Agriculture employees at Winefest.

### Descriptive Statistics

In total, 436 individuals completed the survey and tasting, including: 150 at Wilburs, 172 at Hazel's, and 114 at Winefest. Complete descriptive statistics are included below, by location.

#### Fort Collins (n=150)

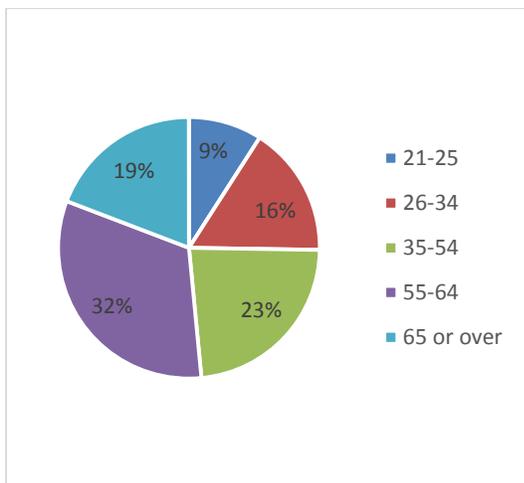


Figure 2: Fort Collins, age of respondent

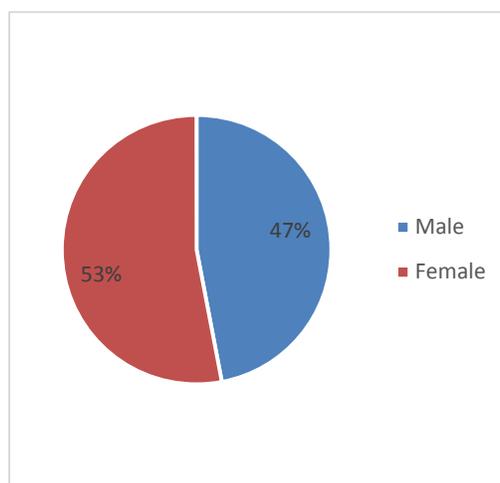


Figure 3: Fort Collins, gender of respondent

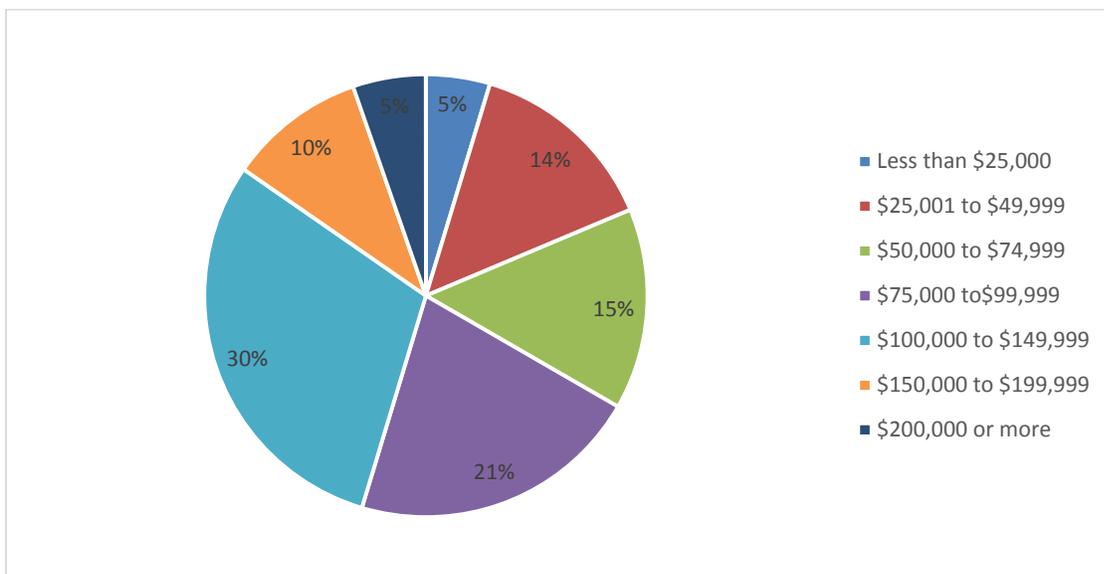


Figure 4: Fort Collins, household income of respondent

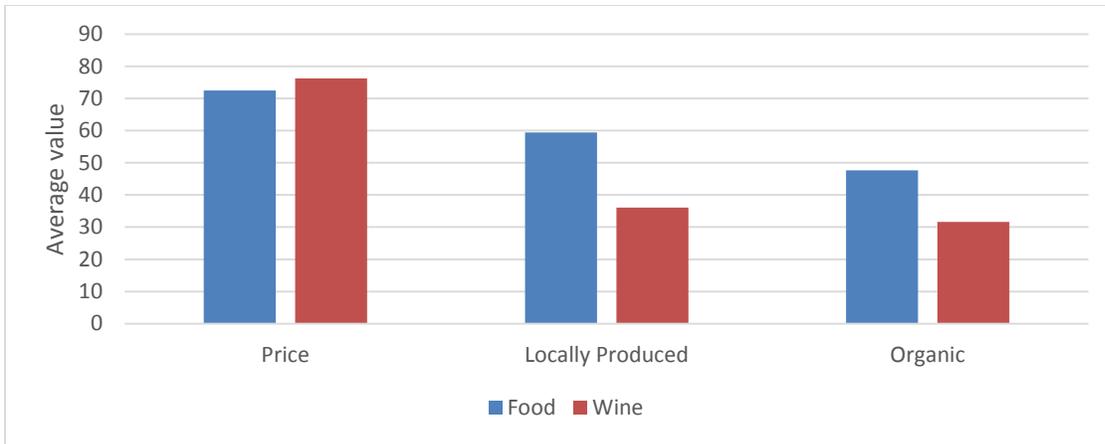


Figure 5: Fort Collins, consumer preference by product attribute

Note: Average value 1= not important, 100= very important

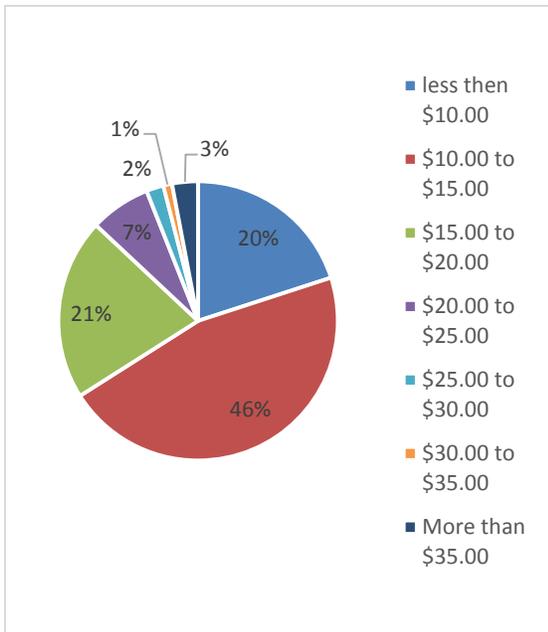


Figure 6: Fort Collins, typical expenditure on 750ml bottle of wine at a liquor store

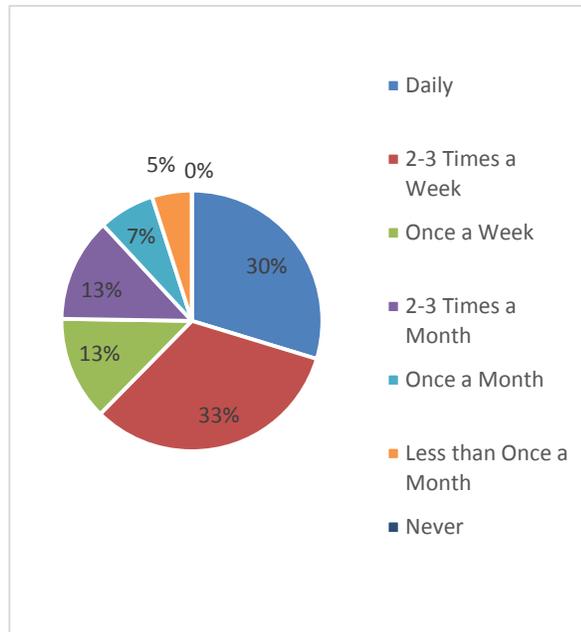


Figure 7: Fort Collins, frequency respondent consumes wine

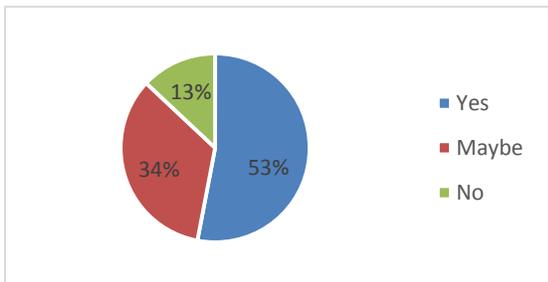


Figure 8: Fort Collins, respondent came to store to buy wine

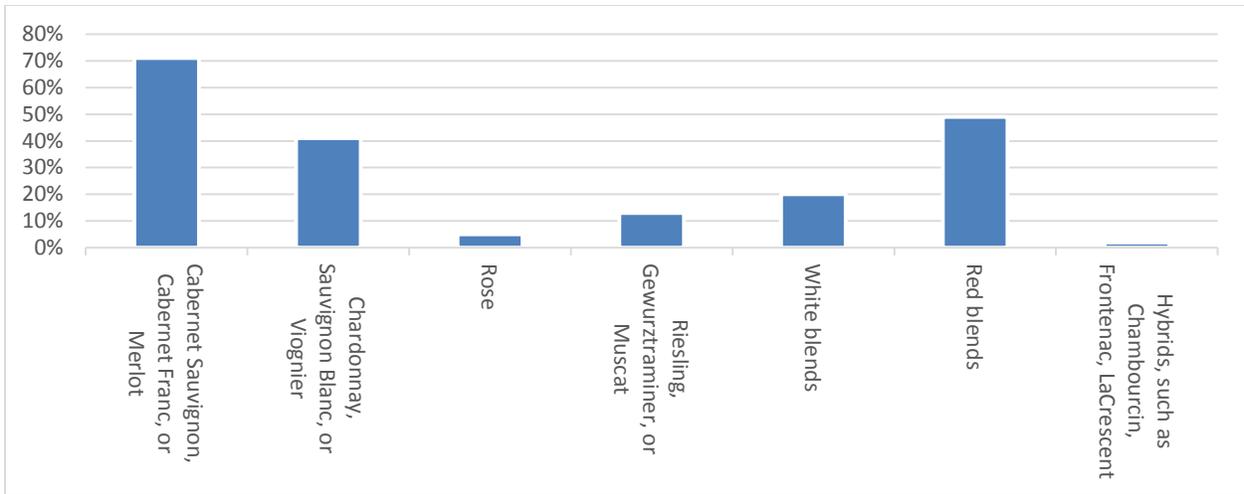


Figure 9: Fort Collins, type(s) of wine respondent normally buys

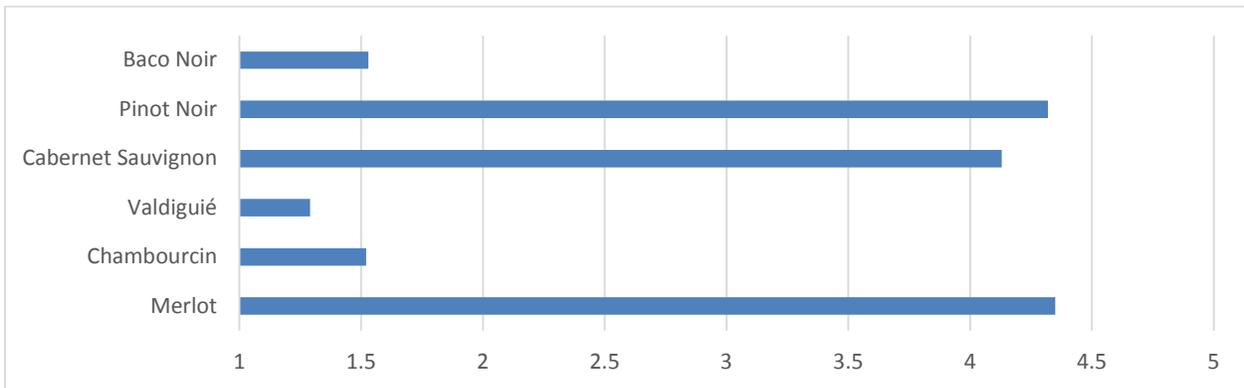


Figure 10: Fort Collins, respondent familiarity with grape variety

**Note: 1= Never heard of it; 2= I have heard the name, but never tasted it; 3= I have tried it once; 4= I have tried it a few times; 5= I consume it routinely.**

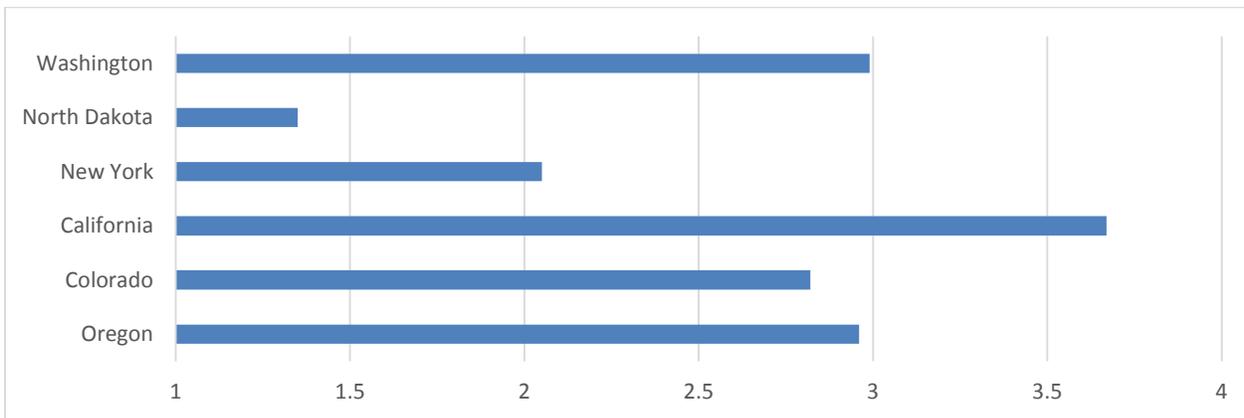


Figure 11: Fort Collins, respondent familiarity with region

**Note: 1= never heard of wines produced in this region; 2= I have heard of wines produced in this region, but never tasted them; 3= I have tasted wine produced in this region; 4= I consume wines produced in this region routinely**

Boulder (n=172)

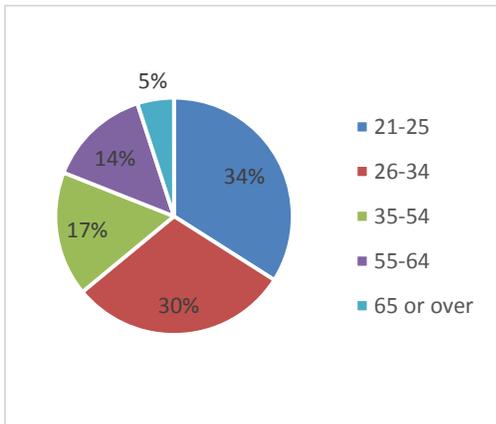


Figure 12: Boulder, age of respondent

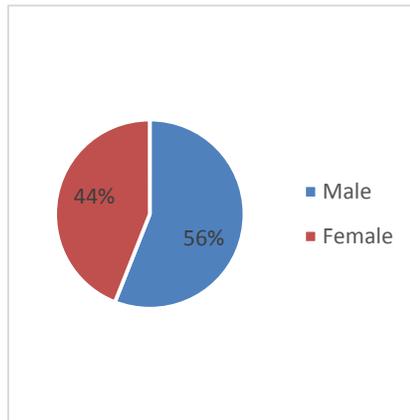


Figure 13: Boulder, gender of respondent

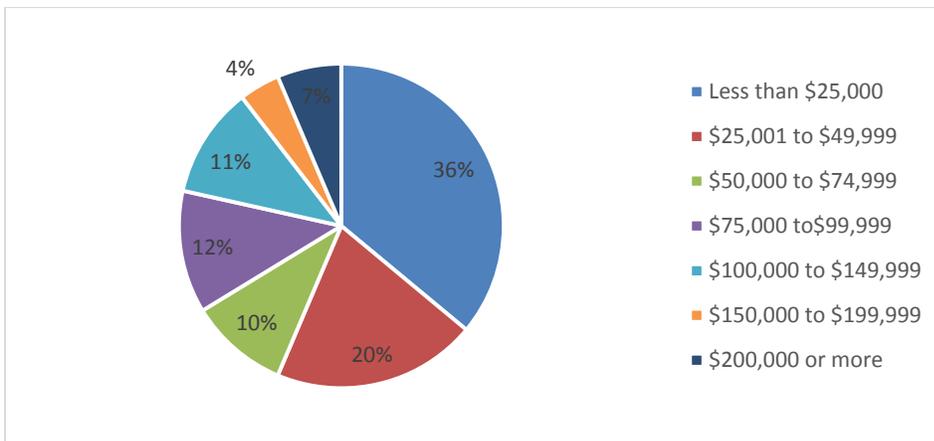


Figure 14: Boulder, household income of respondent

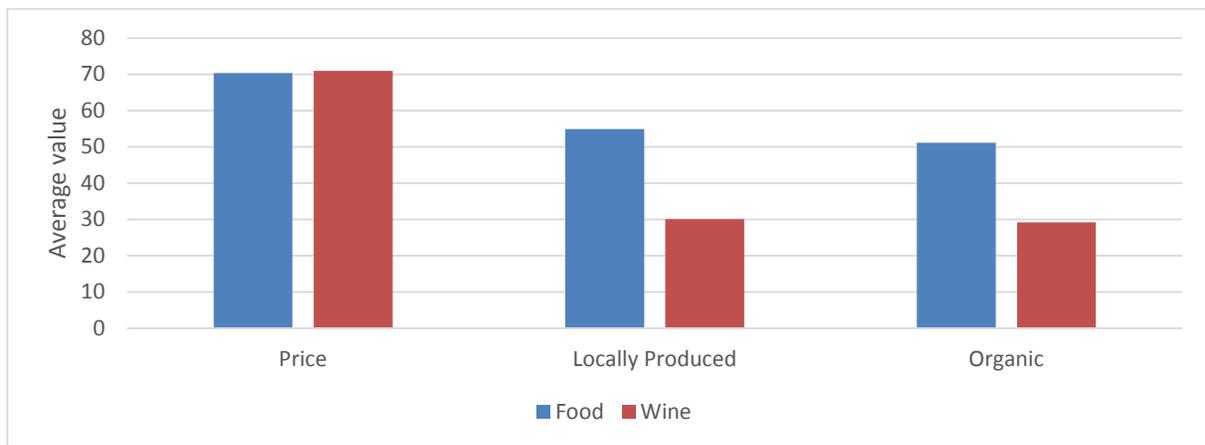


Figure 15: Boulder, consumer preference by product attribute

**Note: Average value 1= not important, 100= very important**

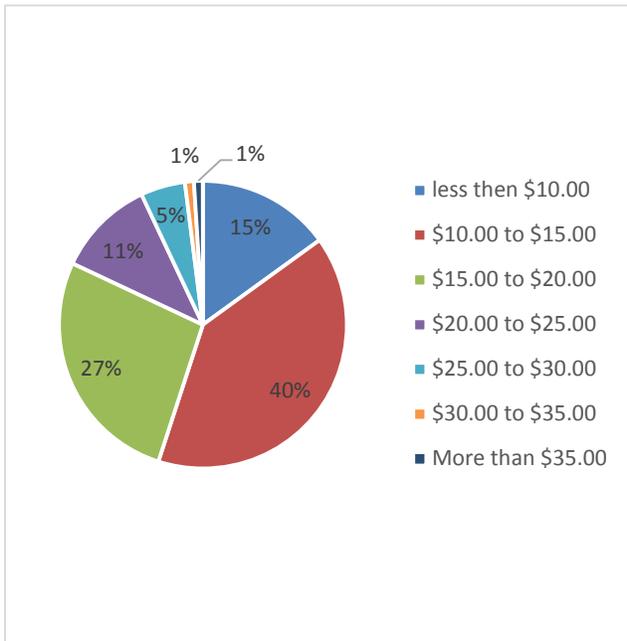


Figure 16: Boulder, typical expenditure on 750ml bottle of wine at a liquor store

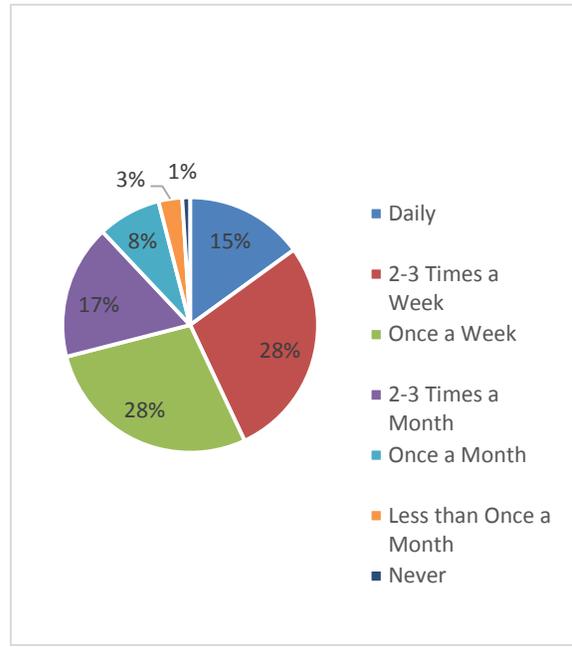


Figure 17: Boulder, frequency respondent consumes wine

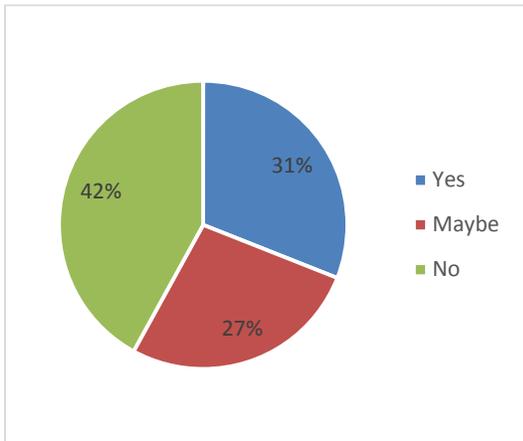


Figure 18: Boulder, respondent came to store to buy wine

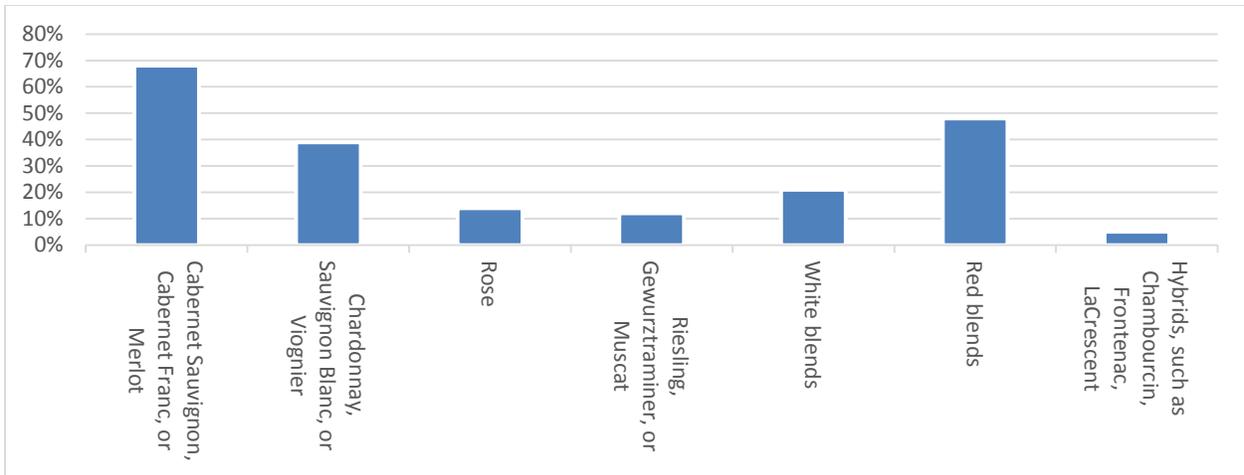


Figure 19: Boulder, type(s) of wine respondent normally buys

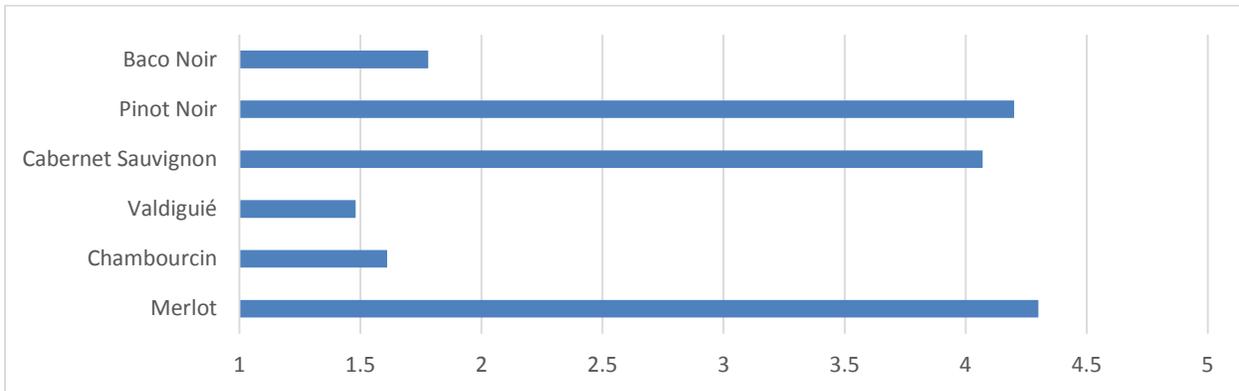


Figure 20: Boulder, respondent familiarity with grape variety

**Note: 1= Never heard of it; 2= I have heard the name, but never tasted it; 3= I have tried it once; 4= I have tried it a few times; 5= I consume it routinely.**

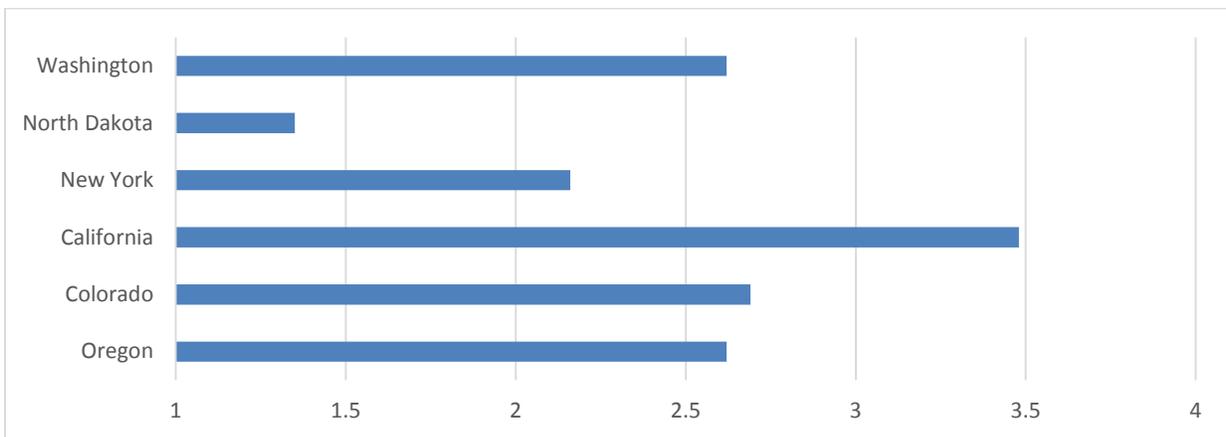


Figure 21: Boulder, respondent familiarity with region

**Note: 1= never heard of wines produced in this region; 2= I have heard of wines produced in this region, but never tasted them; 3= I have tasted wine produced in this region; 4= I consume wines produced in this region routinely**

Winefest (n=114)

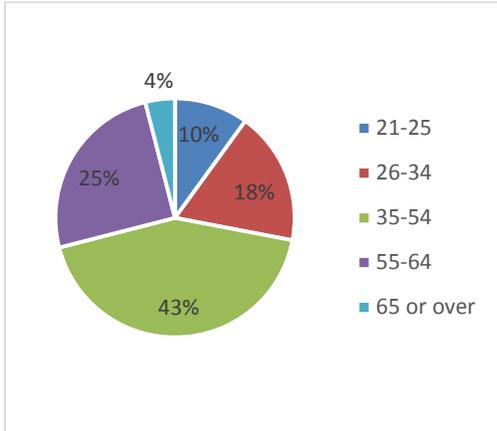


Figure 22: Winefest, age of respondent

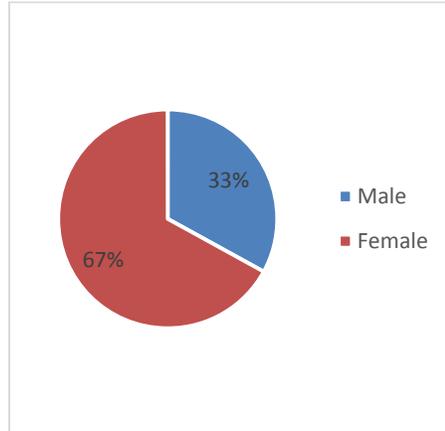


Figure 23: Winefest, gender of respondent

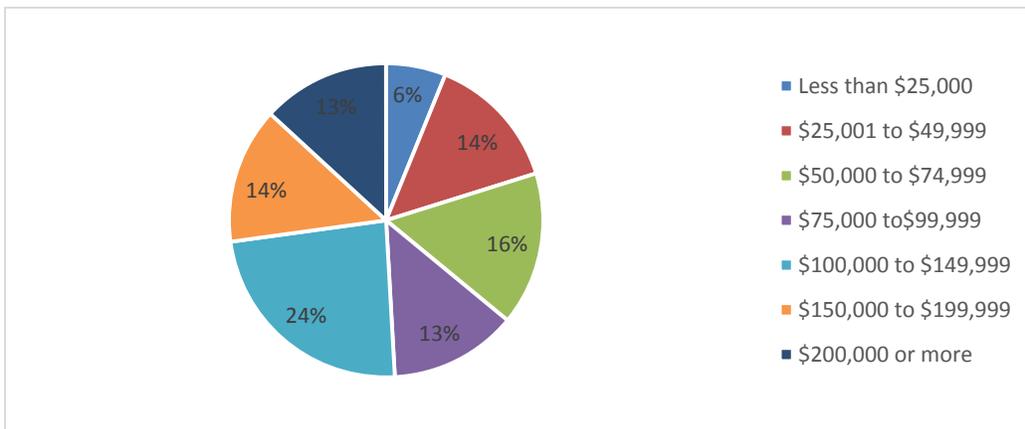


Figure 24: Winefest, household income of respondent

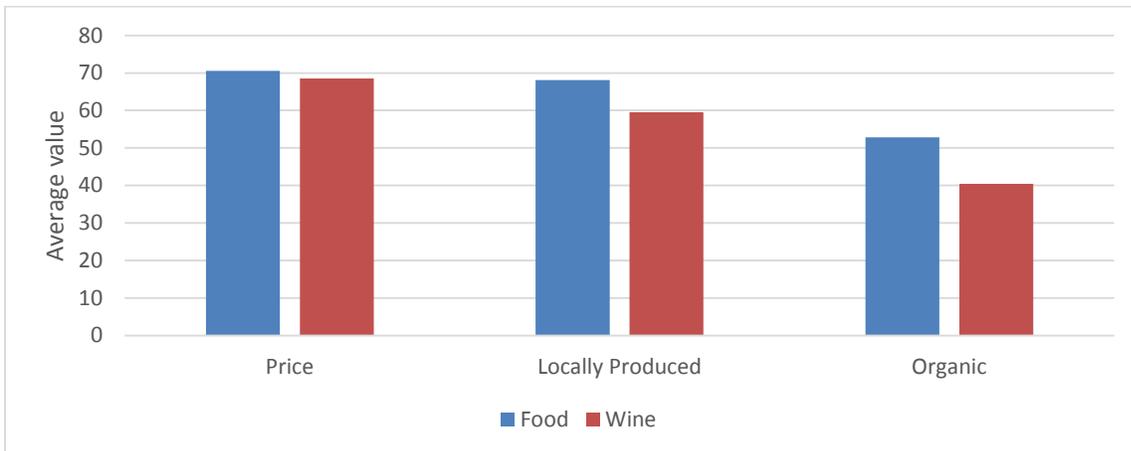


Figure 25: Winefest, consumer preference by product attribute

**Note: Average value 1= not important, 100= very important**

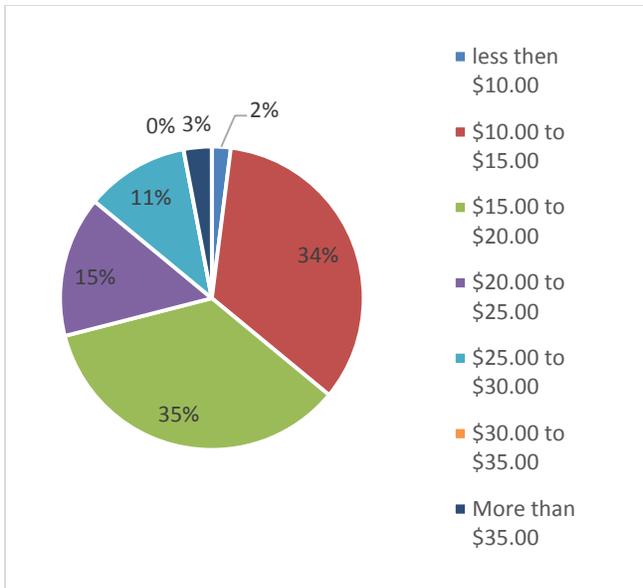


Figure 266: Winefest, typical expenditure on 750ml bottle of wine at a liquor store

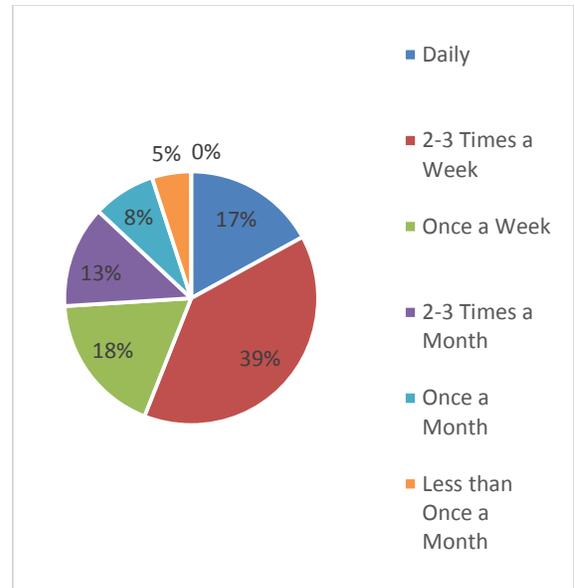


Figure 277: Winefest, frequency respondent consumes wine

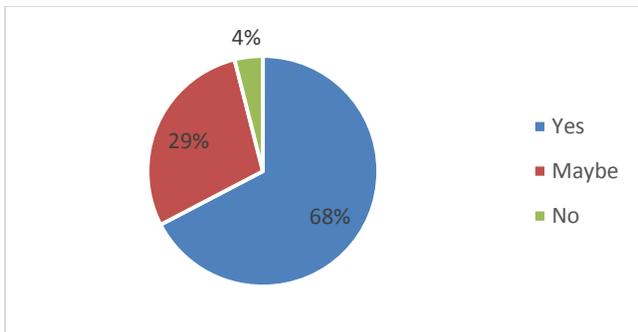


Figure 28: Winefest, respondent came to Winefest to buy wine

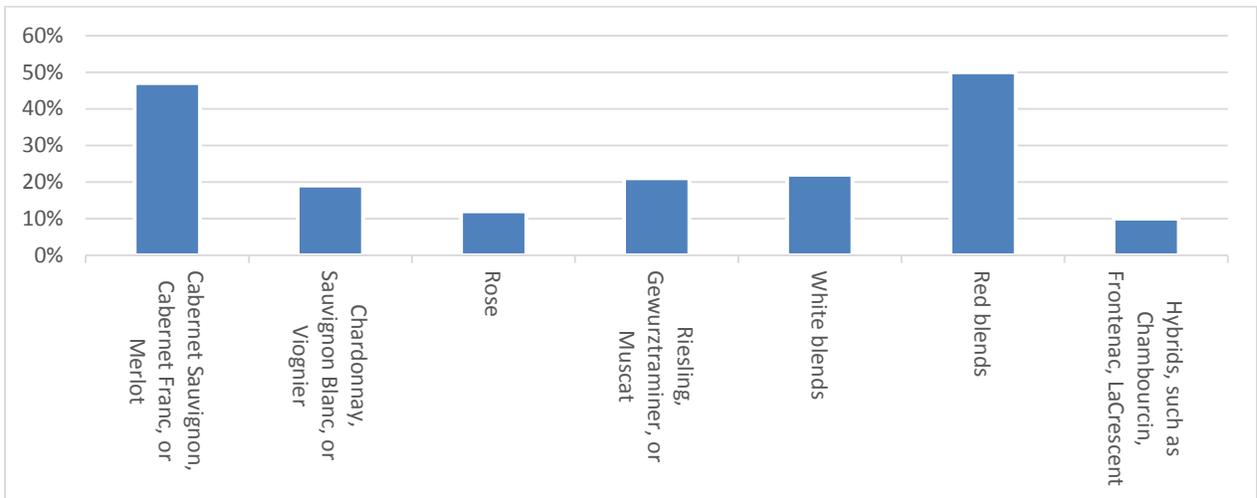


Figure 29: Winefest, type(s) of wine respondent normally buys

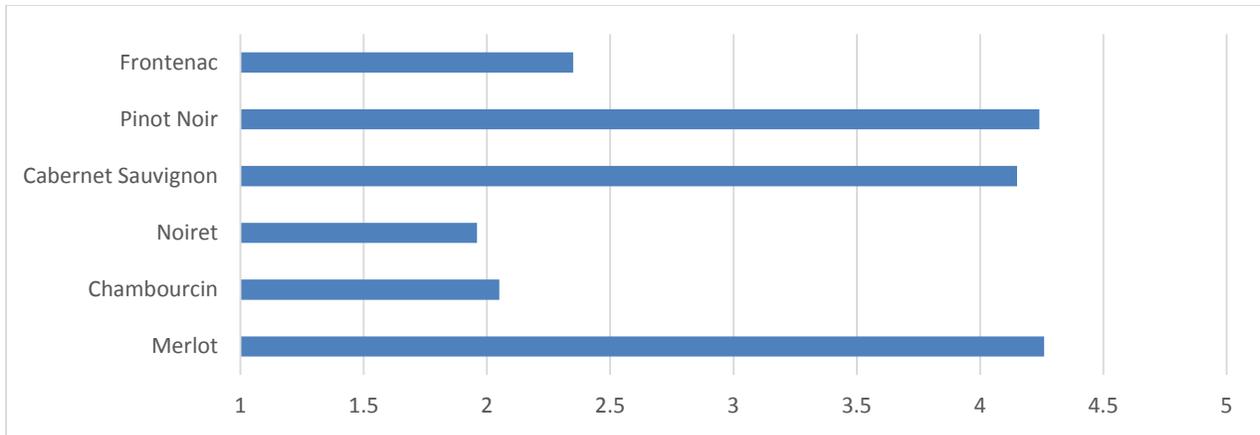


Figure 30: Winefest, respondent familiarity with grape variety

**Note: 1= Never heard of it; 2= I have heard the name, but never tasted it; 3= I have tried it once; 4= I have tried it a few times; 5= I consume it routinely.**

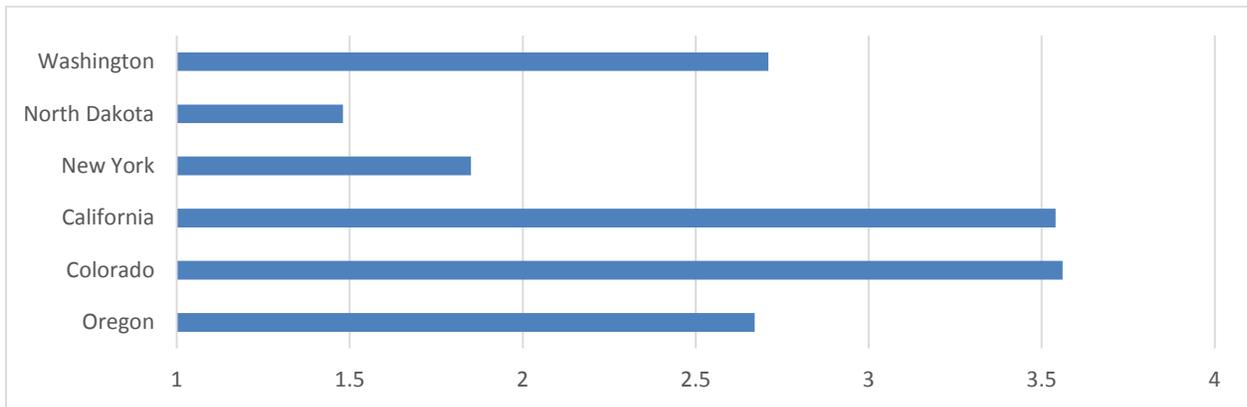


Figure 31: Winefest, respondent familiarity with region

**Note: 1= never heard of wines produced in this region; 2= I have heard of wines produced in this region, but never tasted them; 3= I have tasted wine produced in this region; 4= I consume wines produced in this region routinely**

## Summary of Significant Results:

- Willingness to pay varies significantly by location, with respondents willing to pay the most overall for Colorado wine at Winefest. This suggests that wine festivals, or venues specifically promoting Colorado wines, may be the most appropriate place to test consumer interest in and demand for new or unfamiliar varieties, such as hybrids.
- If only results from survey respondents that a) are red wine drinkers, b) came to the store or wine festival to purchase wine, and c) have a willingness to pay above zero are included, the average willingness to pay for all of the sampled wines ranged between \$8.06-\$12.71 in the Fort Collins store, \$9.06-13.88 in the Boulder store, and \$10.66-\$15.27 at Winefest. Note that these willingness to pay values may be lower than expected due to the fact that the survey design specifically asked what consumers were willing to pay *here and now* for the wine, as opposed to at some hypothetical point in the future. Complete willingness to pay results broken down by information treatment (if the respondent knew the varietal only or varietal and region of the wines they tasted) are included in the table.
- Consumers slightly preferred the overall taste of California wines compared to Colorado wines, regardless of varietal or whether or not they knew the region from which the wine was produced. Given consumers are very familiar with both the region and taste of California wines (see descriptive statistics above), this result is to be expected.
- Taste is the strongest determinant of respondent willingness to pay. Accordingly, regardless of the varietal, the fact that the overall taste of the wine is appealing to consumers is very important and will significantly impact willingness to pay.
- **In liquor store settings, respondents were significantly more likely to be willing to pay more and rank the overall taste higher for Colorado wines with unknown varietals compared to known varietals.** It appears that respondents felt California was the leader in wines made with well-known *vinifera* grapes such as Cabernet Sauvignon and Merlot, and thus the perception was California could produce wines with those grapes better (and perhaps more affordably) than Colorado. The fact that in-store respondents reported both higher willingness to pay and better overall taste for Colorado wines, suggests that they were interested in trying something out of the ordinary. **This finding points to opportunities for a Colorado wine industry interested in diversifying the varieties of grapes it uses to form an identity distinct from that of more well-known regions, including utilizing hybrid varieties.**

In direct response to the project's goal to provide grape growers and wineries with information regarding consumer's perceptions of Colorado wines blending *vinifera* and hybrid grapes or wines made exclusively from hybrid varieties, results show that there is opportunity for these wines – particularly compared to CO wines using familiar/*vinifera* grapes. Though in the Winefest setting consumers are willing to pay more for Colorado wines generally, as most wine is sold through wine stores, the ability to capture consumer interest in the primary wine outlets and among many competing choices is important. By

using unknown grape varieties, CO producers may have an opportunity to set themselves apart from other more established wine regions.

Table 1: Willingness to pay, by information treatment (region and known/unknown varietal)

		Colorado wine		California wine		Known varietal		Unknown varietal		Colorado known varietal		Colorado unknown varietal		California known varietal		California unknown varietal	
		WTP_low	WTP_high	WTP_low	WTP_high	WTP_low	WTP_high	WTP_low	WTP_high	WTP_low	WTP_high	WTP_low	WTP_high	WTP_low	WTP_high	WTP_low	WTP_high
Store: Fort Collins	n	83	83	91	91	85	85	89	89	40	40	43	43	45	45	46	46
	mean	\$ 7.93	\$ 12.46	\$ 8.18	\$ 12.94	\$ 7.87	\$ 12.52	\$ 8.24	\$ 12.89	\$ 7.74	\$ 12.09	\$ 8.11	\$ 12.80	\$ 7.99	\$ 12.90	\$ 8.36	\$ 12.97
	med	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99
	sd	3.739536	3.771968	4.618591	4.902069	3.861938	4.05788	4.535919	4.707453	3.621517	3.1849	3.88041	4.255281	4.100998	4.704071	5.113636	5.140208
Store: Boulder	n	31	31	40	40	31	31	40	40	12	12	19	19	19	19	21	21
	mean	\$ 8.51	\$ 13.34	\$ 9.49	\$ 14.29	\$ 8.76	\$ 13.54	\$ 9.29	\$ 14.14	\$ 8.41	\$ 12.99	\$ 8.57	\$ 13.57	\$ 8.99	\$ 13.88	\$ 9.94	\$ 14.66
	med	\$ 7.99	\$ 11.99	\$ 8.99	\$ 13.49	\$ 7.99	\$ 11.99	\$ 8.99	\$ 13.49	\$ 8.99	\$ 13.49	\$ 7.99	\$ 11.99	\$ 7.99	\$ 11.99	\$ 9.99	\$ 14.99
	sd	4.753041	4.983629	4.212314	4.71332	4.594995	4.856876	4.38061	4.83868	5.03548	4.842989	4.705975	5.188832	4.422166	4.965377	4.067876	4.564355
Winefest: Palisades	n	134	131			68	67	66	64	68	67	66	64				
	mean	\$ 10.66	\$ 15.27			\$ 11.49	\$ 16.06	\$ 9.82	\$ 14.44	\$ 11.49	\$ 16.06	\$ 9.82	\$ 14.44				
	med	\$ 10.00	\$ 15.00			\$ 12.00	\$ 15.00	\$ 10.00	\$ 13.50	\$ 12.00	\$ 15.00	\$ 10.00	\$ 13.50				
	sd	6.110442	6.134172			6.552868	6.651226	5.5412	5.471064	6.552868	6.651226	5.5412	5.471064				

Note: Only includes red wine drinkers, customers who came to the store/wine festival to purchase wine, and those with a low willingness to pay >0

Table 2: Overall taste, by information treatment (region and known/unknown varietal)

	Store: Fort Collins				Store: Boulder				Winefest: Palisades			
	n	mean	med	sd	n	mean	med	sd	n	mean	med	sd
Colorado wine	256	3.23	3.2	0.84	286	3.25	3.2	0.87	332	3.46	3.5	0.88
California wine	256	3.49	3.5	0.76	286	3.70	3.8	0.75				
Known varietal	256	3.37	3.4	0.76	286	3.37	3.4	0.85	166	3.47	3.5	0.89
Unknown varietal	256	3.35	3.4	0.86	286	3.58	3.7	0.83	166	3.45	3.5	0.88
Colorado known varietal	128	3.20	3.1	0.82	143	3.09	3.1	0.89	166	3.47	3.5	0.89
Colorado unknown varietal	128	3.26	3.3	0.86	143	3.41	3.3	0.82	166	3.45	3.5	0.88
California known varietal	128	3.54	3.5	0.65	143	3.66	3.7	0.69				
California unknown varietal	128	3.44	3.4	0.85	143	3.75	3.9	0.80				

Note: Only includes red wine drinkers  
Taste scored as follows: 1= low, 5= high

## **Final Report: Introducing and Emphasizing Specialty Potatoes (Non-Russet) at the PMA Trade Show – 2015**

**Partner Organization: Colorado Certified Potato Growers Association (CCPGA)**

### **Project Summary**

Colorado Certified Potato Growers Association (CCPGA) exhibited at the Produce Marketing Association (PMA) show in Atlanta, Georgia in October 2015. Our objective was to promote Colorado potatoes and our growers. We introduced buyers to 50+ different cultivars of Colorado potatoes and showcased the different characteristics of each cultivar and educated buyers on how these cultivars would enhance their business, in hopes of convincing them to buy our products.

The desire for specialty potatoes has never been greater. The russet market continues to decline, while the specialty market continues to grow. With Colorado harvesting over 200 different cultivars in 2015, there has never been a better opportunity to display our many potato cultivars than at PMA where buyers, growers, and the public from all over the world can see what Colorado has to offer. This will allow the potato industry to think “Colorado” when they need potatoes. The increase in sales of specialty potatoes will benefit over 35 Colorado seed potato growers along with numerous Colorado commercial growers. With an oversupply of russet potato, prices have dropped sharply, hurting our growers. Specialty potatoes have held their price better and it is critical that we grow this market.

### **Project Purpose**

The purpose of this project was to introduce to those that come to the CCPGA booth to the wide variety of specialty potatoes that Colorado produces and how those specialty potatoes can be used in their various businesses to increase their sales, and to demonstrate to the potato industry that Colorado is their one stop shopping for specialty potatoes. Colorado currently has over 200+ different varieties of potatoes to offer to the industry.

### **Project Activities**

**Develop theme/concept for the trade show, incorporating any new design and/or promotional elements. Establish budgets and coordinate with the trade show organizer to finalize exhibit space needs and location.** Three months before PMA, Kent Price and the Promotion Committee, David Holm and Preston and Roxie Stanley planned how the booth would be set up and the number of potato cultivars that would be shown. The concept for our booth was developed and approved by the Promotion Committee under the direction of Chairman Kent Price. Many people played a part in this process. The budget was approved by the Promotion Committee and the CCPGA Board.

The pavilion exhibit space was organized by the Colorado Department of Agriculture. CCPGA was part of the Colorado Pavilion.

Preston Stanley, manager of the CCPGA, met with David Holm, potato plant breeder, at least a month before PMA and discussed in detail the type of specialty potato cultivars that would be displayed at the show.

One month before PMA, all the furniture was ordered, it was re-confirmed who would be staffing the booth, and CCPGA coordinated with the Colorado Department of Agriculture (CDA) as to the final touches.

**Begin recruitment of producers for exhibiting at the trade show and begin work with contractor to build out display.** The building of the display was under the direction of the Promotion Committee and the CCPGA Manager along with the plant breeder, David Holm. The CCPGA manager asked at the June CCPGA Board Meeting if any of the growers were considering going to PMA. Doug Gunnels and Sheldon Rockey indicated that they would like to go and help at the booth. They are both specialty growers, and it was a great asset to have them at the booth to answer questions about specific cultivars. Between the two of them, they grow over 25 specialty potatoes including such cultivars as the Banana, Purple Majesty, Masquerade, Carola, Red Gold, Desiree, Yellow Finn, and many, many more.

The building of the booth display involved discussing with our potato plant breeder David Holm the hundreds of specialty potatoes grown on the research farm and deciding which ones would be the best to display at PMA. CCPGA manager Preston, and his wife Roxie went over how the cultivars were to be displayed and what decorations would be used at the booth to make it attractive. New decorative table cloths were purchased along with additional baskets which the potatoes were displayed in.

**Build out of display by contractor and coordinate logistics with exhibitors.** The building out of the display was done by the CCPGA Manager and the logistics were again coordinated with the Colorado Department of Agriculture. As the CCPGA booth was part of the Colorado Pavilion, the larger structure around the booth was built by the contractor GES, and used panels depicting Colorado and displaying Colorado specialty crops.

The CCPGA manager went over the PMA agenda with Doug Gunnels, Madison Gunnels, and Grant Mattive one week before the show as to when they needed to be there, what their job would be when at the booth, and how to evaluate the customers for the booth evaluation. Grant Mattive had never been to a PMA before, so he needed additional in-service as to how to run a booth.

**Finalize all show logistics and shipping of product and materials. Supervise trade show set up, conduct briefing for exhibitors, and attend to exhibitor needs during the show. Oversee the breakdown of the display and any return shipments.** The CCPGA manager transported all products to the show by van. This transportation is done by van because other shipping methods have proven unreliable in keeping the potatoes at a stable temperature that prevents deterioration at the trade show.



Setup of the booth was accomplished by the CCPGA Manager and his wife, Preston and Roxie Stanley. Staffing of the booth during the show were Doug Gunnels, (potato grower), Mattie Gunnels, (potato grower), Grant Mattive, (potato grower), and Roxie and Preston Stanley, CCPGA Manager.

Before the opening of PMA, the CCPGA manager conducted a briefing of booth staff on what we were trying to accomplish at the booth and how to record the results of customer inquiries on the tally sheet. The booth staff was to educate the customer on the different types of specialty potatoes displayed, the strength and weakness of each cultivar, find out what brought them to the booth, take orders, let them know that all these cultivars were grown in Colorado and are available, and hand out our web-site card as to how to contact us. With five staff members manning the booth, it allowed everyone to take breaks as necessary and meet with interested individuals on a one to one basis as needed.

CCPGA did an excellent job educating the buyers about our specialty potatoes as we had three growers, Doug Gunnels, Mattie Gunnels, Grant Mattive, and the CCPGA Manager and his wife, Preston and Roxie Stanley, who were all helping at the booth.

Most people who came to the booth said that they never knew that such a variety of specialty potatoes existed, especially in Colorado. The booth displayed over 50 varieties of potatoes displayed and 40+ of them were of the specialty variety.

The breakdown of the booth was completed by those that had staffed the booth, with the addition of David Tonso and John Addison.

## Conduct follow-up survey of exhibitors and develop final report.



The CCPGA manager interviewed each of the staff at the CCPGA Booth for an evaluation of PMA 2015. Grant Mattive could not believe the diversity and number of people that were at PMA and what an opportunity it offered to the CCPGA. He commented that retailers were present, buyers, seed growers, and just public people interested in potatoes and the many varieties that are available came to the booth.

Doug Gunnels felt that show was extremely beneficial to him, his business, and CCPGA due to the number of contacts, both his and others, that came to the booth looking for the newest or hottest potato on the market and how they can use it to increase their business.

Madison Gunnels, (CCPGA grower) felt that PMA is a great place to educate the customer as to the specialty market of potatoes and let the people know that Colorado can be their one stop shopping for these specialty cultivars.

The manager, Preston Stanley, completed the survey sent out by the Colorado Department of Agriculture, and presented the CCPGA Board the final report as to the success of PMA 2015, noting the comments of the staff listed above along with the pros and cons of the show.

## Goals and Outcomes Achieved

Goal	Performance Measure	Goal	2015
To educate companies on the varieties of potatoes grown and available in Colorado	Number of qualified leads generated and passed on to our growers.	20	25

Our measurable outcome was to educate buyers at the booth and move them from the interested category to the buying category, acquiring at least 20 new companies, buyers, or growers wanting to purchase Colorado Certified Seed Potatoes.

The benchmark we set was to have at least 20 qualified leads for our growers. This benchmark was reached on qualified leads. CCPGA Growers Sheldon Rockey and Doug Gunnels, who helped staff the booth, determined that we generated 25 leads and there is a great possibility that a good amount of sales could result from these qualified leads. The amount of sales will only be known down the road as orders begin to come in.

We developed a tally sheet which recorded the number of people that attended our booth and what they were specifically looking for. We had recorded on the tally sheet over 553 people

stopping at the booth, which gave us a chance to educate them and find out what their interest was with potatoes. There were some people were not recorded on this tally sheet, because we were so busy, but booth staff interacted with everyone and always asked them what their interest was in potatoes. Especially the first day, we were extremely busy with people at our booth. We estimated that we had at least 900+ people stop at the booth with questions, interest, and just curiosity. Many people stopped, took pictures, and asked questions about our potatoes which gave us a great opportunity to educate them. Many that came to the booth were not prospective buyers, but consumers of the product. Their interest and the education we were able to provide to them will benefit our industry over a period of time.

### **Beneficiaries**

The increase in sales of specialty potatoes will benefit over 35 Colorado seed potato growers along with numerous Colorado commercial growers. CCPGA growers Doug Gunnels and Grant Mattive were at the booth and they both made several contacts for future specialty potato contracts. Not only did these two growers profit from this business, but the entire CCPGA Association profited by making the buyers aware of what Colorado has to offer on the specialty line, and the Colorado potato industry will benefit from increased demand. The economic impact will not be known for several months, but it looks like it could be considerable. A potato buyer from one of the largest retailers in Canada has indicated that she will be purchasing many of our specialty lines for her stores.

### **Lessons learned**

PMA 2015 was definitely a success for the Colorado Certified Potato Growers Association. The exposure that we get at PMA cannot be duplicated anywhere due to the wide variety of countries, people, companies, buyers, and growers that attend. It is the only trade show where there is such a diverse audience.

One thing that could be improved at the booth is the recording of customers visiting and what brought them to the booth. We all felt that just having one person keeping the tally and information sheet and not having any other assignments would help keep track of the total number of people that attended our booth and the reason they came to the booth. So much of the time, especially the first day when we were very busy, we never thought to record the results on the tally and information sheet. Sometimes it was difficult to say exactly how many customers had visited in a specific time period, and an educated guess was made. Everyone working at the booth experienced this at some point in time when the booth had a great number of customers visiting. We figured that we had 25 qualified prospects for the two days of PMA.

The 2015 CCPGA booth at Atlanta Georgia PMA was successful. We had many qualified buyers at the booth, and educated all visitors that came to the booth about Colorado Certified Specialty Seed Potatoes. When the customer left our booth, they had a very good knowledge about our specialty potatoes and how they can obtain them for their use.

The main buyer for a major natural retail chain came by our booth and indicated that they would like to have some samples sent to them for consideration. A follow-up has already taken place with additional follow-up to take place in the near future. We are hoping to have some of our

growers visit with her in December at the New York vegetable show. Sheldon Rockey will be attending and we hope to have a sit-down with her about moving forward with Colorado Specialty Potatoes.

We also had interest from another major retail produce buyer about setting up some type of relationship with our Colorado growers to look at purchasing some specialty lines for their stores. We are in the process of following up with him.

Along with these two excellent prospects, we had several Canadian produce buyers come by and indicate interest in our specialty potatoes. I have Andre Cote, our Canadian representative, following up with them.

The first day at the Atlanta Georgia PMA was definitely one of the very best we have attended. We are certainly encouraged that we can land a couple of these big accounts. Without us being there, we would have missed this opportunity.

**Contact Person**

Preston Stanley  
Colorado Certified Potato Growers Association  
PO Box 267  
Monte Vista, CO 81144  
719-274-5996  
[ccpga151@gmail.com](mailto:ccpga151@gmail.com)

## **Final Report: Better harvest and wine making decisions through detailed berry and must chemical analysis**

**Project Partner: Colorado State University**

### **Project Summary**

This project aimed to provide Colorado grape growers and wineries with more detailed information on pre-harvest berry juice components as well as harvest must composition. The geographic separation between wineries (predominantly located along the Front Range) and vineyards (>95% of crop produced in Western Colorado) creates challenges when it comes to determining the optimum timing for grape harvest as most grape growers do not have the equipment to perform even basic pre-harvest fruit quality analyses. In fact, due to their small scale, the majority of Colorado wineries do not have the laboratory equipment to perform those tests on musts once grapes have been harvested, transported, and crushed. A small number of wineries send must samples to out-of-state commercial laboratories, however most wineries do not due to high costs (>\$100/sample). With only limited information on must composition many winemakers might make must additions such as yeast nutrients and acids that are either insufficient or excessive, both potentially leading to problems with fermentation and lower final wine quality. In response to industry requests, Colorado State University's Viticulture Program at the Western Colorado Research Center has offered a basic grape juice analysis service to growers/wineries since 2004. For most Colorado wineries this is the only way to receive information on basic juice composition prior to harvest, and several local wineries also use the service for must analysis. Due to equipment limitations the service covered only the most basic grape juice parameters (pH, soluble solids, titratable acidity), leaving out a range of other parameters [glucose, fructose, nitrogen (alpha amino N plus ammonia), tartaric/malic acid ratio, volatile acid] that are very important to know from a winemaking perspective.

An OenoFoss analyzer, special equipment used for analyses of must and wine, was purchased by Colorado State University with partial funding through USDA SCBG funds to expand the analysis services available to the Colorado grape and wine industry. The OenoFoss analyzer was installed at CSU's Western Colorado Research Center in late August 2016 and used during the 2015 and 2016 grape harvest seasons to analyze grape juice and must samples. A total of 2,368 analyses were performed between late August 2015 and early November 2016. This total is comprised of 1,806 grape juice samples, 187 samples of must under fermentation, and 375 samples of finished wines. The total includes samples used as duplicates, instrument checks, and calibration. The total number of samples analyzed far exceeds the project target of 1,000 (500 samples each for the 2015 and 2016 season). The number could have been ~200 higher but for an instrument malfunction in mid-September 2016. After three repair attempts the OenoFoss analyzer is still not functioning as reliably as before the malfunction and will be sent in for repair again once the 2016 harvest season is completed.

Data from grape juice samples show a strong varietal effect on the concentration of yeast assimilable nitrogen (YAN). In both seasons  $\geq 50\%$  of Merlot samples had YAN values  $< 150 \text{ mg l}^{-1}$ , a value considered to be the minimum YAN requirement for a sound fermentation. In contrast, averaged over two seasons less than 7% of Riesling samples had YAN values below  $150 \text{ mg l}^{-1}$ . There were also strong site effects on YAN concentration, with some sites producing

grapes very low in YAN and other sites producing grapes very high in YAN. Varietal effects remained evident irrespective of the site effect on YAN.

Averaged over two seasons, 20% of harvest samples had YAN concentrations below 150 mg l<sup>-1</sup>, whereas 13% had YAN values above 300 mg l<sup>-1</sup>.

### **Project Approach**

With the exception of a delay in the installation of the OenoFoss analyzer (August rather than May) the project has been right on track with the work plan.

- The OenoFoss analyzer was installed prior to receiving the first pre-harvest samples of the 2015 season.
- The OenoFoss factory calibrations for several parameters were adjusted in early September, based on comparisons to analyses from standard methods used in the Viticulture and Enology laboratory.
- More than 500 grape berries/must samples submitted by commercial growers and wineries were analyzed in 2015, and again in 2016.
- Growers/wineries were advised of the results via email on the day the samples were submitted.
- Dr. Horst Caspari, Project Leader, presented preliminary results from the 2015 season to members of the Colorado Wine Industry Development Board during a board meeting on November 9, 2015.
- In January 2016, Dr. Caspari presented the results from the 2015 season at the annual conference of the Colorado grape and wine industry.
- More than 2,300 analyses have been performed on the OenoFoss since August 2016. This total includes grape juice samples, musts under fermentation, and finished wines.
- Dr. Horst Caspari, Project Leader, will present results from the 2016 season at the annual grape and wine industry conference in January 2017.

### **Goals and Outcomes Achieved**

This project had two major goals: i) to increase use of pre-harvest grape berry analysis by growers and must analysis by wineries; and ii) to establish baseline data on nitrogen status of grape berries and musts. The project was successful in achieving both goals.

The OenoFoss analyzer was set up by Mr. Calvin Watkins, Analytical Instrument Technician with Gusmer Enterprises Inc., the US vendor for the OenoFoss, on 27 August, 2015. Mr. Watkins then provided on-site training on using, calibrating, and trouble-shooting the analyzer to Drs. Horst Caspari, Stephen Menke, and Jordge LaFantasie (State Viticulturist, State Enologist, and Research Scientist, respectively). The first industry samples were analyzed on 28 August, 2015.

The OenoFoss analyzer comes with factory-set calibrations based on thousands of samples from the major grape growing areas around the world, which exclude Colorado. During installation, the OenoFoss analyzer was calibrated following Gusmer Enterprises Inc. standard protocol using 12 finished wine samples from Colorado wineries. In early August 2015, wine samples were sent

to Gusmer Enterprises Inc. laboratory in California where they were analyzed for density, ethanol, pH, titratable acidity, malic acid, lactic acid, volatile acidity, glucose, and fructose. Duplicate samples were kept at the Western Colorado Research Center, and then analyzed using the OenoFoss on the day of installation. Results from the OenoFoss were compared to the results from Gusmer Enterprises Inc. laboratory, and where necessary the factory-set calibration curves were adjusted.

Two different approaches were used to check and adjust the grape juice/must calibration of the OenoFoss analyzer. First, throughout the 2015 harvest season and must samples were analyzed using both the standard methods used in the Viticulture and Enology laboratory since 2004, as well as the OenoFoss analyzer. The standard methods are measurements of pH by pH meter (Model 720A, Orion Research Inc., Boston, MA), soluble solids by digital refractometer (Palette PR-101, Atago, Tokyo, Japan), and titratable acidity by auto-titration using 0.1 N NaOH to an end point of pH 8.2 (DL50 Graphix, Mettler-Toledo, Columbus, OH). Results from late August and early September 2015 indicated consistent and significant differences between the standard methods and the OenoFoss for pH (Fig. 1), soluble solids (Brix; Fig. 2), and titratable acidity (Fig. 3). These early season data were used to adjust the factory-set calibrations (Fig. 1-3).

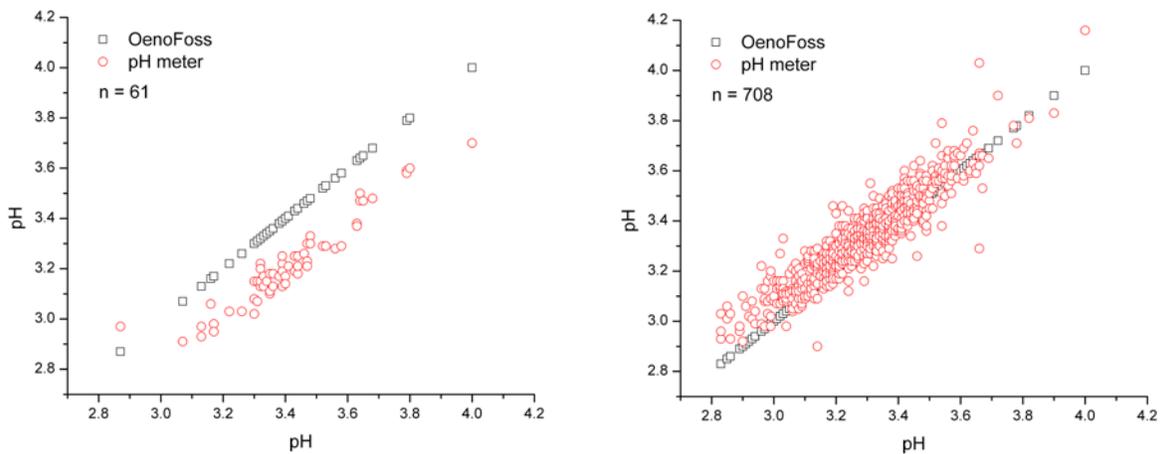


Fig 1: Differences in results for the pH of grape juice samples between standard method and the OenoFoss before (left) and after (right) calibration adjustment.

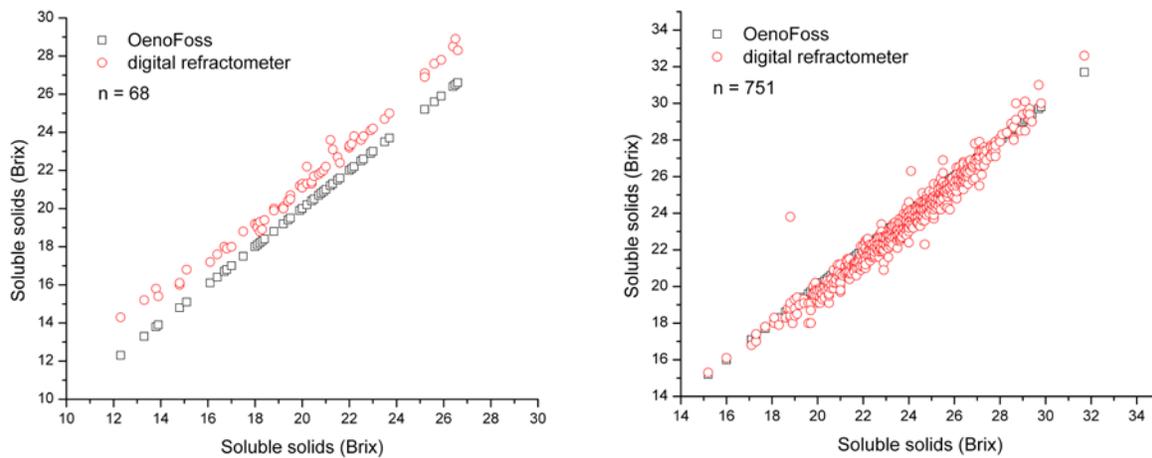


Fig. 2: Differences in results for the soluble solids concentration of grape juice samples between standard method and the OenoFoss before (left) and after (right) calibration adjustment.

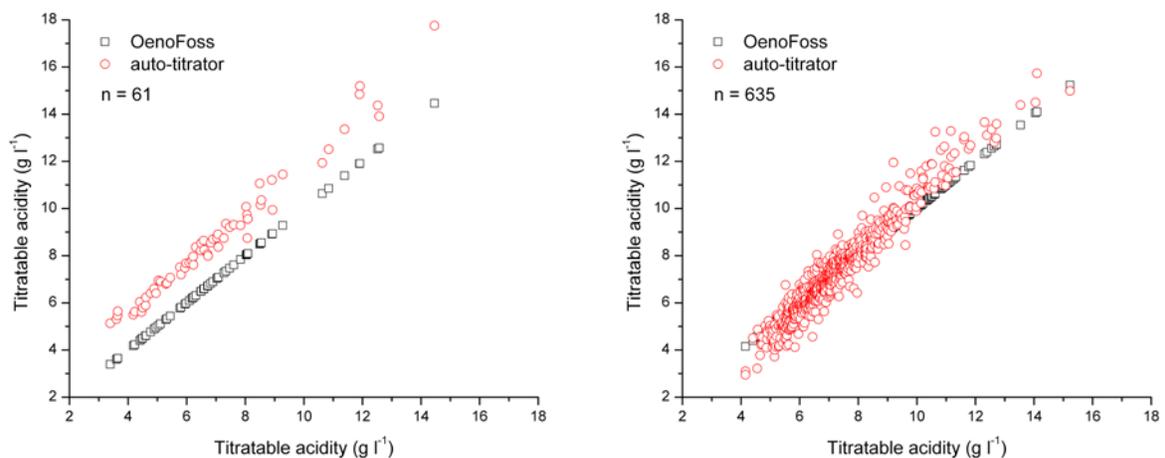


Fig. 3: Differences in results for the titratable acidity of grape juice samples between standard method and the OenoFoss before (left) and after (right) calibration adjustment.

The second approach to check the OenoFoss calibration was a comparison of results from harvest must samples sent to out-of-state commercial laboratories with duplicate samples analyzed in the Viticulture and Enology laboratory. The vast majority of the duplicate samples were provided by two Colorado wineries, Canyon Wind Cellars and Plum Creek Winery, both located in Palisade, CO. The wineries paid for the shipping and analyses by the commercial laboratory (ETS Laboratories, St Helena, CA) and shared the analysis results with the Project Leader. In return, the duplicate samples were analyzed in the Viticulture and Enology laboratory free of charge, and results reported back to the wineries the same day the samples were received.

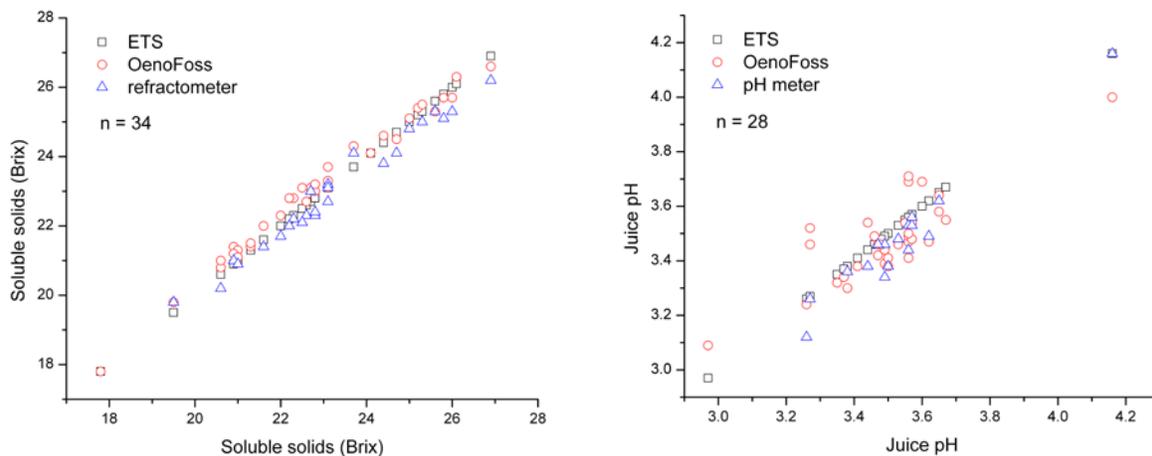


Fig. 4: Comparison of analysis results for soluble solids (left) and pH (right) of grape musts at harvest. Duplicate samples were analyzed by a commercial laboratory (ETS Laboratories, St Helena, CA) or the Viticulture and Enology laboratory using both the OenoFoss analyzer and standard methods.

There was a good agreement between the results from commercial laboratories and the OenoFoss and standard method used in the Viticulture and Enology laboratory for soluble solids (Fig. 4), but agreement was less for pH (Fig. 4) and titratable acidity (Fig. 5). The latter appeared to be due to large differences for tartaric acid as there was very good agreement in the values for malic acid (Fig. 6). A similar good agreement was found for yeast assimilable nitrogen (YAN) after a calibration adjustment (Fig. 7).

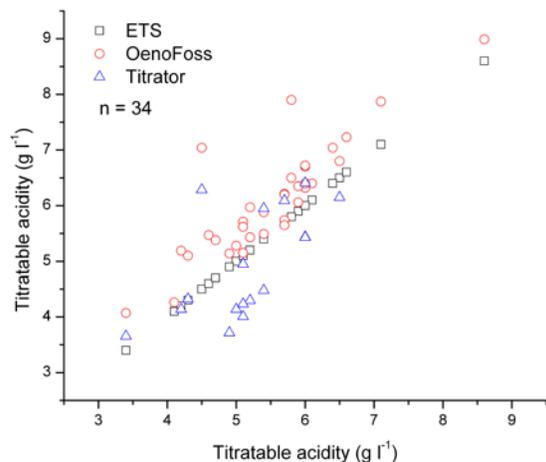


Fig. 5: Comparison of analysis results for titratable acidity of grape musts at harvest. Duplicate samples were analyzed by a commercial laboratory (ETS Laboratories, St Helena, CA) or the Viticulture and Enology laboratory using both the OenoFoss analyzer and standard methods.

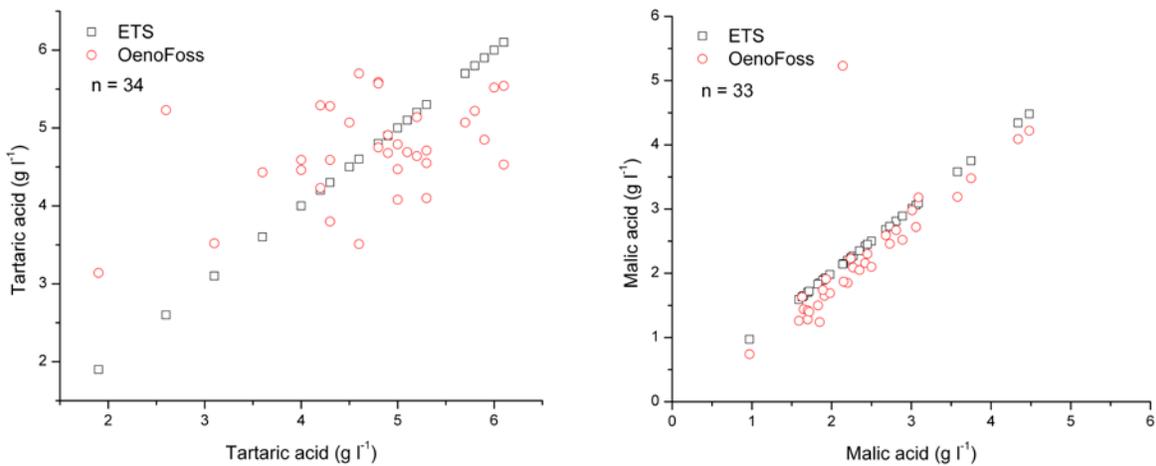


Fig. 6: Comparison of analysis results for tartaric (left) and malic acid (right) of grape musts at harvest. Duplicate samples were analyzed by a commercial laboratory (ETS Laboratories, St Helena, CA) or the Viticulture and Enology laboratory using the OenoFoss analyzer.

With the exception of YAN, factory calibrations were adjusted, if needed, during the early part of the 2015 harvest season using both pre-harvest and harvest grape berry samples. The YAN calibration was based on harvest must samples and included samples from early September until mid-November 2015. During 2016, 29 samples from the CSU Viticulture research program were sent to ETS Laboratories for analysis, and duplicate samples analyzed in the CSU laboratory using the OenoFoss. Results indicated that no further calibration adjustments were required. The only standard method that was used during the 2016 season was the measurement of soluble solids via digital refractometer. Again, there was good agreement in the values from the refractometer, the OenoFoss, and the commercial laboratory.

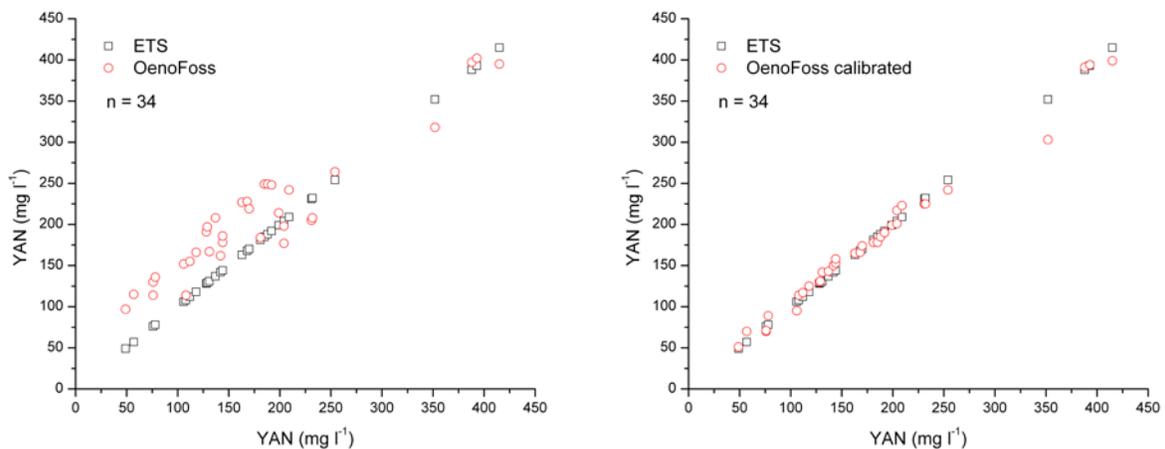


Fig. 7: Comparison of analysis results for yeast assimilable nitrogen (YAN) of grape musts at harvest before (left) and after calibration adjustment. Duplicate samples were analyzed by a commercial laboratory (ETS Laboratories, St Helena, CA) or the Viticulture and Enology laboratory using the OenoFoss analyzer. Results from ETS were used to adjust the OenoFoss factory calibration.

Over two seasons more than 1,100 commercial grape juice and must samples were analyzed on the OenoFoss, and an additional 717 samples from the Viticulture research program. A somewhat unexpected outcome was the large number of samples of musts under fermentation (36) and finished wines (176) that were received from Colorado wineries. The main questions that winemakers had when submitting those samples were related to residual sugar (glucose + fructose concentration in the must/wine) and the stage of the malo-lactic fermentation (concentrations of malic and lactic acid in the wine). Although unexpected, this is a very positive outcome as winemakers would not have submitted as many samples to a commercial laboratory due to the high costs for such analyses. Knowing rather than guessing the must and/or wine composition leads to better winemaking decisions.

A second goal of this project was to establish baseline data on the nitrogen status of grape berries and musts. With more than 1,800 grape juice and must data analyzed over two seasons we now have a large database to investigate variety- or site-specific effects on yeast assimilable nitrogen (YAN), and build upon in future years. For example, data from the 2015 season indicated that the variety Merlot tends to have musts that are low in YAN. More than 50% of the Merlot samples had YAN concentrations less than  $150 \text{ mg l}^{-1}$  compared to only 12% of the musts from the variety Riesling (Fig. 8). Lower YAN concentrations in Merlot compared to other leading red varieties like Cabernet Franc and Cabernet Sauvignon were also evident when looking at the results from vineyards where these varieties are grown next to each other (Fig. 8). This trend for low YAN concentration in Merlot was confirmed in samples from the 2016 season (Fig. 8).

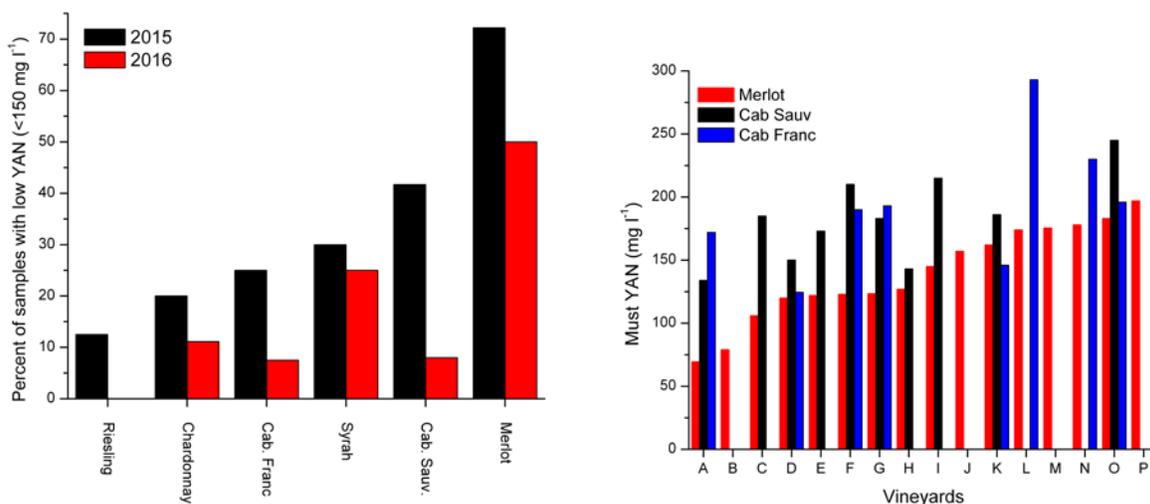


Fig. 8: Percent of harvest must samples of six varieties low in nitrogen (YAN concentration  $<150 \text{ mg l}^{-1}$ ) in 2015 and 2016 (left). Comparison of YAN concentrations in 2015 harvest must samples of varieties Cabernet Franc, Cabernet Sauvignon, and Merlot when grown in the same vineyards (right).

In 2015, nearly 28% of harvest samples had YAN concentrations less than  $150 \text{ mg l}^{-1}$ , whereas in 2016, only 13% of the harvest samples had YAN below  $150 \text{ mg l}^{-1}$  (Fig. 9). The average YAN concentration was  $197 \text{ mg l}^{-1}$  in 2015, and  $226 \text{ mg l}^{-1}$  in 2016. Generally, YAN concentrations remained stable during the last 4 to 6 weeks prior to harvest.

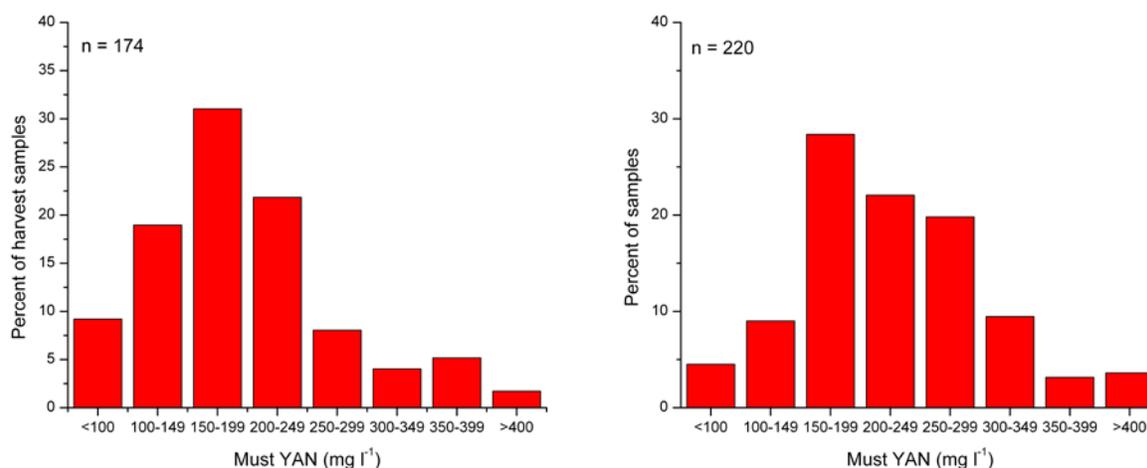


Fig. 9: Yeast assimilable nitrogen (YAN) concentration in grape harvest samples in 2015 (left) and 2016 (right).

### **Beneficiaries**

The main beneficiaries of the project are Colorado grape growers and winemakers. Most of Colorado's wineries are located along the Front Range, whereas >95% of the grapes are being produced on the Western Slope. The geographic separation between wineries and vineyards creates challenges when it comes to determining the optimum timing for grape harvest as most grape growers do not have the equipment to perform even basic pre-harvest fruit quality analyses. In fact, due to their small scale, the majority of Colorado wineries do not have the laboratory equipment to perform those tests on musts once grapes have been harvested, transported, and crushed. The purchase of the OenoFoss analyzer allowed for a high number of pre-harvest and harvest samples to be analyzed in CSU's Viticulture and Enology laboratory, with results reported back to the growers and wineries the same day that samples were received. The number of samples analyzed would have been 60% higher in 2016 compared to 2012 (the last year with a full grape crop) if not for the OenoFoss malfunction in mid-September 2016. Conservatively, the 2016 samples came from >350 acres, about 50% of Colorado's producing acreage. In other words, basic grape juice/must quality from about half the Colorado grape crop was analyzed using the OenoFoss analyzer.

While the number of growers submitting grape samples is known, the exact number of wineries receiving the results is not. Results are reported back to the party submitting the samples (in most cases, grape growers). Grape growers then share those results with the wineries that purchase their grapes. A conservative estimate is that at least one third of Colorado's ~150 wineries receive pre-harvest juice analysis results through CSU's Viticulture and Enology laboratory. All Colorado grape growers, and all wineries utilizing Colorado grapes, will benefit from the detailed information on must nitrogen (YAN) concentration. Growers with either very low or very high YAN may benefit by using this information to modify their fertilization practices. Wineries that are currently not sending must samples to out-of-state laboratories for a detailed must analysis now can make must adjustments based on knowledge, rather than guessing.

## **Lessons Learned**

The Viticulture and Enology program has always encouraged wineries to regularly test musts and wines, and to use certified laboratories for such analyses. An unexpected outcome of the project was the large number of samples of musts under fermentation (MUF) as well as wines submitted by Colorado wineries. All MUF samples came from wineries in the Grand Valley, i.e. in proximity to the Viticulture and Enology laboratory at the Western Colorado Research Center. However, wine samples were received from wineries across the state. This is an unexpected outcome as this type of analytical service was not advertised to the Colorado wine industry. Presumably due to the low sample cost at the Viticulture and Enology laboratory, wineries are using the service to run tests more frequently than they would do otherwise, primarily to check on the progress of both primary and secondary (malo-lactic) fermentation. In the context of quality winemaking, more frequent chemical analyses have to be considered a positive outcome. An unexpected and rather annoying event was the malfunction of the OenoFoss analyzer within 13 months of installation. Three attempts have been made to repair the analyzer, but so far the analyzer still produces intermittent and apparently random errors. The Project Leader is currently discussing potential remedies with both the manufacturer as well as the US distributor of the OenoFoss analyzer.

## **Contact Person**

Dr. Horst Caspari  
970-434-3264  
horst.caspari@colostate.edu

## **Final Report: Developing strategies for managing cytospora canker in peach orchards in Colorado**

**Project Partner: Colorado State University**

### **Project Summary**

Colorado peaches are an important specialty crop with superior market acceptance because of their flavor, color, and timing of harvest. In western Colorado, within Mesa, Delta, Montrose and Montezuma counties, peach production totals over the last ten years have ranged from 12,000-17,000 tons with estimated values of 28 to 35 million dollars. Peach production in the west is threatened by environmental stresses, such as diminishing water supplies, spring frosts, low winter temperatures, and alkaline soils. Further exacerbating the environmental stresses are pest problems like persistent *Cytospora* canker disease, which leads to major reductions in productivity, profitability, and orchard longevity. The consensus among growers is that *Cytospora* canker is the most challenging problem they face in maintaining profitable peach orchards. The extent and severity of infections in western Colorado has reached a critical level. In a CSU survey of 200 orchard-acres conducted in March and April of 2015, 100% of the orchards surveyed throughout the Grand Valley, North Fork of the Gunnison River region and as far south as Olathe were infected with *Cytospora*. On average, 75% of trees were infected in orchards surveyed; however, many orchards were 100% infected, especially those at the typical age of peak production.

At the newly established Cytospora Working Group meeting, growers discussed potential measures needed to combat this disease. Chemical measures are of high importance to growers. Currently, few fungicidal options exist for preventing new infections and decreasing inoculum load. Therefore, our specific objectives were to:

- a) Evaluate conventional and organic fungicides efficacy for *Cytospora* spp. *in-vivo* and *in planta*
- b) Test bark and wound sealing with effective fungicides embedded in paints to develop a preventive approach for *Cytospora* management in existing orchards.

A preliminary study by Stewart, funded by western Colorado growers through Western Colorado Horticultural Society, showed that 5 out of 9 and 7 out of 9 conventional and organic chemicals, respectively, showed promise in controlling *Cytospora* spp. isolates from the western slope. We further investigated effectiveness of these successful chemicals on new infections and existing cankers in peach. In addition, we tested the compatibility of these fungicides with Latex paint and Surround (an organic paint) as a preventive/sealing approach to reduce *Cytospora* inoculation on existing cankers and to prevent new infections occurring on pruned branches and bark cracks caused by cold and winter burn.

We found that Captan, Topsin and Lime Sulfur were effective as preventatives on newly wounded tissues. Further, we found that Latex paint alone and Surround mixed with Lime Sulfur were effective at reducing sporulation on existing cankers, thereby reducing the risk of new infection. Using these chemical measures, future infections within existing orchards can be reduced, thereby increasing orchard longevity.

## Project Approach

Within the proposed works, we had several experiments that were conducted. We started with testing different chemicals, both conventional and organic, on cut peach branches, thereby determining which chemicals to use in field trials. Field trials in Grand Junction began in May. We used orchards located at the Western Colorado Research Station, as well as three growers' orchards. We tested both preventative measures on wounded branches as well as paints and chemicals on existing cankers to reduce inoculum loads to decrease new infections.

### Test efficacy and 7 day-residual of chemical effective *in-vivo*

Further efficacy of successful chemicals was tested on detached branches of peaches. Six conventional chemicals were tested, including Aliette WDG, Topsin M WSB, Benlate WP, Captan, Inspire Super, and Ziram, and eight organic chemicals were tested including Neem oil, Mpede, Kaligreen, Serenage, NuCop WP, Badge X2, Zinc Sulfide and Lime Sulfur. Each chemical was tested on wounded branches that were either inoculated immediately after wounding and chemical treatment or seven days after wounding and chemical treatment. Branches in residual treatment (seven days after wounding and chemical treatments) were placed in the greenhouse for exposure to higher temperatures and UV light. An agar plug of *Cytospora* (2 genetically distinct isolates) was inoculated onto the wounded and treated branches immediately after wounding and chemical treatment or seven days post treatment for the residual treatment. Branches were also incubated for 8 days, after which *Cytospora* induced lesions were measured.

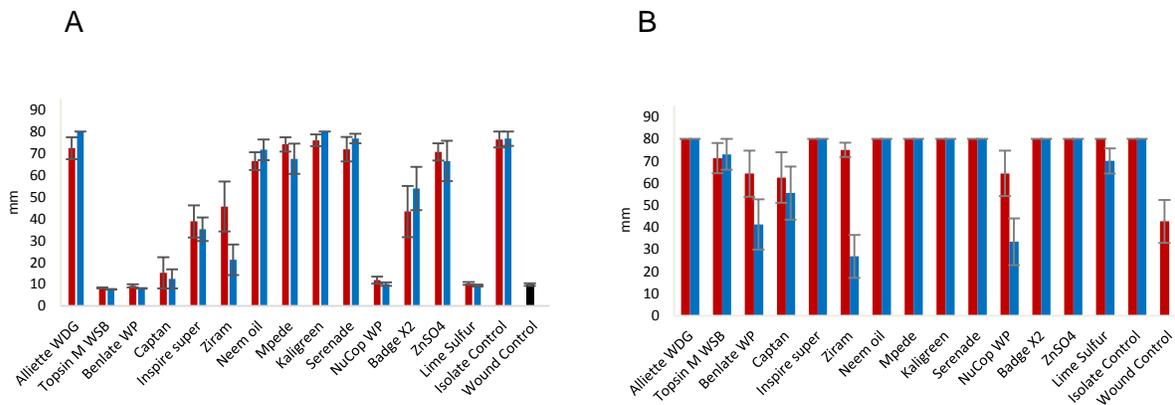


Figure 1. Detached branch chemical assay of *Cytospora* infection immediately after wounding and chemical treatment (A) or residual efficacy of chemicals to *Cytospora* 7 days post wounding and chemical application (B). Bar colors represent isolates of *Cytospora leucostoma* (red) and *Cytospora paraleucostoma* (blue).

The most effective chemicals in both the immediate and residual experiments included the conventional chemicals Topsin M WSB, Benlate WP, Captan and Ziram and the organic chemicals NuCop and lime sulfur.

### Test chemicals *in-planta*

Artificially wounded Cresthaven scions on Vicking rootstocks were utilized to test chemical efficacy within an orchard. Three orchards were used for the study and within each orchard four trees were wounded for a total 12 total trees. Each tree contained all treatments therefore each treatment within an orchard has 10 replicates. Further, the experiment was also completed twice.

Trees were wounded with pruning wounds and razor cut wounds to mimic grower prunes and winter frost cracking. Immediate and residual chemical effects were compared. Immediate inoculations were made 24 hours after chemical spray application while the “Prune residual or Razor residual” inoculations were made seven days after the chemical spray application. Trees were first wounded with either prune wounds or razor wounds.

After wounding, tree shoots were flagged and sprayed with the different chemicals depending on the given treatment at the chemical label midrate. Chemicals were sprayed through the use of 350 ml spray bottles. Each tree contained six different treatments. Each treatment set was assigned five one-year-old shoots per tree, randomized in orientation as to minimize directional influence from radiation. There being six treatments per tree, and five repetitions per treatment, a total of 30 shoots were treated per tree.

The six treatments included the following: two organic chemical treatments, two conventional chemical treatments, and two controls (a positive and negative control). After discussion with the *Cytospora* working group, the organic chemicals included WP Lime Sulfur and NuCop while the conventional chemicals included Topsin M WSB and Captan. The positive control consisted of inoculations with no chemicals while the negative control consisted of water inoculations with no chemicals. Prior to inoculations, the label mid-rate for each chemical was used.

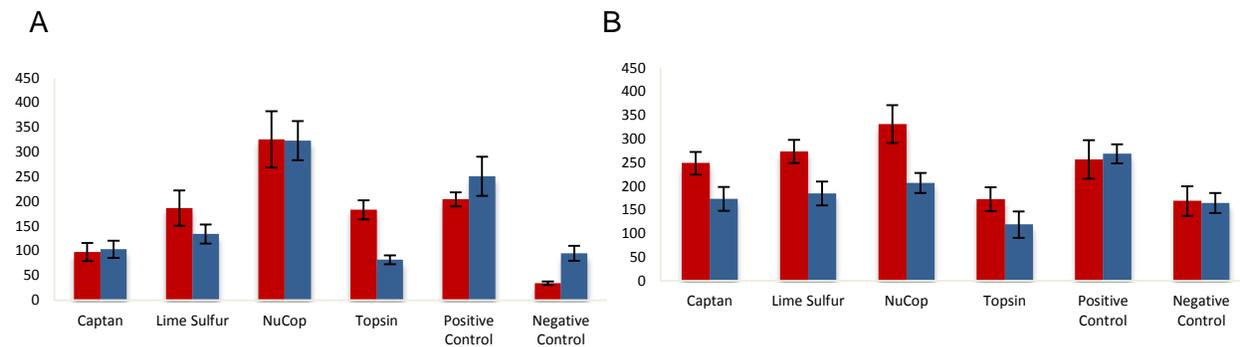


Figure 2. Chemical and organic chemical efficacy on prune cuts artificially inoculated with *Cytospora leucostoma* after 24 hours (A) and seven days (B) after wounding and chemical treatments. Chemical treatments are labeled on the x-axis and lesion size in labeled on the y-axis in mm<sup>3</sup>. Colored bars represent two independent runs (run 1, red; run 2, blue).

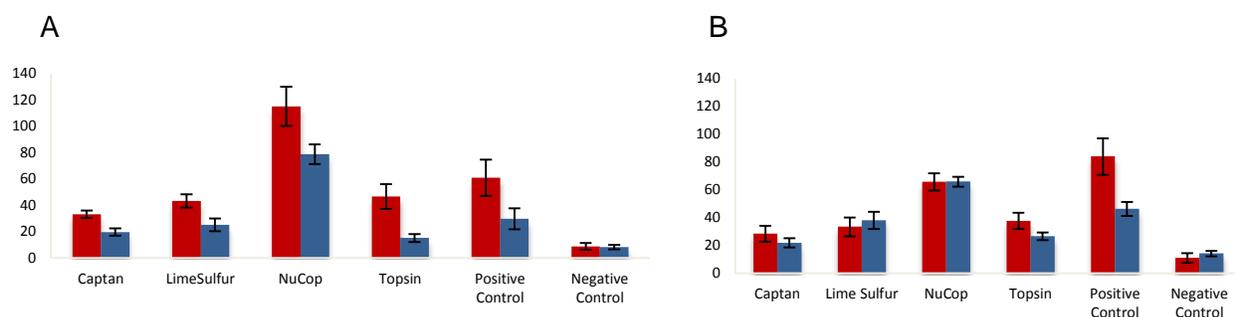


Figure 3. Chemical and organic chemical efficacy on razor cuts artificially inoculated with *Cytospora leucostoma* after 24 hours (A) and 7 days (B) after wounding and chemical treatments. Chemical treatments are labeled on the x-axis and lesion size is measured in mm<sup>2</sup> on the y-axis. Colored bars represent two independent runs (run 1, red; run 2, blue).

As seen from Figures 2 and 3, the most successful chemicals included Captan (conventional) and lime sulfur (organic). In run 1 and run 2 for both wounding types, lesions formed with NuCop as the organic chemical treatment were the same size or larger than the positive controls. We hypothesize this was caused by chemical induced phytotoxicity on peaches. We would not recommend NuCop for use in peaches. For the convention growers, Captan showed the most consistent positive results compared to Topsin.

#### Test effective conventional and organic chemicals in sealing paints

In order to test the efficacy of chemicals within sealing paints on existing cankers, cankers were painted with either a latex (conventional) or surround (organic) paint and mixed chemical solutions including Captan / 50% Latex in water, Topsin M WSB / 0% Latex in water, NuCop/Surround (1/2 lb in 1 gallon of water) or lime sulfur/Surround (1/2 lb in 1 gallon of water). At one orchard, Talbott (grower orchard), three cankers per treatment were used (more replications are currently being processed and measured). Three controls were also used, one control of a latex solution with no chemicals, a second control of a surround solution with no chemicals, and a third positive control which consisted of no paint or chemical applications. Prior to the painting, the label mid-rate for each chemical was used. The mid rates were used according to the labels.

Initial spore production counts were taken, prior to chemical applications, to determine the initial spore production by each canker. Spore counts were taken through the collection of 10 ml from each canker. The 10 ml collection was concentrated to 5ml through the use of a centrifuge. After this, spore counts were taken using a hemocytometer, the final spore/ml amount was re-adjusted to account for the number of spores per ml for the original 10 ml.

Cankers were then painted with the chemical treatments and remained on the tree for one month. After one month, spore production was measured for each canker. In this manner, the initial spore reduction percentage for each chemical treatment was calculated. We saw the best reductions with Latex paint alone with a reduction of 61% and Surround mixed with Lime Sulfur with a reduction of 92%.

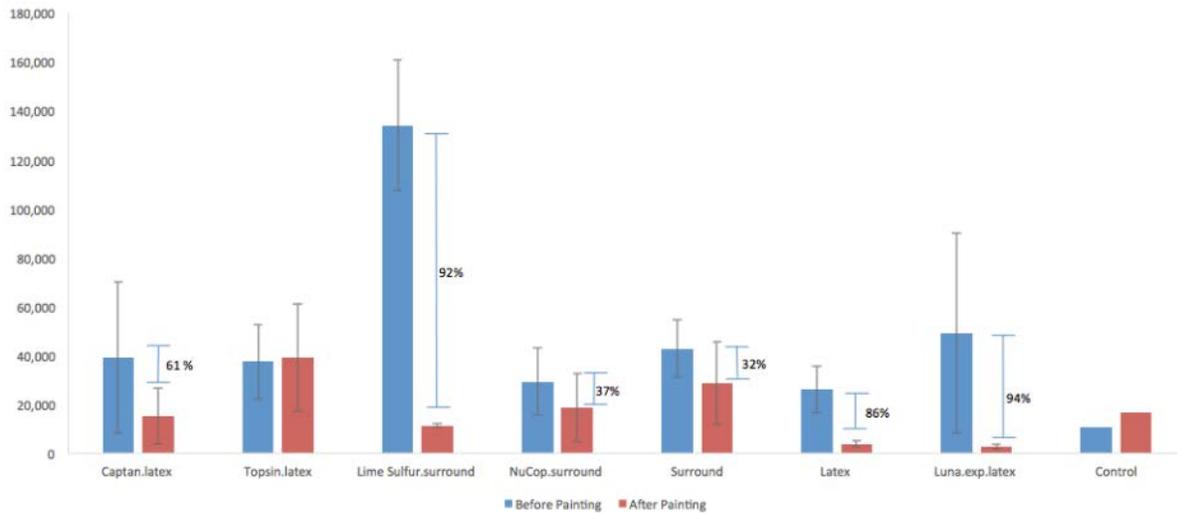


Figure 4. Spores counts of existing cankers at Talbott Farms before (blue) and after (red) chemical treatments. Percentages highlight the reduction after treatments. Chemical treatments are labeled on the x-axis and spore counts are along the y-axis.

This funded research will improve peach production in Colorado and potentially help in other fruit production as well. We have determined that Captan and Topsin, for conventional growers, and Lime Sulfur, for organic growers, works well to inhibit infection caused by *Cytospora* in peach orchards for both pruned cuts sites and razor cuts, which were done to mimic winter cracking of bark tissues. In addition, we found a reduction in spore counts in existing cankers using Latex paint alone for conventional growers or Surround mixed with Lime Sulfur for organic growers. *Cytospora* canker is a group of pathogens with a large tree host range that infects pome fruits but can also have a significant impact in our urban trees as well. Therefore, this research is important for the peach industry but could also have impact much beyond.

This was a collaborative project among partners at Colorado State University, Western Colorado Horticulture Society and *Cytospora* Working Group. Dr. Jane Stewart, who is a Plant Pathologist in the Department of BioAg Sciences and Pest Management and Dr. Ioannis Minas who is a Pomologist working at the Western Colorado Research Station and is also faculty in the department of Horticulture Sciences have co-mentored a graduate who is housed in the Department of BioAg Sciences and Pest Management. Stewart initiated the work and set up the experimental design and has been the primary advisor for the graduate student. Minas has helped in the design, and has played a vital role in helping the student while working in Grand Junction. Further, discussions have been ongoing with the *Cytospora* Working Group in the experimental design and in what chemicals to test. Also, this research has been conducted on the Western Colorado Research Station, but also in the orchards of Bruce Talbott of Talbott Orchards, John Cox, owner-Palisade peaches with his manager Eric Favier, and Frank Stonaker, owner-Osito Orchards.

## **Goals and Outcomes Achieved**

The long-term goal of this project is to reduce the incidence of *Cytospora* canker in peach orchards in Colorado. The most significant findings include finding both conventional and organic compounds that are effective as a preventative against *Cytospora* canker and that can be used on existing cankers to reduce fungal sporulation. However, as results from our research are just now being completed and analyzed, we are still working towards communicating our findings to growers. The first and most important goal of this project is to educate growers about the finding of this important research. By attending the Annual Horticultural Society Meeting in January 2017 in Grand Junction and by attending workshops and field days in 2017, we hope to educate as many growers as we can. We will strive to get 20% of the roughly 350 peach growers to adopt these management practices. Further, based on our survey results, we conclude that *Cytospora* canker is now found in roughly 80% of orchards with an average incidence of 75%. Our goal is to use our identified chemicals and management practices to reduce the incidence of *Cytospora* canker by 10% in 3-year-old orchards in 2017, thereby increasing the number of retained trees by 10%. It will be a major success when we achieve these ongoing goals.

## **Beneficiaries**

All peach growers in Colorado are currently dealing with the high infection rate of *Cytospora* canker and the disease is having a discernable impact on all decisions concerning orchard establishment, management and replacement. In 2014, peach production in Colorado was valued at \$27.4 million. Growing regions in western states that support peach production are limited geographically by unique climatic conditions. For that reason, the community of peach growers in western Colorado is concentrated in Mesa and Delta counties and extends from Olathe to Palisade to Paonia, which accounts for essentially all of the peaches grown in Colorado, and all can potentially benefit from this research.

Total annual losses caused by *Cytospora* canker on stone fruit can average 15-20% depending on the area, management practices and varieties planted. In a recent survey of 31 orchards on 192 acres in western Colorado, the average infection rate of *Cytospora* canker on peach trees was 75%. Further, a recent study of incidence of *Cytospora* canker within a single peach orchard showed that the infection rate increased from 15 to 70% in a three-year period. Clearly, healthy peach orchards have a direct impact on the economic health of western Colorado. By providing a solution to *Cytospora* canker, peach growers will be able to crop the most acres of land at the highest levels of production without the concern for premature orchard removal or the risk of infection in newly planted orchards. Our initial survey of 200 orchard-acres, conducted in 2015, found that 100% of these orchards had infections from *Cytospora* canker. This research has the potential to benefit at least the growers owning the 200 orchard-acres surveyed and will likely have a much broader impact.

Benefits of this *Cytospora* research are not limited to Colorado or the surrounding western region. *Cytospora* species including *Cytospora cincta* and *C. leucostoma* infect a variety of stone fruit specialty crops grown in multiple regions throughout the United States, including peaches, nectarines, sweet cherries, apricots and plums. Results from this research will enhance peach

production in Western Colorado, but will also give US growers of stone fruit options for controlling and managing Cytospora canker.

### **Lessons Learned**

A variety of lessons were learned in doing these experiments. We found that chemicals that worked in the laboratory were not effective on peach tissues and it was important to include a detached peach branch assay that would be conducted in the laboratory before going directly to orchards to test chemicals. Second, we did trials to examine the best method of inoculation with spore suspension. We found that mimic spore contained water drops with a pipet were most effective, therefore, we used this method in our orchard trials. Last, many growers were excited by the product NuCop and it was effective in our detached branches assays. However, when applied in July in our orchard trials, cankers were found to be larger than the positive controls of inoculated wounded branches with no chemical treatment. We deduce that these larger lesions were caused by phytotoxicity by the copper component of the NuCop induced by the hot summer temperatures.

### **Contact Person**

Jane Stewart, PhD  
Colorado State University  
Department of Bio Agricultural Science and Pest Management  
970-491-8770  
Jane.Stewart@colostate.edu

## Additional information



Upper photos: Culture of *Cytospora leucostoma* (left) and spores (conidia) which are used for inoculations (right).

Lower photos: Prune cut infected with *Cytospora* canker (left); gummosis (symptom of *Cytospora* canker infection) observed on a frost crack canker (center); Graduate student, Stephan Miller, inoculating a branch (right)

**Final Report: Evaluation and demonstration of organic sweet cherry production using precocious dwarfing root stock, the super spindle axe training system and high tunnels.  
Project Partner: Frank Stonaker, Osito Orchard**

**Project Summary**

Sweet cherry can be a very profitable crop for Colorado fruit growers, however, spring freeze events are common, resulting in significant losses for sweet cherry growers. Mitigation of spring freeze damage using high tunnel technologies promises to reduce crop losses. Coupled with the use of precocious dwarfing root stocks and novel training systems, Colorado sweet cherry growers may be able to bring trees to full production in half the time traditional cherry production requires.



Research trials evaluating the performance of sweet cherries on dwarfing root stocks grown in high density plantings around the country are showing great promise. However, the varieties in high demand in Colorado (Bing, Lapin and Black Gold grown on Gisela 5 and Gisela 12 rootstocks) have not been evaluated. Researchers from Michigan State University, Cornell University and Oregon State University have indicated that these combinations of root stock/scion, using novel training systems, are likely to succeed, pointing out that the use of high tunnels in our climate is likely to produce significantly different results than might be expected in other regions.

The objective of this project was to evaluate promising and novel sweet cherry production methods (precocious, dwarfing root stocks with the super spindle axe training method, in high tunnels) that have a good likelihood of success in Colorado. The knowledge gained from this farm scale trial has been and will continue to be shared with western slope fruit growers looking for ways to reduce production risk and improve their farms' bottom lines.

In 2014 Osito Orchard LLC was awarded a Grower Research and Education Grant through the Colorado State University Specialty Crops Program to initiate this project. The project was originally intended to span a three year period, however due to administrative constraints at CSU, the project period was cut to two years; effectively curtailing evaluation of the high tunnel impact during spring freeze events on blooming trees. The project scope was adjusted to span two years. The trees were planted in 2014 and 2015, the high tunnel was constructed in the fall/winter of 2015/2016. Initial tree growth has provided excellent information, however a third growing season with the high tunnels in place for spring freeze protection, and the trees scheduled to produce their first crop, would provide outcomes that will be much more meaningful to area growers. Funding through this specialty crop grant allowed us to complete a cropping cycle and share this information with regional fruit growers.

## Project Approach

Construction of three bays of Haygrove gutter connected tunnels (approximately 34,000 square feet) was completed in March 2016 and covered with Luminance greenhouse polyethylene. The construction went well and the building was well designed for ease of erection, however the drill-in legs of the tunnels did not work in our land which is full of large stones, and required predrilling all of the post positions – adding significantly to the time and cost. The large poly roofs were a challenge to install, however with a large crew, we installed the roof and secured it during two days. In the weeks that followed we experienced unusually high winds and the structure and roof held up well. Data loggers were installed in the tunnel and outside of the tunnel to monitor temperatures inside and out of the structure (figures 1-3) providing important information about the performance of the high tunnel during freeze events in the spring.

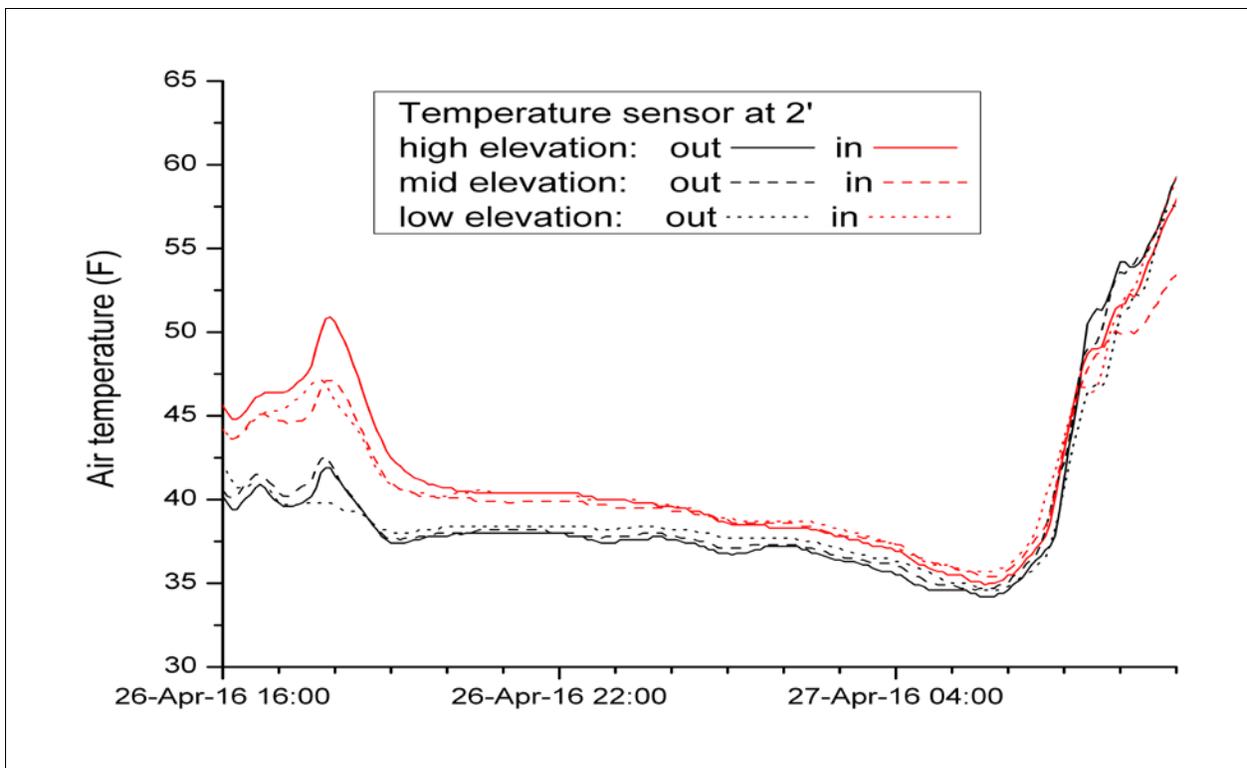


Figure 1: Temperatures at 2 ft above ground level. Note the convergence of temperature lines after dark and the little spread in temperatures inside and outside

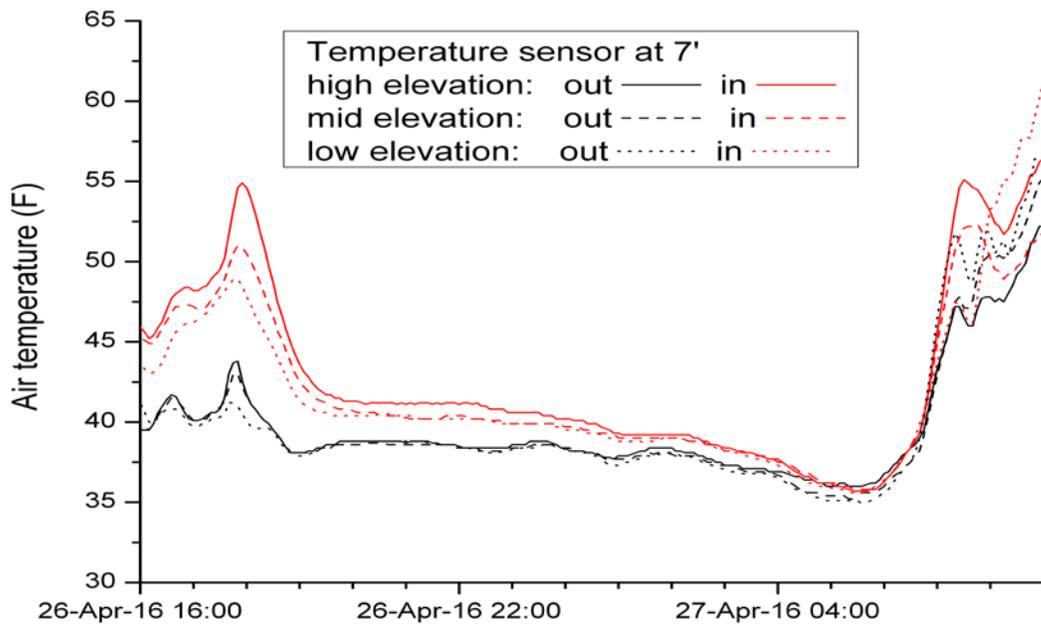


Figure 2: Temperatures at 7 ft above ground level. Note the convergence of temperature lines after dark and the little spread in temperatures inside and outside

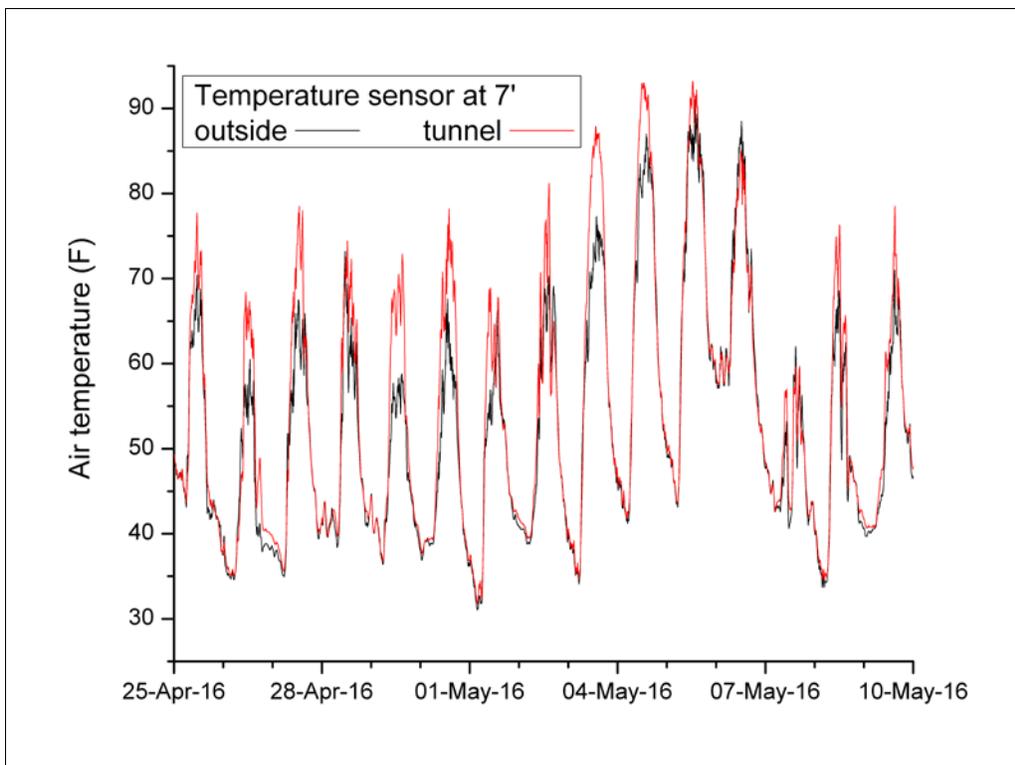


Figure 3: Multiple day temperature recording inside and outside temps during bloomtime.

Daily monitoring of temperatures and cloud cover determined when roof venting was required. The opacity of the poly film reduced high temperature peaks that I have experienced with clear greenhouse films, so daily adjustments to venting was all that was required. The trees responded well to the quality of the light under the “IR” type polyethylene roofs. In terms of temperatures experienced in the tunnels, and tree growth, I was pleased with the performance of the roofing material, however, pollination of the crops was very poor and it was observed that honey bees that were installed near the high tunnels for crop pollination were reluctant to enter the open sides to pollinate the abundant flowers. The de-polarization of light by “IR” greenhouse films may disorient bees, and result in poor bee activity which is critical for the cross pollinated cultivars of sweet cherries. One variety, “Black Gold”, is self fertile and does not require cross pollination, and this variety produced a good first crop. The challenge with pollination of the other varieties we have planted in the tunnel will require alternative pollination management – which is yet to be identified; introducing bumblebees and/or mechanized application of pollen are possible options. Because of the poor pollination and resulting thin crop on all but one cultivar, yield data was not collected in 2016.

This spring season was unique in its mildness. Freezing temperatures during bloom did not occur, and so evaluation of the tunnel’s freeze mitigation was not possible, however temperature comparisons of indoor and outdoor during the season have shown that there was not sufficient protection to mitigate freeze damage during bloom-time (as is illustrated in figures 1-3). This is very disappointing, but with supplemental heating under the tunnels we should be able to provide the protection needed. We anticipate adding some propane burners in 2017 to provide extra protection.

The super spindle axe (SSA) training of cherry trees that has been used in this planting has performed well for the most part, however side shoot development in the lower portions of the trees has required additional efforts to force shoot production. Dr. Minas, CSU pomologist, has been an excellent resource and help in identifying this issue and resolving the problem. We have scored and girdled the trees with reasonably good results, and will continue to implement these techniques in the future. Some disease (Cytospora) has been observed where tree scoring was done, and so additional disease management for this issue will be needed.

Raccoons and birds were problematic when fruit was ripening. Raccoons were excluded with electric fencing (Figure 11). Birds will be excluded in the future with bird netting.

Despite the challenges identified, the trees have grown very well and promise to be very productive in the future. The small crop of Black Gold cherries that was produced this year was of excellent quality and size.



Figure 4 Black Gold cherry on Gisela 6 rootstock in 3rd leaf

ON GISELA 5 ROOTSTOCK planted 2014	Avg. height growth (inches) 1 <sup>st</sup> leaf	Avg. height growth (inches) 2 <sup>nd</sup> leaf	Avg. height growth (inches) 3rd leaf	Avg. diameter trunk growth (Inches) 1 <sup>st</sup> leaf 2014	Avg. diameter trunk growth (Inches) 2 <sup>nd</sup> leaf 2015	Avg. diameter trunk growth (Inches) 3 <sup>rd</sup> leaf 2016
	2014	2015	2016	2014	2015	2016
Black Gold	57.1	17.2	62.3	0.2	0.6	1.2
Lapin	48	24.3	29	0.2	0.6	1.2
Bing	45	22.1	44.7	0.5	0.5	0.8
ON KRYMSK 6 ROOTSTOCK planted 2015	1 <sup>st</sup> leaf	2 <sup>nd</sup> leaf		1 <sup>st</sup> leaf	2 <sup>nd</sup> leaf	
Skeena	38.8	41.5		0.4	0.6	
Benton	45.7	96.9		0.5	0.6	
Bing	24	133.8		0.3	1.2	
Rainier	28.4	56.6		0.3	0.8	

Table 1 Growth of sweet cherries in high tunnels, noting trunk diameter 1 ft above soil level and height grown per season above the initial planting height. All trees are pruned to fit in the tunnel; shoot growth extends beyond tunnel height during summer

## **Goals and Outcomes Achieved**

The goal of reducing the risk of spring frost to developing fruit was not tested directly because of the mild spring we experienced during critical developmental stages of the crop. However, the temperature data collected during the extended season indicates that the covering alone will not provide sufficient temperature protection to avoid crop damage during critical periods before sunrise. To increase temperatures to safe levels it appears that supplemental heat (propane burners) and/or an additional layer of fabric (such as floating row cover) will be needed to achieve the desired outcome. This finding, although disappointing, provides important information, and economically feasible solutions do exist.

The discovery of poor honey bee activity in the tunnels also points to the need for either mechanically applied pollen (used to a limited degree in cherry and almond production) and/or introduction of bumble bee colonies (commonly used in greenhouse fruit and vegetable production). This discovery is also valuable and may allow for greater success in the industry.

Another goal of the project was to share the information with growers, researchers and extension agents. We have had many visitors, including people that “dropped by” because they had heard of the project, and also a formal grower group visit that was organized by a local supply house “Cropworx.” The group of growers represented some of the region’s most progressive growers, and pest management and soil fertility consultants. Many observations, comments and recommendations were shared during the field day. Finally, an update of the project will be presented at the Western Colorado Horticultural Society Annual Conference in Grand Junction Jan.17-20, 2017. Preceding this grant, the bus tour for the WCHS conference stopped here to see the project in January 2016 when over 50 participants were introduced to project.



Figure 5 Grower group tour 7/2016

Goals for the project included reduction of risk of spring freeze damage to blooming cherries and the sharing of knowledge gained about the unique production system with other regional fruit growers. The goal of reducing risk by frost was not achieved, however, thanks to this study; we have learned additional measures will need to be taken to protect the crop during night time hours when temperatures are below acceptable thresholds. This information has been shared with other growers and will allow them to make better informed decisions about whether or not this technology is for them. Also, pollination issues arose, which were not identified as a research objective, but which require solutions. Finally, the outreach component has been fulfilled by having visitors on site and by presenting this information at the 2017 WCHS conference.

### **Beneficiaries**

This project is in the initial stages of development, and so beneficiaries at this point are limited to those that have worked on the project, sold materials for the project and those that have learned from the project's outreach elements. In the future the following groups will benefit if the technology is adopted.

- Colorado fruit growers
- Farm laborers (expansion of harvest opportunities, additional specialized labor for training trees, additional packhouse employment)
- Packing sheds (additional crops to pack),
- Packaging manufacturers (additional bags and boxes required), trucking companies (additional product to ship)
- Food distributors and grocers (additional seasonal products)
- Consumers (increased choice of Colorado (organic) fruit with high nutritional value),

- High tunnel manufacturers
- Number of beneficiaries affected by the project’s accomplishments and/or the potential economic impact of the project:
  - Western Slope fruit growers – on over 4000 acres in western Colorado may benefit from this project if the technology is proven to be useful and is adopted.
  - Consumers – beneficiaries of specialty crop production – could be counted in the tens of thousands.

### **Lessons Learned**

Please see sections above which have covered these points.

### **Contact Person**

Frank Stonaker  
970-420-2972  
fstonaker@gmail.com

### **Additional Information**

Special thanks to Dr. G. Litus CSU AES for assistance collecting temperature data, Dr. I. Minas CSU AES for tree training consultation, Dr. H. Caspari CSU AES for data analysis.



Figure 6 Bending hoops for roofs



Figure 7 Applying poly roof to tunnels



Figure 8 Building roll-up end walls



Figure 9 Covered sweet cherries



Figure 10 Removing snow from roof



Figure 11 Electric fencing to exclude raccoons.