2015 Specialty Crop Block Grant Program – Farm Bill

FINAL PERFORMANCE REPORTS
FOR PROJECTS ENDING ON OR BEFORE SEPTEMBER 30, 2017

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CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
SPECIALTY CROP BLOCK GRANT PROGRAM
FINAL PERFORMANCE REPORT

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Project Summary

California public schools serve over 4.5 million meals each day. Federal and state funding provide 83.2% of the cost, an investment of $1.95 billion. California Thursdays® leverages the magnitude of this market to meet its objective of serving more freshly-prepared California-grown fruits and vegetables in school meals. California students face chronic diet-related public health challenges, such as childhood obesity and food insecurity. Improving school food – particularly by serving and promoting fresh, nutrition-dense, and delicious California fruits and vegetables – is a strategic and sustainable public health intervention. Expanding the use of fruits and vegetables in school meals increases the market share of specialty crop stakeholders as it simultaneously improves the health of students.

California Thursdays makes the procurement, serving, and consumption of specialty crops easier and more desirable. It demonstrates the potential to improve school food with an achievable first step of "just one meal, one day a week" coupled with the practicality of providing "turn-key" implementation and marketing resources. The program adopts a "collective impact model," with the Center for Ecoliteracy (CEL) serving as a backbone organization for a network of school districts to serve more freshly prepared, California-grown fruits and vegetables. Building on the successful statewide pilot, which grew the network from one to 15 to 42 participating school districts, the expanded California Thursdays program further enhances the marketability of specialty crops, creates opportunities for producers, increases access for underserved students, and improves student understanding of specialty crop agriculture.

The California Thursdays program timeliness and significance is evident to industry, consumers, and the media. Its potential to increase sales and competitiveness is recognized by industry: California Thursdays was named one of the "top three market movers for 2015" by Sysco and new product lines for school districts featuring California-grown food were developed by distributors Gold Star, AgLink, and Sysco. Its appeal to consumers is clear: evidenced by the bold images of fruits and vegetables that are the centerpiece of promotions. Its effectiveness at improving consumption is demonstrable: districts reported a 13% increase in student participation on California Thursdays in its first year. And outcomes related to raising awareness are noteworthy: earned media coverage with broadcast and online features resulted in a total of more than 240 million impressions.

School meal programs predominantly feed students who are eligible for free and reduced-price lunches, increasing access for underserved youth. The program illuminates the linkages from farm to school. During this grant period, original educational resources that are standards-based and explore the culture and history of California specialty crops and agricultural practices were created, assessed, and disseminated. The positive ramifications of combining an understanding of specialty crop history and practices with the experience of

enjoying the fruits and vegetables has been shown to change students' attitudes and behaviors, which can impact consumption habits for a lifetime.

This project builds upon the 2013 Specialty Crop Block Grant Program Project 12: *CA Food for CA Kids*. The project was the pilot statewide launch of California Thursdays. It resulted in a successful collaboration with 15 school districts that collectively serve 190 million meals per year. Participating districts reported increased serving and consumption of specialty crops. The pilot Collective Action Day (CAD) on October 23, 2014, with participating districts hosting local events across the state on the same day coupled with a communications campaign, built awareness through earned media coverage from over 90 outlets, including television, radio, front page newspaper, and online. The expanded program built upon the accomplishments of the pilot effort.

Project Approach

The CEL successfully accomplished all "Expanding California Thursdays" program activities. The integrated suite of program activities included three tracks: (1) market enhancement, (2) nutrition education, (3) program assessment and management.

Market Enhancement Activities
Activity 1(a)(1) Create artwork featuring six new California specialty crops.

The CEL selected, sourced, and photographed six new California specialty crops: apricots, beets, cabbage, chard, grapes, and watermelon. The CEL's Creative Director worked with a commercial food photographer to create the appealing images. They became part of a collection of 18 California Thursdays produce images that are featured prominently in a variety of promotional materials –posters, signage, and truck-wraps – and are made available free to participating districts for their use, further amplifying the importance of California-grown specialty crops as the centerpiece of the program.

Activity 1(a)(2) Design new marketing materials for school districts.

During the entire grant period, the CEL designed and disseminated a variety of promotional materials to school districts on three separate occasions that were aligned with events and convenings. The artwork for the promotional materials, such as poster templates, is also made available for free to participating districts for their subsequent production of additional items.

In preparation for the California Thursdays third CAD on March 17, 2016, CEL produced and distributed double-sided bilingual posters (in English and Spanish) promoting California-grown oranges, strawberries, and carrots. The 58 participating school districts, which included the third cohort of 16 new districts, received a total of 2,350 posters. The pilot RFP process for the truck-wrap promotion (see Activity 1(b) below) was also conducted with 12 participating districts in San Diego County timed to coincide with the March 2016 CAD.

During the two August 2016 professional development orientations for the fourth cohort of participating school districts, which included 13 new districts, CEL designed and produced aprons featuring a California-grown orange. These aprons serve as marketing tools to students at the point of purchase in school cafeterias.

New districts also received the full collection of produce images and poster templates on thumb drives distributed at the orientations.

In recognition of National Farm to School Month in October 2016, CEL encouraged all 71 participating school districts to conduct a Tomato Salsa Challenge, based on one of the three specialty crop lessons. To raise awareness, promote the tomato lesson, and incentivize the challenge, a social media contest was conducted (see Activities 2(a)(2) and 3(f) below). Responding to requests for additional student-facing materials for use in cafeterias, CEL designed and produced "clings," clear vinyl window decals for use on salad bar sneeze-guards and service line windows, featuring tomatoes, broccoli, carrots, lettuce, and oranges. CEL produced a total of 7,320 sets of the clings, each set containing all five produce images in sizes ranging from 3.25"x3.25" to 3"x6," and distributed them the districts for use in the more than 2,900 school sites within the California Thursdays Network in advance of the October Salsa Challenge.

Activity 1(a)(3) Produce, distribute, and promote educational resources to school districts.

As part of its promotional efforts to educate students and school communities about the availability of California specialty crops as well as where food comes from and how it reaches the table, CEL developed and promoted online educational resources. They include: "Five Things Educators Can Do," to encourage teaching students about fresh, healthy California food and, among other things, promoting visits to local farmers' markets; family-scaled versions of five California Thursdays recipes for children and parents to cook at home that emphasize California-grown specialty crops; and a special website supporting the program's regional collective impact effort in San Diego County with "Five Things Parents Can Do," (in English and Spanish versions) encouraging visits to "a farmer's market or grocery store that features locally grown fruits and vegetables." The majority of these efforts were produced through matching funds and they are distinct from the standards-based lessons created as part of the Nutrition Education track.

Activity 1(b) Provide funds to school districts, through an RFP process, to truck-wrap delivery vehicles with artwork featuring California specialty crops; provide delivery vehicle decals to school districts with remaining funds.

At the outset of the promotional efforts related to the first California Thursdays Network CAD, CEL produced a Styleguide, to encourage consistent and effect use of the California Thursdays produce images, which included a graphic display on the side of a delivery vehicle as a sample "rolling billboard." One innovative district immediately used the specialty crop images on a 22' truck and reported enthusiasm from the community. Inspired by this successful effort, during this grant period, CEL made available matching funds to districts that wished to use one of two approved truck-wrap designs for their delivery vehicles. In advance of the March 2016 CAD, CEL conducted a pilot Request for Proposals (RFP) process with 12 school districts in the San Diego County, which resulted in three districts wrapping a total of 11 vehicles with images promoting California specialty crops. The production process was more challenging and time consuming than anticipated, due to variations in vehicle size and shapes. Subsequently, the RFP was made to the full California Thursdays Network in advance of the October 2016 Salsa Challenge, which resulted in an additional 13 districts securing funding, for a final total of 24 truck-wrapped vehicles in 16 districts. Despite the initial production challenges, the wrapped trucks have been very well received in their school communities and the promotional effort was a tremendous success.

When it became clear that there would be funds available at the conclusion of the statewide RFP process, CEL continued to innovate and be responsive to needs in the field. CEL proposed to use the remaining funds to offer vehicle decals with produce images, approximately 4'x4' in size, to districts that would pay for installation. The decals were equally well received and 51 were installed on delivery vehicles. In all, 75 school district vehicles are wrapped or have decals with engaging, large-scale images of California specialty crops.

Activity 1(c) Conduct three student focus group sessions and produce a summary report.

CEL contracted with Brown Miller Communications to conduct three student focus group sessions to better understand students' attitudes about eating California specialty crops, their perceptions surrounding the benefits that specialty crops bring to their lives, and which messages and strategies resonate with youth. Focus groups were conducted with students in seventh and eighth grade in three locations across California (Sacramento, Monterey, and San Diego counties) in order to provide a statewide sample.

The focus groups were held during September 2016 with students from Seaside Middle School in Monterey Peninsula Unified School District, Millennial Tech Middle School in San Diego Unified School District, and Harriet Eddy Middle School in Elk Grove Unified School District. Participants were recruited according to three criteria: students in seventh or eighth grade who are proficient in the English language, qualified for free or reduced-price school meals, and comfortable speaking in a group setting. Every attempt was made to recruit students who reflected the ethnic and gender diversity of each school district. Each of the moderated focus groups lasted approximately 90 minutes.

Brown Miller Communications authored a Student Focus Group Report with a description of methodologies and key findings. CEL authored a Student Focus Group Summary with key findings and disseminated it to all 71 food service directors in California Thursdays Network. A sample of key findings include:

- General Attitudes on Fruits and Vegetables: Students enjoy eating fresh, unblemished fruits and believe they are healthy and beneficial, but are generally ambivalent toward vegetables.

- Prefer Local and Organic: On average, students slightly prefer locally-sourced foods over out-of-state, but would very likely choose organic/non-GMO options due to concerns regarding the use of pesticides.

- Perception of Agriculture: Students define their region as "agricultural" only if they can see a field on a regular basis. "Agriculture" generally has a positive connotation, although it can raise concerns of pesticides.

Nutrition Education Activities

2(a)(1) Develop three classroom lessons that examine the historical and cultural significance of California specialty crops.

Prior to developing individual lessons focused on California specialty crops, CEL conducted research and conceived of a framework for a curriculum that increases the opportunity for new lessons to be incorporated in formal classroom instruction. Initially, the plan was to create learning experiences for fourth grade students

that compliment that grade level's emphasis on California history. Subsequently, the framework was expanded to align with California science and social science standards creating developmentally appropriate learning experiences for third- through fifth-grade students.

CEL developed, designed, produced, and assessed three new lessons that focus on navel oranges (Oranges: A Taste of California Sunshine), cabbage (Investigating Cabbage Traditions), and tomatoes (Tomato Salsa Challenge). To create the lessons, CEL worked with a curriculum design technical expert in consultation with educators at Farm Lab at Encinitas Unified School District.

2(a)(2) Design publication of three lessons and disseminate them free online through California Thursdays network of school districts.

Following the educator assessments completed by Farm Lab, the full collection of lessons was revised, finalized, and published as a free download on CEL's website. A targeted email, with links to the lessons, was disseminated to the entire Network with encouragement to disseminate them further to educators, administrators, FoodCorps service members, and parents within each school community.

Program Assessment and Management Activities

Activities 3(a)-(i) Assessment-related Activities (listed below).

CEL worked with Resource Development Associates to successfully complete the following activities:

- 3(a) Create/conduct baseline survey of school districts participating in California Thursdays program.
- 3(b) Record baseline digital statistics for social media.
- 3(c) Record digital statistics for social media and record earned media count.
- 3(d) Activity removed from original work plan.
- 3(e) Create and conduct questionnaire survey of school districts participating in California Thursdays program.
- 3(f) Record digital statistics for social media and record earned media count.
- 3(g) Create and conduct questionnaire survey to educators assessing their use of the California Thursdays educational resources.
- 3(h) Manage projects, compliance, and regular reporting.
- 3(i) Monitor performance through data collection and assessment.

Project scope did not benefit commodities other than specialty crops.

Project partners include:
Two new cohorts of school districts joined the California Thursdays network bringing the total to 71 districts. The third cohort included 16 new district partners: Arvin Union, Buckeye Union, Cajon Valley Union, Chula Vista Elementary, Encinitas Union, Escondido Union, Grass Valley, Julian Union, Nevada Joint Union High, Pajaro Valley Unified, Palm Springs Unified, Rescue Union, San Ysidro Union, Santa Cruz City, Tustin Unified, and Vista Unified School Districts. The third cohort participated in the third statewide CAD on March 17, 2016. The forth cohort included 13 new district partners: Bakersfield City, Banning Unified, Centralia Elementary, Coast Unified, Escondido Union High, Fort Bragg Unified, Grossmont Union High, North Monterey County, Oxnard Elementary, Pasadena Unified, Rio, San Luis Coastal Unified, and

Woodlake Unified School Districts. The forth cohort attended one of two orientations in August 2016 and the Farm to School Month (October) statewide Tomato Salsa Challenge contest. For a complete list of districts and their enrollment and nutrition service statistics, please visit: www.californiafoodforcaliforniakids.org/network.

CEL produced new marketing materials during this period featuring six new crop images and contracted with an accomplished food stylist and photographer, who selected fresh and seasonal California fruits and vegetables for photographing. CEL engaged in the truck wrap promotion and contracted with Plumbline Studios, Inc., a design agency with many years of experience, to tailor the design to each district's individual vehicle requirements. CEL contracted with Brown-Miller Communications to conduct three focus group sessions across the state and to support public relations campaigns aligned with the March 2016 collective action day. CEL contracted a curriculum design technical expert to develop the California agriculture lesson plans and also partnered with Encinitas Unified School District's Farm Lab to evaluate the classroom lessons. CEL worked with a social media coordinator to provide continuous social media communication and engage with social media efforts at the participating school districts. CEL also worked with Resource Development Associates to develop data collection and assessment instruments and conduct analysis for progress reports and the final report.

Goals and Outcomes Achieved

California Thursdays is an effective implementation and marketing strategy that incentivizes sustainable systems change and provides opportunities, technical expertise, and turn-key resources to partnering school districts.

This project aimed to achieve two main goals: 1) increase procurement and serving of California specialty crops, and 2) increase awareness of California specialty crops. Achieving these goals was an ongoing and sometimes long-term process as each school district begins at a different stage of readiness to implement California Thursdays, including the necessary processes and activities to increase procurement, serving, and awareness of California-grown produce in school meals. As such, all districts have a different starting point (or baseline) from which progress can be measured and also progress at different rates. For some districts, increasing procurement of specialty crops by 10% or doubling the number of California Thursdays meals may be a short-term target, while for others this may be a longer-term goal.

Several school districts reported they have increased procurement and serving of California specialty crops following implementation of California Thursdays, while others have reported they are putting processes in place to increase procurement (e.g., outreaching to new vendors, inquiring about California-grown products). Additionally, detailed, baseline procurement data (2014-2015) has been collected from school districts with advanced data capacity. This data will be used to assess more quantitative changes in procurement of California specialty crops when updated information is available. CEL has undertaken several activities and created and distributed a variety of marketing and educational materials to raise awareness of California specialty crops (e.g., social media campaigns, posters, salad bar clings, aprons, truck wraps/decals, lesson plans). Districts have recounted the usefulness of these resources and some food service directors have noted increased awareness among students and community members.

CEL will continue to support participating districts, provide useful resources, refine data collection processes, and track program outcomes to assess progress toward these goals.

1. Increased procurement and serving of California specialty crops

Collecting procurement data from all California Thursdays school districts has been challenging. In many cases, distributors do not provide the origin of the produce to schools, or food is delivered weekly, making it difficult to discern produce purchased specifically for California Thursdays. For schools without advanced procurement data capacity, collecting and synthesizing provenance information is burdensome and requiring such onerous data collection could dissuade school districts' participation in the California Thursdays program. As a result, CEL has collected detailed, quantifiable procurement information from schools identified as having external support to facilitate advanced procurement data collection and synthesis.

For schools without advanced procurement data, CEL conducted several key informant interviews with Food Service Directors (FSDs) to collect self-reported information about approximate or estimated changes in the procurement and serving of California specialty crops since implementation of California Thursdays. Additionally, in the fall of 2016, CEL sent a survey to FSDs of the 58 school districts participating in California Thursdays Network during the 2015-16 school year. The surveys included questions about the serving of California specialty crops and frequency of California Thursdays meals.

Districts will have reported a 10 percent increase in purchases of California specialty crops, as reported by districts with advanced procurement data:

CEL identified 13 California Thursdays school districts with support and advanced data capacity, all of which are part of a regional collaborative in San Diego County facilitated by Community Health Improvement Partners (CHIP). Of these 13 school districts, 11 had baseline procurement data available for the 2014-2015 school year (reported below). However, procurement data for the 2015-2016 school year is not currently available; changes in procurement will be assessed once available.

During 2014 to 2015, California Thursdays school districts spent an average of 11.7% of their total food expenditure on California-grown foods (Figure 1). In comparison, non-California Thursdays school districts in the collaborative spent only 9.5% of their total expenditure on California-grown food, suggesting higher procurement of local foods in California Thursdays districts. CHIP estimates that ¾ of all California-grown food expenditures are spent on produce. Using this metric, CEL estimates that California Thursdays districts spent nearly half of all produce expenditures on California-grown fruits and vegetables (Figure 2).

Figure 1. Proportion of Total Food Expenditure Spent on California-grown Foods in 11 California Thursdays Districts in San Diego County, 2014-2015

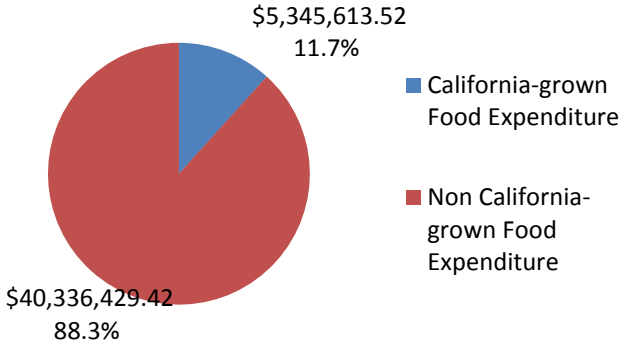
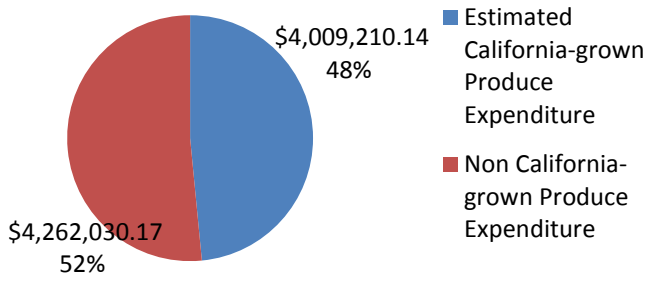


Figure 2. Estimated Proportion of Total Produce Expenditure Spent on California-grown Produce in 11 California Thursdays Districts in San Diego County, 2014-2015



CEL conducted key informant interviews with 10 FSDs, representing a diversity of regions and district sizes. Among the FSDs interviewed, six reported that they are purchasing more California-grown items. One FSD estimated that after implementing California Thursdays, their districts' "procurement of local produce has increased from less than one third to over 60%." Among the four districts who reported no increased purchase of California specialty crops, one explained that their district was already serving California-grown food every day. The others stated that although overall procurement of California products did not increase as much as expected, they are being more proactive about connecting with local farmers directly or they have communicated their preference for California-grown foods to their vendors.

Districts will have added an additional, new California specialty crop procured from a current or new vendor:

During the key informant interviews, five FSDs reported procuring at least one new California-grown item, including carrots and strawberries. Two FSDs reported they are procuring these items from new vendors. Several FSDs also noted they are expanding their recipe repertoire to incorporate more and new California-grown products. Of the 19 districts who completed the California Thursdays survey, 74% (n=14) reported serving at least one new California Thursday menu item during the 2015-16 school year. Five districts (26%) reported serving four or more California Thursday menu items throughout the school year.

Students in participating school districts will have seen a 100 percent increase in the number of opportunities to eat school meals containing fresh fruits and vegetables:

The California Thursdays survey administered in the fall of 2016 was used to collect baseline information regarding the number of opportunities to eat school meals containing California-grown fruits and vegetables. This survey will be administered again in the winter of 2017-2018 to assess any changes. Of the 19 districts who completed the survey, 79% (n=15) reported their districts were serving California Thursdays meals, including California specialty crops, at least once a week during the 2015-16 school year, while the remainder reported they served these meals at least once a month. The majority (81%) reported all school sites in their

district served California Thursdays meals in 2015-16; only three districts were not yet serving California Thursdays meals at all school sites.

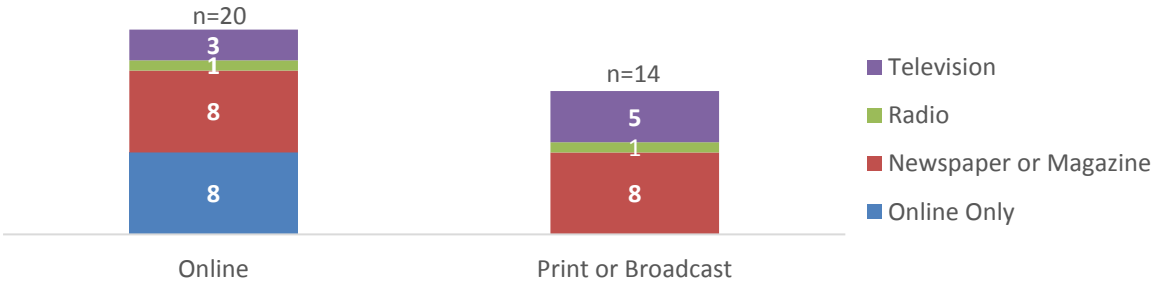
Moreover, 12 districts (67%) reported they plan to increase the frequency of California Thursdays meals, the number of California Thursdays menu items, or the number of participating school sites during the 2016-17 school year. Five additional districts (28%) reported they are currently brainstorming future steps to increase the serving of California-grown foods. Through the key informant interviews, two FSDs elaborated that they plan to expand opportunities to consume California specialty crops by incorporating California-grown fruits and vegetables into the breakfast and/or afterschool snack programs.

2. Increased awareness of California specialty crops

Earned media coverage will have included: (a) one national broadcast or print feature; (b) 10 local broadcast or print features; and (c) 20 web-based outlet features:

During the grant period, California Thursdays met its local broadcast/print and web-based feature goals, but did not have a national feature. California Thursdays earned 22 unique, local media features, including 14 print or broadcast features, and eight web-only articles (Figure 3). Twelve of the print and broadcast features were also featured online, resulting in 20 total web-based features. Through these earned features, CEL surpassed its target of 10 local or broadcast features, and met its goal of 20 web-based features.

Figure 3. Number of Earned Articles or Broadcasts Highlighting California Thursdays in March 2016 by Media Outlet Type (N=22 Unique Features)



Facebook will have received a 15 percent increase in "likes" and Twitter will have seen a 15 percent increase in re-tweets of California Thursdays postings:

California Thursdays also substantially boosted its social media presence. California Thursdays increased its average number of monthly Facebook posts, likes per post, and shares per post from 2.5 to 5.4, 13 to 20.5, and 1.1 to 2.9, respectively, from baseline (November 2014 to September 2015) (Figure 4). Similarly, California Thursdays increased its average number of monthly tweets, re-tweets per tweet, and hearts per tweet from 4.1 to 6.5, 1.7 to 4.9, 1.4 to 2.8, respectively (Figure 5). These surges in Facebook likes and Twitter re-tweets represent 58% and 100% respective increases over baseline, far exceeding the original target of a 15% increase in each metric.

Figure 4. Change in Average Number of Facebook Posts, Likes, and Shares per Month from Baseline to October 2015-December 2016

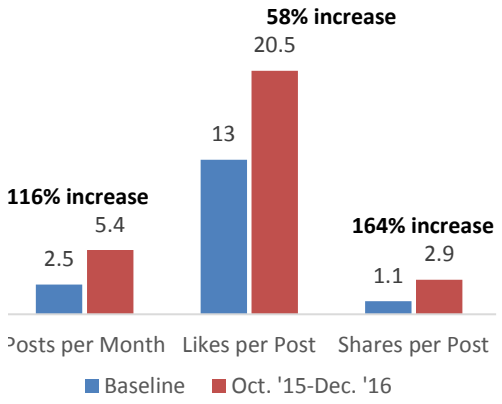
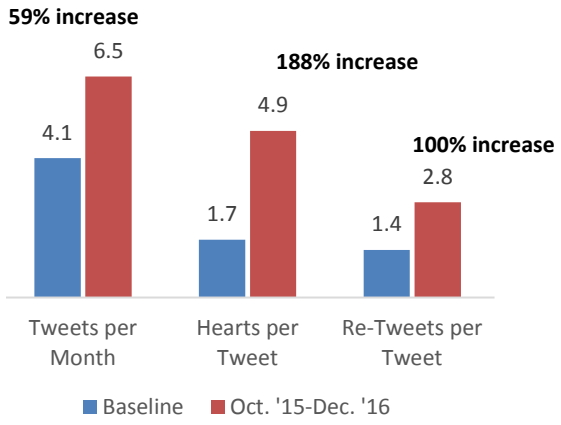


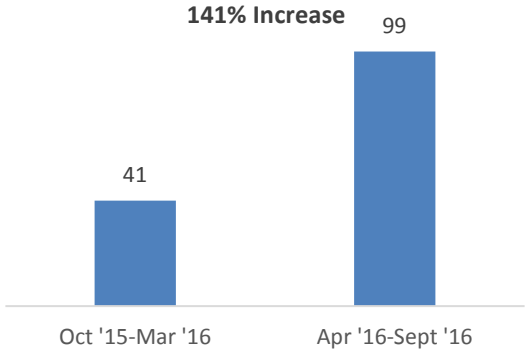
Figure 5. Change in Average Number of Tweets, Hearts, and Re-Tweets per Month from Baseline to October 2015-December 2016



Students in participating school districts will have been exposed to a 70 percent increase in the amount of marketing and educational materials promoting large images of California specialty crops in their schools and local communities:

CEL distributed new marketing and educational materials to school districts that increase awareness of California specialty crops. During the first half of the grant period, CEL distributed 2,350 posters depicting California-grown oranges, strawberries, and carrots to 58 school districts, representing an average of 41 posters per district. Throughout the remainder of the grant period, CEL produced and distributed 7,320 sets of salad bar clings featuring California-grown broccoli, carrots, lettuce, oranges, and tomatoes to 74 districts, representing an average of 99 clings per district. With the addition of salad bar clings CEL increased the students' exposure to California specialty crop marketing and educational materials by 141% (Figure 6), exceeding the original target of a 70% increase. Additionally, CEL distributed 170 aprons to the 16 new school districts joining the California Thursdays network in August 2016 to further raise awareness California specialty crops being served in the schools.

Figure 6. Change in Average Number of Marketing Materials Distributed to Districts from October 2015-March 2016 to April 2016-September 2016



Students and school community members in 12 districts will have seen school delivery trucks showing large images of California specialty crops:

CEL exceeded its goal of truck-wrapping or applying decals to delivery vehicles in 12 districts. During the grant period, CEL successfully engaged 16 districts, providing matching funds to truck-wrap 24 delivery vehicles and providing truck decals for an additional 51 vehicles. School district personnel reported the

wrapped trucks have been very well received by the community and have helped raise community and student awareness of California specialty crops being served in their schools.

Students will have reported an increased awareness of the availability of California specialty crops being served in their schools, according to the results from three student focus group sessions:

Brown Miller Communications conducted three focus groups with seventh and eighth grade students to evaluate students' awareness of California-grown foods, and identify key messages and communication strategies that resonate with youth. Generally, students had favorable attitudes towards fresh produce and indicated a slight preference for locally-grown fruits and vegetables. Most students reported they enjoy eating fresh fruit, although fewer enjoyed eating vegetables. From the focus group findings alone, it was unclear whether students were aware of the California specialty crops served in their schools. During key informant interviews, however, some FSDs noted changes in awareness. For example, one FSD stated, "[kids] ask now on Thursdays, where did [the food] come from? They now know that Bolthouse carrots come from up the road…this happens at multiple schools in [our district]; the kids want to know where the food comes from." Other FSDs noted they were unsure of changes in awareness, noting they did not have the means to identify or assess changes.

To help further raise awareness about California-grown foods in schools, students in the focus group suggested emphasizing where the product is sourced, including the name of the farm and nearest city, and telling stories about where the food was produced. Students also reported that highlighting fruit could be one strategy to encourage students to try new foods and eat locally-sourced foods. Other suggestions were to incorporate fruit into a greater number of dishes or create a "Fruit of the Week" program to introduce students to new varieties. Messages citing better taste, improved health, increased focus, better grades, environmental benefits, and boosting the local economy may also help motivate students to consume meals containing fresh, local produce.

Three educators will have seen and assessed the use of new educational resources made available to their districts:

CEL developed three classroom lesson plans for fourth grade, incorporating California history and one of three California specialty crops: tomatoes, cabbage, and navel oranges. Two educators at Farm Lab piloted and evaluated these lesson plans. Overall, all of the lesson plans were very well received, with the educators rating all lesson plans as "very good." The educators found the lesson plans very engaging and informative for students. One educator noted, "this engaging, experiential lesson is the sort that makes learning come naturally, so that sensory memory is made and information is absorbed and endures…into future food choices, grocery shopping, and appreciation for the historic accounts of food, health, plants, and agriculture." The educators reported that the lesson plans fit into the curriculum well, and they are likely to implement the lesson plans, or parts of the lesson plans, into future classes. These lessons were published and disseminated free online to school districts in the California Thursdays network to further increase awareness of California specialty crops.

Successful outcomes include:
CEL had several notable successes in increasing the procurement and awareness of California specialty crops. Through the resources and support provided to schools, it appears that CEL and California Thursdays is

helping schools increase the procurement and serving of California specialty crops. For example, in San Diego, on average, California Thursdays districts spent 2% more of their food expenditures on California grown foods compared to non-California Thursdays districts. Moreover, six out of the 10 FSDs interviewed reported they have increased procurement of specialty crops following implementation of California Thursdays, while five out of 10 mentioned they are also serving new California-grown fruits and vegetables. Additionally, 79% of the 19 school districts survey reported they are already serving California Thursdays meals, including fresh California-grown produce, at least once a week. Most districts surveyed, 67%, reported that they plan to further increase the frequency of California Thursdays meals or menu items in the next school year.

CEL is also successfully raising awareness of California specialty crops in schools among students and the larger community. Following the California Thursdays CAD in 2016, California Thursdays earned 22 local media features. Additionally, CEL provided matching funds for 24 truck-wraps and 51 decals for food delivery vehicles in 16 different school districts. These truck wraps and decals feature bold images of California specialty crops and serve as rolling billboards to raise awareness of California-grown produce served in school meals. To raise awareness in schools and the community further, CEL has also substantially increased its social media presence, doubling the number of monthly Facebook posts and increasing tweets by 59%. The number of Facebook likes and Twitter re-tweets have also grown by 58% and 100%, respectively, demonstrating the community's increased engagement in these campaigns.

Within the schools, CEL has produced and distributed 2,350 double-sided bilingual posters, 7,320 sets of salad bar clings, shareable poster templates, and aprons to raise students' awareness of California-grown fruits and vegetables available in their schools. With these new products created and distributed, CEL increased students' exposure to and promotional materials featuring California-grown produce by 141%. The exposure to these materials has increased students' awareness of and curiosity about California-grown vegetables served in their schools. Some districts have noted that students are more aware and interested in where their food comes from. CEL conducted three focus groups with middle-school students to identify more effective strategies and messages to promote awareness and education about California-grown foods. Beyond developing promotional materials, CEL created three lesson plans integrating California history and a different California specialty crop (navel oranges, tomatoes, and cabbage). Educators at Farm Lab piloted these lesson plans, and rated them all as informative and engaging. CEL disseminated these lesson plans free online to extend their reach and help educate more students about California-grown foods.

Beneficiaries

California growers and producers: 340 direct beneficiaries. The data from the San Diego County cohort revealed that California Thursdays districts spent an average of 11.7% of their total food expenditures on California-grown foods, nearly half of all produce expenditures on California-grown specialty crops, and 60% reported an increase in purchases of California-grown specialty crops. Extrapolating across 71 districts with estimates of average grower and producer beneficiaries results in this conservative figure. The formula for this figure includes the following factors: estimating that an average district purchases fruits and vegetables from a minimum of 20 California growers and producers (sometimes aggregated through one or more distributors) and adjusting for overlaps (i.e., one farm providing product to several districts) results in an average of eight grower and producer beneficiaries per district, which is then multiplied by 60% (reflecting the percentage of districts that reported an increase in purchases through the program) and results in the estimate of California

specialty crop growers and producers direct beneficiaries (i.e., 71 x 8 x .60) receiving increased income from school districts for their product.

California student consumers: 517,984 direct beneficiaries. This figure comes directly from the 33 districts hosting California Thursdays events at the CAD celebrating the forth cohort of new districts. Nutrition Service Departments at the districts collectively reported serving this number of California Thursdays meals, which feature freshly prepared California-grown fruits and vegetables, at 1,394 school sites on a single day. Given that some of the 71 participating districts did not report, even though they served California Thursdays meals (primarily because they were not hosting events), this figure is lower than the full number of student beneficiaries.

School community awareness of California-grown fruits and vegetables: 418,200 direct beneficiaries. Using the 1,394 school site figure reported above and estimating that the promotional materials (posters, clings, aprons, truck wraps, and vehicle decals) are viewed by a minimum of 300 students, staff, families, and local community members results in this number of direct beneficiaries. Note that this figure is likely to be low: total impressions for the third CAD on March 17, 2016 resulting from earned media equaled one million broadcast and 11.7 million web impressions and social media campaigns associated with CADs and the Tomato Salsa Challenge resulted in more digital engagements to raise awareness.

Estimates of total program beneficiaries are 936,524.

Lessons Learned

The "Expanding California Thursdays" program involved multiple, interrelated activity tracks engaging a large statewide network – with 71 districts encompassing more than 2,900 schools, 1.85 million students, and 11,600 nutrition service staff – with a range of overlapping outcomes related to the goals of increasing the procurement, consumption (participation), and awareness of California-grown fruits and vegetables in school meals.

Among the challenges were three significant disruptions, which CEL and program partners were able to overcome and that consequently reinforce the major lesson learned regarding flexibility, nimbleness, and the necessity for a backbone organization in a collective impact effort to remain alert to opportunities. The disruptions include two principle staff changes during the grant period. The founding program director moved on after the March 2016 CAD. With its strong connections and knowledge of the field, CEL was able to identify and recruit a highly accomplished new program director who had been a Nutrition Service Director. The program director was able to seamlessly join the CEL staff and successfully continue the ambition efforts associate with this grant program. In April 2016, the CEL education program director left the organization. Fortunately, the CEL executive director was able to assume direct management of the education-related program activities and work with long-time curriculum development technical expert contractor to seamlessly advance program goals and outcomes.

Two other disruptions to program efforts —the truck wrap promotion and the student-created video project— were addressed in two different manners. The complexities of tailoring approved truck wrap designs for vehicles with different dimensions and districts with different marketing graphics capacities to address the requirements necessitated the engagement of a design agency with many years of experience. This resulted in exceeding program objectives and outcomes. After exploring opportunities to develop and produce a student-

created video and consulting with three video production companies with expertise working with students, CEL concluded that it could not adequately deliver a video that would meet the requirements of the program and solely enhance California specialty crops. The program activity was discontinued and remaining funds were allocated to other innovative projects intended to reach the same target audience. Using social media, the "This is What Local Looks Like" Tumblr campaign associated with the San Diego County Collective Impact Effort, and the statewide "Tomato Salsa Challenge" social media contest met the target objectives.

An additional ongoing challenge involves the complexities of procurement data collection at the statewide scale of the program.

Activating a program and network of the scale of "Expanding California Thursdays" generates broad and granular outcomes, many of which are anticipated yet occur in innovative and unexpected ways. The most noteworthy unexpected outcomes are the program's successful and rapid scaling and replication. Growing from 42 to 58 to 71 public school districts is noteworthy. Much of this success is related to the strategies described above and to the power of providing motivated operations, like the participating school districts, with the turnkey resources that the program generated. Its replication, as evidenced by New York City Public Schools, the second largest district in the nation, adopting the program as "New York Thursdays" and planning effort with leaders in Nebraska to adapt the program statewide in their public school districts, demonstrate both the effectiveness of the program model and the power of the promotional and public relations efforts that have conveyed its value across the nation.

Additional Information

For an extensive collection of resources, including many detailed in this final report; a full list of the California Thursday network of 71 collaborating public school districts; and a media room with sample broadcast, print, and online earned media and the full collection of press releases, please visit www.californiathrusdays.org.

USDA Project No.: 10	Project Title: Promoting California Pistachios and Dried Plums (Prunes) as Ingredients in China	
Grant Recipient: American Pistachio Growers	**Grant Agreement No.:** SCB15010	**Date Submitted:** December 2017
Recipient Contact: Haiying Zhang	**Telephone:** (559) 475-0435	**Email:** HZhang@AmericanPistachios.org

Project Summary

American Pistachio Growers (APG) and the California Dried Plum Board (CDPB) proposed hosting a series of culinary and baking seminars to promote pistachios and dried plums as ingredients to the hotel industry in China and Hong Kong. This series was a continuation of the "Bakery Seminars" conducted by APG and CDPB in Korea and Japan in 2014 and was based on the success of these seminars. While pistachios and dried plums have not been widely used as bakery ingredients by the China and Hong Kong hotel and restaurant sector in the past, through hosting these seminars, APG and CDPB endeavored to create a new demand among the trade, and to maximize the potential of the rapidly growing hotel and restaurant sector of this market.

Over the last several years, China and Hong Kong have been important export markets for both California pistachios and dried plums. However, most pistachios and dried plums are purchased at the retail level by consumers seeking healthy snack options. Furthermore, while purchase of U.S. pistachios among foodservice professionals has increased in recent years, it remains a largely undeveloped channel for pistachios and dried plums. Distributors and foodservice professionals that source pistachios frequently mix products from multiple origins to reduce costs. To build awareness and demand for California products, APG and CDPB sponsored baking seminars encourage the utilization of pistachios and dried plums as ingredients.

This project built upon the 2013 Specialty Crop Block Grant Program Project 7: *Baking Seminars for Food Professionals in Japan and South Korea*. The project implemented five successful bakery seminars and two recipe contests in Japan and South Korea in the spring of 2014. This project was part of an overall objective by APG and the CDPB to create demand among foodservice professionals in Asia. Following the completion of the baking seminars, 384 participants received a survey requesting evaluation of the event. Of all respondents, 98% indicated their experience was 'good' or 'excellent.' A total of 93% indicated they would use or recommend the use of California pistachios and dried plums in their business.

Through the current project, progress built upon and applied successful tactics that were used in South Korea and Japan to reach luxury hotel chefs in China and Hong Kong. To accomplish this objective, APG and the CDPB hosted multiple cooking seminars in Shanghai, China's largest and most prosperous city, and Hong Kong, a large import hub and top tourism destination for Asia region. Both cities maintain a high concentration of luxury hotels, restaurants, and professional bakers, and show positive signs for future growth.

Project Approach

The following table outlines APG/CDPB's work plan activities and indicates the timeframe in which they were completed:

Activities	Completed
Coordination of in-country representative and chef; Preliminary event organization	October 2015 - January 2016
Kick off meeting and contract negotiation with celebrity chef Nancy Silverton and in-country representative	January 2016
Developed curriculum for seminars, including recipe development, recipe photography, and recipe book layout and design; worked with three, U.S. based contracted chefs to develop additional recipes for inclusion in recipe book that contained at least 51% specialty crop ingredients	January 2016 – April 2016
Organized all seminar logistics including identifying qualified attendees, securing space in Hong Kong and Shanghai and developed supporting materials (including translation to traditional and simplified Chinese).	January 2016 – May 2016
Invitations to attend baking seminars were distributed and responses monitored	February 2016 – April 2016
Planned trip by in-country contractor to the seminar locations to finalize the event details. Travel included a trip from Shanghai to Hong Kong.	May 2016
Post-seminar survey was prepared	April 2016
Pre-seminar coordination (ensuring all raw materials were purchased and sent to venue locations; coordinating Chef Silverton's presentation and demonstration with in-market agency; provided equipment list necessary for Chef Silverton's work; other required plans and preparations between Chef Silverton and in-market agency)	May 2016
On-site day-before and day of preparation and recipe demonstration (assisted in set-up on location at each seminar venue; assisted in demonstration during event to support Chef Silverton's presentation; fielding relevant questions and requests from attendees)	June 2016
U.S. delegation (APG, CDPB, two growers, and celebrity Chef Nancy Silverton and Dahlia Narvaez) traveled from California to Shanghai to perform the first series of baking seminars.	June 2016
Two baking seminars hosted in Hong Kong and three baking seminars hosted in Shanghai (nine day trip). Prior to each baking seminar, one day of preparation is required. APG contracted with the bakers, chefs and a coordinator associated with the hotel (Shanghai) or training vocational (Hong Kong) venues where the events took place. Following preparation and orientation, these individuals were available to assist on the following day at the seminar. Surveys were conducted immediately following the baking seminars.	June 2016
The U.S. delegation (two APG, two growers, Chef Silverton and Chef Narvaez, and the two in-country representatives traveled from Shanghai to Hong Kong to perform the second series of seminars.	June 2016
Export data was collected on a monthly basis following the conclusion of the baking seminar series. Beginning in August 2016, APG accessed the United States Department of Agriculture's (USDA) Global Agricultural Trade System (GATS) to determine monthly changes in U.S. pistachio export volume and value.	August 2016 – February 2017
Assessed results of baking seminars including following-up with participants to identify the likelihood of developing recipes using pistachios and dried plums. Quarterly newsletters were also distributed to participants.	July 2016 – December 2016

Activities	Completed
Follow-up evaluations were conducted six months following the conclusion of all five baking seminars in Hong Kong and Shanghai.	August – December 2016
APG/CDPB worked with in-country contractor to organize and coordinate a Recipe Contest. List of participants were contacted for interest and recipe submission, advertising was conducted on APG website, social media and other associated media platforms, and contest rules were communicated to participating seminar attendees. Once participants were identified, APG/CDPB worked with in-country contractor to send ingredients to each participant for use in recipe formulation.	October 2016 – November 2016
APG/CDPB worked with contractor to collect recipe submissions per collection guidelines. Recipes were translated to English.	November 2016
In-country contractor sent APG a minimum of 80 recipes translated in English, formatted in correct recipe format, and with accompanying photos. Once prepared, contractor/APG sent all recipes to each of four US based chef judges. Each chef judge received 20 – 30 recipes for review.	December 2017
US judge panel reviewed and rated recipe submissions according to guidelines. Final selections by each US-based judges—one featuring pistachios, one featuring dried plums—were submitted to APG.	January 2017
In-country contractor announced winning recipe selections, alerted winning participants, and began announcement work across all APG/CDPB associated media platforms and the China Bakery Association's website. The contractor finalized the design for printing each recipe in a double-sided, full color, binder addition page. The contractor mailed each seminar participant copies of the eight winning recipe pages to be included with binder.	January 2017

Pistachios and dried plums are the only commodities that benefited from this project.

APG and the CDPB both made significant contributions towards this project, with the assistance of APG's export program consultant and in-country representative. The groups worked closely on many of the activities related to the grant. Staff from each group provided oversight of all grant activities and ensured that all program expenses met the approved budget.

Furthermore, APG Vice President, and, APG Asia Marketing Director, traveled to the Shanghai and Hong Kong seminars to coordinate the seminars, present on the specialty crops, and provide informational materials information about American pistachios. Additionally, APG growers traveled to speak at the seminars about their work and experience in the pistachio industry. At the seminars, two chefs conducted demonstrations of several recipes using pistachios and dried plums, and spoke about their versatility, nutritional value, and functional benefits in a variety of sweet and savory recipes. All six travelers worked with the in-country representative to coordinate the seminars and communicate with seminar attendees and other contacts during the event. The in-country representative also coordinated with APG to successfully execute a bakery recipe contest as a follow-up event to the seminars which utilized a U.S. judging panel. Recipe submissions were translated and submitted to APG and the U.S. judging panel for review. Finally, the in-country representative announced the winners of the contest and designed and printed recipes for distribution to seminar participants. The recipe contest activity sought to maintain the engagement and interest in pistachios and dried plums among attendees that was initially established during the baking seminars in June 2016, and encourage them

to work first-hand with the specialty crops, while also generate publicity for participation and creativity around opportunities for chefs and other professionals to utilize the specialty crop in their work on a regular basis.

Goals and Outcomes Achieved

The project objective was to increase consumption of California grown pistachios and dried plums as an ingredient among the hotel and baking industry in China and Hong Kong. In order to achieve this, APG and CDPB: 1) utilized surveys to track seminar attendee's increase in awareness, knowledge, and likelihood for utilizing the specialty crops in the future; 2) continue to work with the in-country representative to track the number of menu items in Shanghai and Hong Kong using pistachios and dried plums; 3) collected recipe entries for the baking contest, which provided a measurement of continued engagement among seminar attendees; and 4) continue to use export databases to monitor and record the level of pistachio and dried plum exports to the region.

The longer term, or ongoing measure includes monitoring the export sales value and volume of pistachios and dried plums to the China and Hong Kong region by using the USDA GATS which provides value and volume data for U.S. exports of pistachios and dried plums by their respective HS codes.

Attendance
Goal: Achieve a minimum of 70 attendees per seminar in Hong Kong and 90 attendees per seminar in Shanghai.
Result: For the two seminars in Hong Kong, average attendance for each reached 80, surpassing the goal. For each of the three seminars in Shanghai, attendance reached 90, 95, and 100, respectively, meeting or surpassing outlined goals. APG/CDPB's bakery seminar series in both cities reached a total of 445 members of the market's sector, primarily decision makers from restaurants, ingredient companies, commercial bakeries, baking schools, and hotels.

Post-Seminar Survey
Goal: Achieve post-seminar survey results of 90% or higher for positive responses on the final survey question gauging attendee's use of the specialty crops in the future.
Results:
- For Shanghai seminars, out of 191 total surveys received, 97% of surveyed attendees indicated that they would specify California pistachios and prunes in their businesses in the future.
- For Hong Kong seminars, out of 115 total survey respondents, 100% indicated that they would specify pistachios and prunes in their businesses in the future.

All survey results include the following:

Survey Question	Shanghai Results	Hong Kong Results
Please rate your overall experience at this seminar (*5 being highest rating*)	4.69	3.99
Event facility	4.89	4.06
Recipes produced for this seminar	4.73	4.16
Recipe book and educational videos	4.73	4.05
Did you find these recipes new, innovative, and inspiring to your business?	4.59	3.87
The above are average results, on a scale from 1-5, with 5 being the highest.		
Do you currently use pistachios in your baking and desserts?		
Yes	63%	69%
No	37%	31%
Do you currently use prunes in your baking and desserts?		
Yes	43%	43%
No	57%	57%
As a result of this seminar, will you specify pistachios from California in your business in the future?		
Yes	97%	100%
No	3%	0%
As a result of this seminar, will you specify prunes from California in your business in the future?		
Yes	95%	100%
No	5%	0%
Have you learned anything new about California pistachios and prunes at this seminar?		
Yes	99%	95%
No	1%	5%
Would you recommend this seminar to other bakers or chefs?		
Yes	99%	97%
No	1%	3%

Hotel and Restaurant Sector Menu Item Surveying
Goal: APG/CDPB will work with the in-country representative to monitor and track the number of establishments offering pistachios or prunes as ingredients in menu items. The goal is to see an increase in the regular offering of these products.
Result: In a pre-seminar screening of many of the attending hotels, restaurants, and bakeries, a majority of them had not utilized pistachios or dried plums as ingredients before attending. As a result of the education received through APG/CDPB's bakery seminars however, the demand and regular usage of pistachios and prunes as ingredients were found to be more widely used in establishment's menu items. The resulting percentage is 32.7% of responding establishments—that is, out of 327 outlets surveyed, 20 in Hong Kong and 87 in Shanghai (for a total of 107) reported that they now utilize or have featured pistachios or prunes as ingredients on their menus.

Specialty Crop Exports
Goal: APG/CDPB will collect and analyze export data for increases in export sales of the specialty crops.
Results: According to the USDA GATS during the period following the baking seminars (between August 2016 and January 2017) exports of U.S. pistachios (in-shell and kernels) to China and Hong Kong reached 67,531 MT valued at over $473.9 million. Between August 2015 and January 2016, U.S. pistachio exports (in-shell and kernels) to China and Hong Kong reached 13,258 MT valued at $129.1 million. Year-on-year, this represents a 409% increase in volume and 267% increase in value for the period following APG/CDPB's baking seminars.

The rationale behind measuring total pistachio exports (in-shell and kernels) is that China primarily imports raw (in-shell) pistachios to then have processed domestically into kernels used in the hotel and restaurant sector as ingredients. There is an advantage to this in that tariff rates are less burdensome for raw, in-shell product, and labor for shelling is also less expensive in China.

For U.S. dried plum exports (HS code: 0813200000) to China and Hong Kong combined during 2016 experienced a 19% decline in volume, but an 11% increase in value over 2015, reaching 2,460 MT and $9.38 million. The 2016 export levels for U.S. dried plums reached the highest value returns since 2014.

For the period just following the baking seminar events (August to December 2016) dried plum exports reached 837.8 MT worth more than $3.1 million, representing a slight decrease in volume—but an increase in overall value—when compared to the same period during 2015 (886.8 MT and over $2.6 million). The lower volume during the recent year was due primarily to a pending short crop in California. The results of the seminars, however, will produce long-term benefits for California prunes in the China and Hong Kong hotel and restaurant market.

While it is difficult to measure the exact impact that the bakery seminars APG and CDPB conducted in China and Hong Kong during 2016 had on overall specialty crop export levels, the data being tracked via the USDA database provides insight into the market's overall demand trends and sales potential for these ingredients. APG/CDPB utilize this data to determine market trends and identify targeted audiences to provide education and resources that encourage future sales. These efforts ultimately build a reliant source of export revenue for some of California's most valuable export crops, ensuring profitable returns for growers.

Bakery Recipe Contest
Goal: Fifty to 85 recipe contest entries.
Results: In total, 180 participants submitted entries, half for recipes with pistachios and half with dried prunes. Media results for the announcement of the eight winning recipes reached around 100,000 viewers, mostly hotel and restaurant professionals and consumers, through placement on social network platforms for the China Bakery Association and the China Food Industry Association.

Furthermore, all of the recipes submitted through the contest were new creations, and already 60% of participants from the contest that developed new recipes have expressed their willingness to include their recipes as a regular menu item in their business should they find the appropriate purchasing source.

Baseline data and progress to date includes the export levels for U.S. pistachio kernels and dried plum exports to China and Hong Kong combined, whereby during the 2016 year total U.S. pistachio kernel exports reached

73,504 MT worth over $527 million. Annual U.S. dried plum exports to China and Hong Kong for the 2016 year reached 2,460 MT and $9.38 million. These represent an increase in export value across both crops, and an increase in volume for kernel pistachios. These data points will serve as baselines against which future export sales for the specialty crops will be collected and analyzed, helping APG/CDPB to monitor market trends and potential, and identify opportunities for building on educational efforts.

Major successful quantifiable outcomes of project activities include a total seminar series reach of 445 attendees from key hotel and restaurant sector professions; 12 organic media hits of media coverage for the seminars on key online and print platforms; 180 recipe contest entries from seminar participants four months following the seminars; and 16 media placements for the recipe contest on key online and print platforms worth an ad value equivalent of $48,000 USD.

Beneficiaries

The beneficiaries to this program are 1,850 California pistachio and dried plum growers. Since 2004, the number of pistachio bearing acres in California increased by over 200 percent. In order to support this growth, while maintaining strong prices and returns to growers, APG must continue to generate new demand through building export markets. California also produces an average of 393,740 tons of dried plums annually, making this the 17th largest export crop in California. Furthermore, California is home to upwards of 49,000 acres of dried plum trees and accounts for 48 percent of the world's supply. Additionally, food and ingredient safety and quality is a major concern among the hotel and restaurant sector in China and Hong Kong and their consumers. The completion of this project has provided this sector with important resources and contacts within the California pistachio and dried plum industry, which is well known to provide the highest quality specialty crop products.

Combined, 1,850 California grower families statewide will benefit from this project. These growers generate more than 10,000 locally employed jobs.

Lessons Learned

Overall, APG/CDBP is satisfied with the outcomes of the bakery seminars and bakery recipe contest that were conducted. APG/CDPB achieved significant outreach to the hotel and restaurant sector in the targeted market, conducted highly professional, educational, and engaging seminar events, and received a high level of bakery contest participation from seminar attendees. These outcomes demonstrate the interest and demand for education and information on California pistachio and dried plum specialty crops, and the market potential for future export sales. The baking seminars also allowed APG/CDPB to build on their relationships with some of China's key bakery and tree nut organizations and other major hotel and restaurant contacts, paving the way for future collaborative partnerships, events, or promotional activities.

Should APG/CDPB conduct future activities similar to the bakery seminars, one idea to improve could be working closer with these in-market organizations to provide additional outreach to targeted audiences. Another lesson learned during the planning and implementation of the project was the difficulty in coordinating two seminars in Shanghai to occur on the same day, and the limited time spent in-country ahead of the seminar dates to prepare. While the execution of each of the seminars was professional and successful, APG/CDPG would improve the timing and planning in working with the venues and partners just ahead of the events to ensure smoother day-of preparations.

Additional Information

Attached to the report submission are three PDF files containing activity summaries, results, and professional photos of the baking seminars in Shanghai and in Hong Kong, as well as the follow-up recipe bakery contest.

AMERICAN PISTACHIO GROWERS

2015 Specialty Crop Block Grant – Baking with California Pistachios and California Prunes

Shanghai, June 14-15, 2016

Activity Summary

As part of the Special Crop Block Grant to promote California pistachios and prunes, a series of bakery seminars themed “Baking with California Pistachios and California Prunes” were organized to be held between June 14-15 in Shanghai. APG, who leads this project, brought over two James Beard Foundation Award recipients: Nancy Silverton and Dahlia Narvaez, to develop and demonstrate the application of California pistachios and prunes by creating several special recipes. In total, three seminars were held in Shanghai. Each seminar was attended by pastry chefs and bakers from local hotels, restaurants, bakeries, cafes and bakery institutes. To further promote APG and California pistachios, growers Diane Wood and Kristi Robinson also traveled to Shanghai to meet with local media outlets.

AMERICAN PISTACHIO GROWERS

Project Background

About China's Bakery Market

Baked goods increased in market value from $19.6 billion to $25.4 billion from 2012 to 2013. It is predicted that China will be the second largest bakery market by 2018 at an estimated $47 billion in value. In addition to bakeries, the city has over 20,000 restaurants. As China becomes an increasingly developed country, more people will be concerned about their health and seek ways of introducing healthier foods. The Chinese Nutrient Society recommends to consume more nuts as the average Chinese person does not eat enough. Bakeries and restaurants will reflect this mentality and can introduce pistachios as a source of nut nutrients.

While many regions in China offer different styles and tastes in bakery, Shanghai is undoubtedly one of the most influential. The city makes up around 50% of the bakery industry size in China. Its over 5,000 bakeries offer a wide range of baking goods. Bordered by the Jiangsu and Zhejiang provinces, the city's bakeries are also heavily influenced by other regions.

Shanghai Venue Decorations &InterContinental Shanghai

Foam Board Signs (x10)

Outdoor Tent/Umbrellas with APG/CPB Logos

Banners (Dining Hall)

Backdrop & LED Screens

Banners (Meeting Room)

Backdrop (Reception Area)

Shanghai POS Materials

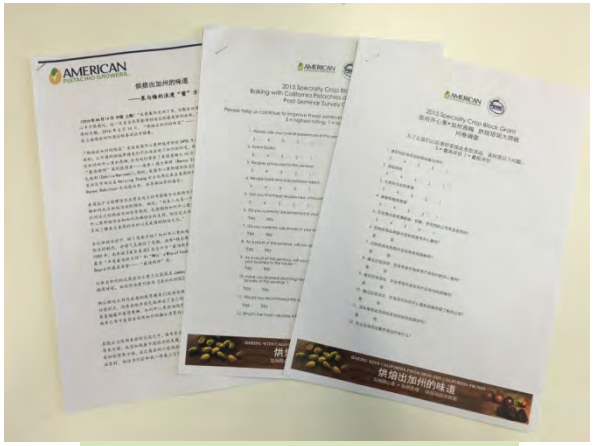
Invitations (Chinese & English) & Envelop

Brochures (Chinese & English)

Folder

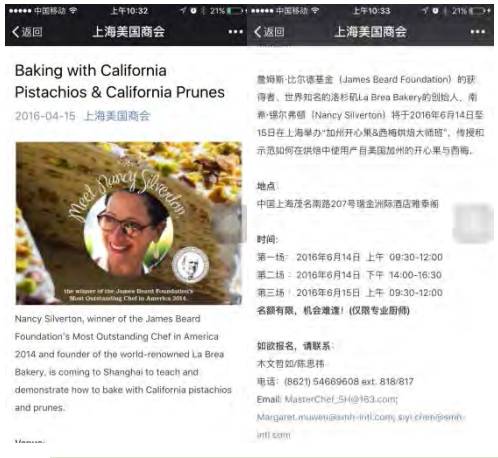
Notepad & Flash Drive

Recipe Binder



Questionnaire & Press Release

Shanghai Advertisement



AmCham WeChat Official Account
(4/15, 4/22, 5/13, 5/27)

Banner on AmCham E-newsletter
(4/20, 4/27, 5/11, 5/25)

China Food Manufacturing Journal
(May 2016)

China Bakery Association
WeChat Official Account
(May 7)

Commerce of Baking WeChat
Official Account
(4/14, 4/19, 5/6, 5/30, 6/6, 6/13)

HiBaking WeChat Official
Account
(4/12, 4/20, 5/9, 5/26, 6/16)

21Food WeChat Official
Account
(4/14, 5/9, 6/1, 6/6, 6/9)

Shanghai Activity Details

Baking with California Pistachios and California Prunes - Shanghai
Location: InterContinental Shanghai Ruijin
Date: June 14-15, 2016
-Session 1: June 14, 9am-12pm
-Session 2: June 14, 1:30pm-4:30pm
-Session 3: June 15, 9am-12pm

Introduction by Mr. Roger Zhang, APG China In-Market Representative

Starting off each session, APG In-Market Representative Mr. Roger Zhang welcomed the attendees to the seminar and thanked them for their support. At the first session, USDA Agricultural Trade Office Shanghai Director Ms. Valerie Brown-Jones was introduced, who also gave a welcoming speech to the audience.

Presentation from Ms. Judy Hirigoyen and Ms. Haiying Zhang

APG Vice President of Global Marketing, Ms. Judy Hirigoyen, introduced APG and the history/background of American pistachios to the audience. APG Asia Marketing Director Ms. Haiying Zhang also provided additional remarks about the American pistachio market in China. Two videos about produced by APG were played to help further educate the attending chefs about the quality, harvesting and processing of American pistachios.

Shanghai Activity Details

APG Growers Ms. Diane Wood & Ms. Kristi Robinson Introduced

Growers Ms. Diane Wood and Ms. Kristi Robinson were introduced by Ms. Hirigoyen. Each grower was introduced separately, and they greeted the audience and spoke about their work and experience with the pistachio industry.

California Prune Presentation from Mr. Roger Zhang

As a cooperator of this project, the California Prune Board was also represented in the seminar. A presentation by CPB China In-Market Representative Mr. Roger Zhang helped educate the attendees on the market for the California prunes in China.

Baking Seminar & Demonstration by Chef Nancy Silverton & Dahlia Narvaez

After being introduced, Chef Silverton and Narvaez began demonstrating the making of the former's 6 special recipes created using California pistachios and prunes. The preparation, baking method, information about the ingredients used, skills and techniques, as well as Chef Silverton's own personal tips were shared on stage. A professional interpreter helped translate in real time for the attendees. At the end of each recipe's showcase, a sample piece is brought across the room for photographs.

Shanghai Activity Details

Tasting & Networking Session

At the end of all demonstrations, 5 recipes from Chef Silverton's were offered for tasting. Guests were able to network and mingle, as well as to meet and greet Chef Silverton, Chef Narvaez, Ms. Wood and Ms. Robinson, signing autographs and taking photos for memento. Chef Silverton and Narvaez also answered questions about baking in general as well as questions regarding the recipes. Ms. Hirigoyen and Ms. Zhang also answered questions regarding American pistachio and its availability.

Shanghai Activity Details

Media Interview Session

On June 14, after both seminar sessions were completed, APG China held a Media Interview session with 10 media outlets from local print media and online media. Attending the session from APG were Ms. Judy Hirigoyen, Ms. Haiying Zhang, Ms. Nancy Silverton, Ms. Dahlia Narvaez, Ms. Diane Wood and Ms. Kristi Robinson. Each member received questions regarding APG, American pistachio's information, growing and harvesting, using American pistachios in baking, as well as strategy for the Chinese market. The session was hosted by APG China In-market representative Mr. Roger Zhang, and the media questions and APG members' answers were translated by a professional interpreter.

Post-Event Survey

Participants of the seminars were given a survey questionnaire at the end of each session to fill out in order for APG to learn their feedback and improve on organizing these seminars. Below is the results received from all 285 participants attending the 3 seminars:

5 = highest rating 1 = lowest rating

•Please rate your overall experience at this seminar.
Average: 4.69

•Event facility
Average: 4.89

•Recipes produced for this seminar
Average: 4.73

•Recipe book and educational videos
Average: 4.73

•Did you find these recipes new, innovative, and inspiring to your business?
Average: 4.59

•Do you currently use pistachios in your baking and desserts?
Yes: 121 **No: 70**

•Do you currently use prunes in your baking and desserts?
Yes: 82 **No: 109**

•As a result of this seminar, will you specify pistachios from California in your business in the future?
Yes: 186 **No: 5**

•As a result of this seminar, will you specify prunes from California in your business in the future?
Yes: 181 **No: 10**

•Have you learned anything new about California pistachios and prunes at this seminar?
Yes: 190 **No: 1**

•Would you recommend this seminar to other bakers or chefs?
Yes: 189 **No: 2**

Selected comments from participants:

What's the most valuable information you learned from this seminar?

•Never expected pistachios/prunes can be used for baking like this
•Diversified recipes
•Creative recipes, very enlightening
•Better understanding on the bakery ingredients and their application
•First time learning about baking with California pistachios and prunes. Will apply what's learned to future product development
•Selection of baking ingredients
•Easy-to-do recipes and suitable for bakery stores
•Very rewarding event! See the baking skills of Nancy, learn about the specialties of the two ingredients. I feel safe to use these two for my products
•A lot of new methods to make cakes/desserts
•A good opportunity to network with industry peers
•I've learned that pistachios/prunes can help add flavor to baking stuff. I will try use them for my products later
•Very helpful for new product development
•I've learned that Californian pistachios/prunes are natural and healthy. I plan to use them for my products
•The hygiene of California pistachio production
•Safe and healthy Californian pistachios/prunes are worthwhile for purchasing

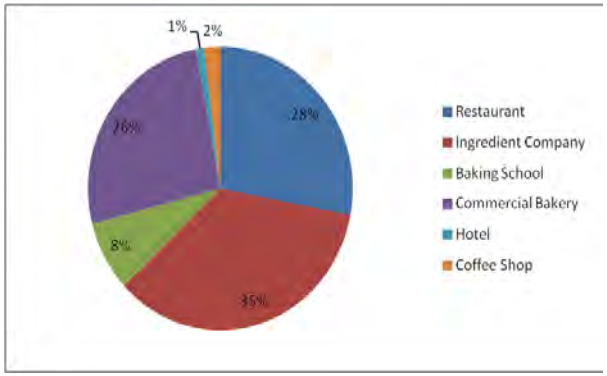
Participant Demographics

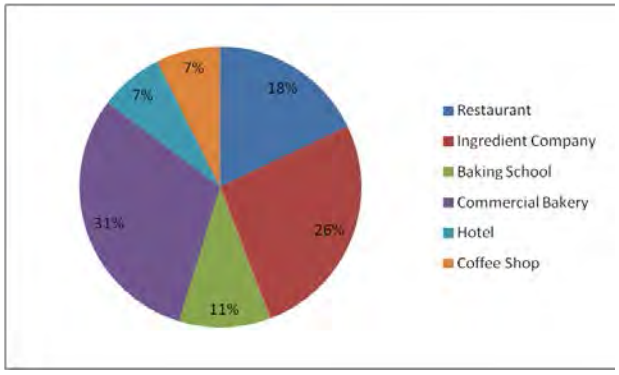
The tables and charts below are data from each session's participants. Among all 285 attendees, 59 were from restaurants, 83 from commercial bakeries, 13 from coffee shops, 22 from hotels, 83 from ingredient companies and 25 from baking schools. Among all participants, 41% of them said the chefs have the authority to order products, 39% refer to their Purchasing department and remaining 20% by their R&D department.

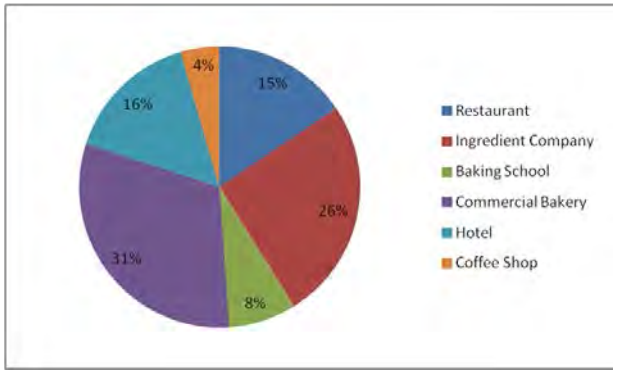
Session 1	
Restaurant	28
Ingredient Company	35
Baking School	8
Commercial Bakery	26
Hotel	1
Coffee Shop	2
Total	100

Session 2	
Restaurant	17
Ingredient Company	25
Baking School	10
Commercial Bakery	29
Hotel	7
Coffee Shop	7
Total	95

Session 3	
Restaurant	14
Ingredient Company	23
Baking School	7
Commercial Bakery	28
Hotel	14
Coffee Shop	4
Total	90







Conclusion

The Baking Seminar was a very successfully held event. By associating American pistachios with a world-renowned chef such as Nancy Silverton, APG is able to promote its pistachios to a Chinese market, particular in the foodservice market, a high quality, safe and versatile ingredient to use in bakery applications.

The vast majority of participants was happy and satisfied with the preparation and execution of the seminars. Many have shown considerable interest in using American pistachios in their menus and services in the future.

The press released via 12 print media, online media and social media has helped APG and American pistachios gain exposure and interests from both other foodservice providers who could not attend the seminars as well as regular consumers who follow these outlets.

Appendix I: Session 1 Attendance List

Contacts – Session 1

No.	Company Name	Name	Title
1	Xiao Cai	Alvin Lee	Art Director
2		Midi Ding	Content Director
3		Vicky Wong	Marketing Director
4	Artisan Bakery	Minyi Wang	Shop Owner
5	Xinchen Bingwu	Lai Peng	Shop Owner
6	Your-Cake	Your Cake	Shop Owner
7	Sweetbox	Xian Zhu	Shop Owner
8	Seven Plus One	Kun Wu	Art Director/Content Director/Marketing Director
9	Shanghai Mengshushu Food Co., Ltd	Jinhua Zhang	Deputy Director
10	Hefei Hualong Shipin Canliao Co., Ltd	Xiansheng Zeng	Manager
11		Haiguang Cao	
12	Shanghai Yian Catering Co., Ltd	Hong Xie	Pastry Chef
13	Individual/Self-Employed	Guoqin Yang	Individual Pastry Chef
14	Individual/Self-Employed	Ping Li	Individual Pastry Chef
15	Individual/Self-Employed	Chad Grochowski & Karen Yan	Media DirectorIndividual Pastry Chef

Contacts – Session 1

No.	Company Name	Name	Title
16	COFCO Zhangjiagang Office	Kui Song	R&D Department
17	Shanghai Main Codex Trading Company	Zhicheng Zhou	Pastry Chef
18		Zhihong Zhou	Pastry Chef
19	Shanghai Yonghui Supermarket (Bread Workshop)	Lang Kong	R&D Department
20	Individual/Self-Employed	Yanfang Zhou	Pastry Chef
21	Shanghai Shida Catering Co., Ltd	Wenwen Feng	R&D Department
22		Jin Yang	R&D Department
23		Yanping Dou	Pastry Chef
24	Taiyuan Pingu Food Co., Ltd	Xinghui Zhang	Pastry Chef
25	Jike Express	Zhaohui Liu	Pastry Chef
26	Shanghai Milk Food Co., Ltd	Rongmin Xie	Pastry Chef
27	Guangdong Qichang Food Co., Ltd	Zuoliang Yi	Pastry Chef
28	Shandong Bake Hanbang Food Co., Ltd	Mingdi Song	Pastry Chef
29	Shenzhen Dafeng Spice Company	Risu Na	Pastry Chef
30	Dongguan Shengmai Kitchen Facility Co., Ltd	Wenan Liu	Pastry Chef

Contacts – Session 1

No.	Company Name	Name	Title
31	Guangzhou Paris Angel Bakery House Company	Longhai Zhou	Pastry Chef
32	Zhuzhou Media JW Hotel	Wei Zheng	Pastry Chef
33	Shanghai Taste-Agri Food Company	Yanming Xie	R&D Department
34		Jiancheng Zhu	R&D Department
35	Shenzhen Nanshan Hammett Hatton	Gaoli Deng	R&D Department
36	Shenzhen Liu Kyuan Bakery School	Qianwen Pan	Pastry Chef
37		Zhiyong Liang	Pastry Chef
38	Meilin Bakery Workshop	Juan Xu	Individual Pastry Chef
39	Xiaoshan Maixiangyuan Food Co., Ltd	Zhigang Tong	Pastry Chef
40	Shanghai Maiyou Food Co., Ltd	Kuilong Fan	R&D Department
41	Shanghai Bon Matin Paris	Weiren Zheng	R&D Department
42	Jiecheng Food Co., Ltd	Weikang Xiong	Pastry Chef
43	Shanghai Wanresearch Food Co., Ltd	Xinjing Xie	Pastry Chef
44		Jun Xie	Pastry Chef
45		Yanzhong Xie	Pastry Chef
46	Jiaxing Baohong Food Co., Ltd	Ruiying Huang	Pastry Chef

Contacts – Session 1

No.	Company Name	Name	Title
47	Taylor Foodservice Equipment Distribution (Shanghai) Co., Ltd.	Martha Yang	Regional Sales Manager
48	Shanghai Longhua Suzhai Food Co., Ltd	Jinjiu Liu	R&D Department
49	Shanghai CDF Food Industry Co., Ltd.	Chiu	R&D Department
50	Shanghai Young Bakers	Flora Xiao	R&D Department
51	Yi-Chang Holdings Co., Ltd.	Evelyn Liu	Product Manager
52	Joyhan International Trading (Shanghai) Co., Ltd.	Richard Shen	Procurement Director
53	Shanghai Yuanying Trading Company	Yiren Liang	R&D Department
54	Shanghai Langyifang Catering Co.	Xiaojun Huang	Executive Chef
55	Shanghai New East Cuisine School	Yanwei Wu	Pastry Teacher
56	Hong Kong Xincan Food Co., Ltd	Xinwei Yuan	Purchasing Manager
57	Hunan Xiangxiang Baking Park	Gang Luo	VIP Customer Manager
58		Haijun Wang	
59	Zhongjian Agri-food Company	Xuemin Zheng	Product Manager
60	Guangxi Fangchenggang Baking Material Trading Company	Zongji He	Chairman
61	Everbiz Catering Management Company	Yunhai Yin	Product Manager

Contacts – Session 1

No.	Company Name	Name	Title
62	Shanghai Jiangren Construction Company	Yunye Meng	R&D Department
63	Shanghai Lintai Catering Co., Ltd	Ye Qiu	R&D Department
64	Individual	Yan Wang	Individual Pastry Chef
65	Individual	Ju Zhou	Individual Pastry Chef
66	GAIA II	Johnny Wang	Executive Chef
67	Shanghai Xingfu Trading Company	Jing Zheng	Product Manager
68	8 2/1 Otto e Mezzo BOMBANA	Shouyan Zhu	Executive Chef
69		Bob Xie	Pastry Chef
70	Wagas	Daniel Sunzenauer	R&D Department
71		Hui Zhu	Individual Pastry Chef
72	Shanghai Bright Cheese & Butter Co., Ltd.	Meng Jie	Sales Manager
73	GK Life	Zhaohui Liu	Sales Manager
74		Yatai Liu	
75	ABC Cooking Studio	Jin Ying	Purchase Department
76	Meiji's	Xiaolan Ye	Product Manager
77	Shanghai Jiawai International Trade Co., Ltd.	Kevin Zhou	Technical Support

Contacts – Session 1

No.	Company Name	Name	Title
78	Hunter Gatherer	Renel Sun	R&D Department
79		Phoebe Tran	
80	Jamaicablue	Chengke Lou	Pastry Chef
81	Raya Workshop	Yiqun Tang	R&D Department
82	Fashion Bakery	Yuan Dong	Pastry Chef
83	Individual	Zhaojun Wang	Individual Pastry Chef
84	Vanguard Supermarket	Zuodong Ren	Purchasing Manager
85	Ledudu Cake Shop	Haihong Wang	Pastry Chef
86	Ningxia Yunwu Villa Food Co., Ltd	Junjie Zeng	Pastry Chef
87	Jinjiang High Hat Vocational School	Youmei Cheng	Pastry Chef
88	Give me 5 Holdings Ltd.	Tony Wong	Pastry Manager
89	Shanghai Yinrui Catering Management Co.	Pan Yin Lin	Marketing Director
90		Lai Shen Qing	
91	Shanghai Maishengli Restaurant Management Co.	Guang Hua Mi	Art Director
92		Zhe Ke	

Contacts – Session 1

No.	Company Name	Name	Title
93	Shanghai Shuyou Seafood Restaurant	Ruan Wei Xian	Content Director
94		Tian Zhi Fang	
95	Renhe Hotel	Ren Si Si	Pastry Chef
96		Tian Hao Dong	Executive Chef
97	Shanghai Lingang Hotel	Bao Wu Jun	Pastry Chef
98		Xu Dai	Pastry Executive
99	Shanghai New Phoenix Town Hotel	Liu Ying Jie	Pastry Chef
100		Tao Zhi Wen	Executive Chef
101	Shenzhen Maigu Trading Company	Xinyuan Huang	Pastry Chef

Appendix II: Session 2 Attendance List

Contacts – Session 2

No.	Company Name	Name	Title
1	Shanghai Hengshan Picardie Hotel	David Song	Executive Chef
2	Disney Royal Banquet Hall	Xuewen Yu	Pastry Chef
3	Moogo Industrial (Shanghai) Co., Ltd.	Cissy Chen	Pastry Chef
4		Leigh Yang	Pastry Chef
5	Individual	Hong Xie	Individual Pastry Chef
6	Yiguo.com	Yuan Sun	Product Manager
7	Dashidai Shanghai Food Co., Ltd	Xuemei Zhang	Product Manager
8	Shanghai Shujie Catering Co., Ltd	Siew Lin Mok	Pastry Manager
9	Guangdong Hongxin Food Co., Ltd	Wei Feng	Pastry Chef
10	Shanghai Xinrong Food Co., Ltd	Yongquan Yao	Manager
11	Shanghai Ka Yuan Property Management Co.	Yuan Wei Jun	Executive Chef
12	Stone Line	Alex Wang	Pastry Manager
13	Lan's Kitchen	Ellen Chen	Owner
14	Crowne Plaza Century Park Shanghai	James Wang	Executive Chef
15	Individual	Fei Wang	Individual Pastry Chef

Contacts – Session 2

No.	Company Name	Name	Title
16	Shanghai Kelao Catering Co., Ltd	You Jin	R&D Department
17		Ying Zhuang	
18		Jijing Zhang	
19	Raya Workshop	Yiqun Tang	R&D Department
20	Shanghai Kaida Vocational School	Aixian Wang	Pastry Chef
21	Make a Wish	Zanguo Mo	Pastry Chef
22	Regal International East Asia Hotel	Mary Zhang	Pastry Chef
23	Bright Dairy & Food Co., Ltd	Johny Zhang	BCB Manager
24	Shanghai Rushi Catering Co., Ltd	Haiping Ouyang	R&D Department
25	Mr. Gan Bakery Class	Lili Fan	Pastry Instructor
26	Shanghai Baikexing Food Co., Ltd	Hui Yu	R&D Department
27	Paris Baguette	Hongqiu Zhang	Purchasing Manager
28	The Family Li Imperial Cuisine	Chef Wang	Executive Chef
29	Individual	Hui Zhu	Individual Pastry Chef
30	Beijing Chunbo Technology Co., Ltd	Maggie Bai	R&D Department

Contacts – Session 2

No.	Company Name	Name	Title
31	Shanghai Bond Vocational School	Lei Guan	Pastry Instructor
32	Shanghai Yuyuan Wanli Hotel	Jie Cheng	Executive Chef
33	Bread Talk	Ms. Ji	Marketing Director
34		Alan Tsou	Art Director
35		Tiger Yu	Content Director
36		Jiaren Feng	Marketing Director
37	Shanghai Modern Food Professional School	Wenhua Gan	Pastry Instructor
38	Formaggeria	Marina Ma	Manager
39	Nanjing Beicheng Food Co., Ltd	Peipei Zhu	District Manager
40	Shanghai Haren Food Co., Ltd	Yuhui Mao	District Manager
41	Shanghai Qishi Industrial Trade Co., Ltd	Tiantian Xia	Sales Manager
42	Pingan	Wenwen Yu	Pastry Chef
43	Bon Matin	Weiren Zheng	Art Director/Content Director/Marketing Director
44	Baker's Pizza	Wei He	Art Director/Content Director/Marketing Director
45	Forever Young Bread	Forever Young Bread	Owner

Contacts – Session 2

No.	Company Name	Name	Title
46	Marco Polo	Hongwi Zhang	Manager
47	Maison Asano	Taiwei Lin	Executive Chef
48	Paris Blue	Nepal Bertrand	Executive Chef
49	Barbarossa	Javier Carrizosa	Group Head Chef
50	Hilton Shanghai	Allen	Pastry Chef
51	Songshan Kaiyang Bakery Shop	Jingzhi Li	Pastry Chef
52	Taiyuan Pingu Food Co., Ltd	Qilong Wen	Pastry Chef
53	Shanghai Pingu Food Co., Ltd	Xianxin Zhu	Pastry Chef
54	Jiangsu Youshiyuan Food Co., Ltd	Yaxin Zhang	Pastry Chef
55	Individual	Jiguang Yi	Individual Pastry Chef
56	Dongguan Jiaodian Food Co., Ltd	Lihua Yuan	Pastry Chef
57	Zhejiang New Meixin Food Co., Ltd	Shide Shao	Pastry Chef
58	Shanghai Kesong Food Co., Ltd	Fengyang Ye	Pastry Chef
59	Hunan Taijie Food Co., Ltd	Shaochun Yun	Pastry Chef
60	Kangzhibao Supermarket Bakery Shop	Xiuzhen Yang	Pastry Chef

AMERICAN PISTACHIO GROWERS

Contacts – Session 2

No.	Company Name	Name	Title
61	Mianyang Kafu Cake Shop	David Song	Pastry Chef
62	Julian Dessert Factory	Xuewen Yu	Pastry Chef
63	Lida Cake	Cissy Chen	Pastry Chef
64	White Knight European Cake	Leigh Yang	Pastry Chef
65	Huizhou Minus Five Degrees Food Co., Ltd	Hong Xie	Pastry Chef
66	Shenzhen Pinzhenshi Green Food	Yuan Sun	Pastry Chef
67	Dongguan Jiaodian Food Co., Ltd	Xuemei Zhang	Pastry Chef
68	Irisk Cake Shop	Siew Lin Mok	Pastry Chef
69	Dongguan Yicheng Food Co., Ltd	Wei Feng	Pastry Chef
70	Fusheng Trading Company	Yongquan Yao	Pastry Chef
71	Shanghai Pingu Food Co., Ltd	Yuan Wei Jun	Pastry Chef
72	Life Crop Hand-made Cake	Alex Wang	Pastry Chef
73	Individual	Ellen Chen	Pastry Chef
74	Individual	James Wang	Pastry Chef
75	Anna's Park Dessert Shop	Fei Wang	Pastry Chef

Contacts – Session 2

No.	Company Name	Name	Title
76	Individual	David Song	Pastry Chef
77	Aoze Bakery Shop	Xuewen Yu	Pastry Chef
78	Yuanlang Food Co., Ltd	Cissy Chen	Pastry Chef
79	Yangfengtang Bakery Factory	Leigh Yang	Pastry Chef
80	Pinquanju Bakery House	Hong Xie	Pastry Chef
81	Qinhuangdao Beijiamisi Food Co., Ltd	Yuan Sun	Pastry Chef
82	One Family Bread House	Xuemei Zhang	Pastry Chef
83	Individual	Siew Lin Mok	Pastry Chef
84	Shenzhen Pinzhenshi Green Food Co., Ltd	Wei Feng	Pastry Chef
85	Forever Young Food Technology Co., Ltd	Yongquan Yao	Pastry Chef
86	Taohongbei Bakery House	Yuan Wei Jun	Pastry Chef
87	Mingxiang Fruit Food Co., Ltd	Alex Wang	Pastry Chef
88	Jinlv Cutural Communication Company	Ellen Chen	Pastry Chef
89	Guiyang Huaxin Kude Educational Conculting Company	James Wang	Pastry Chef
90	Fujiade Flour Co., Ltd	Fei Wang	Pastry Chef

Contacts – Session 2

No.	Company Name	Name	Title
91	Beijing Paopaoxiong Food Co., Ltd	Liang Zheng	Pastry Chef
92	Shandong Yihao Food Co., Ltd	Jing Ma	Pastry Chef
93	Individual	Shuquan Dong	Individual Pastry Chef
94	Individual	Wenxiong Li	Individual Pastry Chef
95	Individual	Yijin Wang	Individual Pastry Chef

Appendix III: Session 3 Attendance List

Contacts – Session 3

No.	Company Name	Name	Title
1	Shanghai Hengshan Picardie Hotel	Li Zhe	Executive Chef
2	Shanghai Meiji Catering Co., Ltd	Cheng Cheng	Manager
3	Starbucks (China) Company Limited	Jane Jin	R&D Department
4		Tracy He	
5		Lizzie Xu	
6	Yuyao Botman	Wenbin Zhang	Pastry Chef
7	Shanghai Nuoshen Food Trading Co., Ltd	Zhiju Zhu	Product Manager
8	The Central Asian Diet	Zhenlin Gu	Pastry Teacher
9		Qiaoling Zou	Individual Pastry Chef
10	Intercontinental Shanghai National Exhibition and Convention Center	Rick Bartram	Executive Chef
11	Hilton Shanghai Hongqiao	Cary Cheng	Pastry Chef
12	El Pomposo	Jose Mascaros	Executive Chef
13	Farine	Fred	Pastry Chef
14	Avec Toi	Konno Ai	Art Director/Content Director/Marketing Director
15	Individual	Yunna Qian	Individual Pastry Chef

Contacts – Session 3

No.	Company Name	Name	Title
16	Individual	Yi He	Individual Pastry Chef
17	Individual	Guanyu Chen	Individual Pastry Chef
18	Shanghai Kaida Vocational School	Haoran Wang	Pastry Chef
19		Wei Li	
20	Zhengzhou Qianji Food Co., Ltd	Junming Hu	Pastry Chef
21	Yang Jing Bang	Shangyu Li	Pastry Chef
22	Ding Yuan	Junhua Zhong	Executive Chef
23	Radisson Hotel Shanghai New World	Mars Xu	Pastry Chef
24	Longemont Shnaghai	Helen Zhang	Pastry Chef
25	Marriotte City Center	Angela Shu	Executive Chef
26	Individual	Qiuyan Li	Individual Pastry Chef
27	Onehome Hotel	Wentian Zhang/Tony Hu	Executive Chef
28	Shanghai Port View Catering Management Company	Nico He	Product Manager
29	Shanghai Xingguo Hotel	Wei Fu	Executive Chef
30	Oreno	Xiaobin Zhang	Chef

Contacts – Session 3

No.	Company Name	Name	Title
31	Shoei International Trading Shanghai Co., Ltd.	Melody Chen	R&D Department
32	Chikalicious	Eugenio Mauro Pompili	Executive Chef
33	Va Bene	Pep Zhong	Chef
34	Wolfgang Puck Bar&Grill	Ms. Li	Chef
35	Bang Bistro	Shine	Pastry Chef
36	Morton's	Satish K Birhade	Executive Chef
37	Sunflour	Eva Hu	Pastry Chef
38	Grand Kempinski Hotel Shanghai	Duncan Feng	Assistant Executive Chef
39	Renaissance Shanghai Putuo Hotel	Jason Lu	Pastry Executive Chef
40	Crowne Plaza Shanghai Harbour City	Yun Shi	Pastry Chef
41	Shanghai Four Season Hotel	Jin Feng	Executive Chef
42	Shanghai Hongquan Lisheng Hotel	Chef Yang	Executive Chef
43	Shanghai Kuaiyi Info-tech Company	Sailing Li	R&D Department
44	Vindmylla Bakery	Chang Xiao	Pastry Chef
45	Changsha Richy Cake House	Mu Li	Pastry Chef

Contacts – Session 3

No.	Company Name	Name	Title
46	Individual	Dongqiong Guo	Individual Pastry Chef
47	Haixing Chenyi Cake World	Guoyong Wang	Pastry Chef
48	Jianan Xuhe Food Co., Ltd	Chengrui Li	Pastry Chef
49	Jianan Xuhe Food Co., Ltd	Jing Ma	Pastry Chef
50	Jianan Xuhe Food Co., Ltd	Feng Song	Pastry Chef
51	Jianan Xuhe Food Co., Ltd	Fenglin Tan	Pastry Chef
52	Jianan Xuhe Food Co., Ltd	Jianbo Wang	Pastry Chef
53	Jianan Xuhe Food Co., Ltd	Xinbing Wu	Pastry Chef
54	Jianan Xuhe Food Co., Ltd	Jianlong Zou	Pastry Chef
55	Beijing Sugar Food Co., Ltd	Danxin Li	R&D Department
56	Yummy Cake House	Nijia Chen	R&D Department
57	Upcity Bakery	Yuan Liu	Pastry Chef
58	Maiyou Food Processing Company	Minjie Chen	R&D Department
59	Jason's Shop	Zong Weng	Pastry Chef
60	Colar Bakery	Jun Kong	Pastry Chef

Contacts – Session 3

No.	Company Name	Name	Title
61	Colar Bakery	Qing Zhang	Pastry Chef
62	Individual	Dezhi Zhang	Pastry Chef
63	Shaoxing Zixi Bread House	Guohui Lin	Pastry Chef
64	Huangyan Dike Bakery	Jiguang Yi	Pastry Chef
65	Bluemill Cake Shop	Xianguang Li	Pastry Chef
66	Pengyuan Food Co., Ltd	Jianfeng Lao	Pastry Chef
67	Shanghai Huating Hotel	Li Ni	Pastry Chef
68	Maik You Catering Company	Ge Chen	Pastry Chef
69	Bright Road	Yida Lu	Pastry Chef
70	Kaiyang Bakery House	Jingzhi Li	R&D Department
71	Lianyungang 7785 Food Co., Ltd	Ning Wang	Pastry Chef
72	Avon Cake Chain Store	Xiaochuan Liu	Pastry Chef
73	Shanghai Croissant Food Co., Ltd	Zeyu Qiu	Pastry Chef
74		Zenglong Xu	Pastry Chef
75	Shaoyang Xinshangren Theme Cake Store	Yong He	Pastry Chef

Appendix IV: Media Interview Attendance List

Contacts – Session 3

No.	Media (EN)	Circulation
1	Metro Express	650,000 per weekday
2	iMERON	50,000 per month
3	Betty's Kitchen	622,700 per month
4	GL' PICTORIAL	80,000 per month
5	Food Development News	600,000 per day
6	PR Newswire	45,000 per day
7	Emigrate to Shanghai	50,000 per two month
8	WHB.CN	500,000 per day
9	Douguo.com	2,880,000 per day
10	That's Shanghai	62,500 per month
11	Restauranteur	80,000 per month
12	Global Gourmet	100,000 per month

Thank you!

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AMERICAN PISTACHIO GROWERS

2015 Specialty Crop Block Grant – Baking with California Pistachios and California Prunes

Hong Kong, June 16-17, 2016

AMERICAN PISTACHIO GROWERS

Activity Summary

As part of the Special Crop Block Grant to promote California pistachios and prunes, a series of bakery seminars themed “Baking with California Pistachios and California Prunes” were organized to be held between June 16-17 in Hong Kong. APG, who leads this project, brought over two James Beard Foundation Award recipients: Nancy Silverton and Dahlia Narvaez, to develop and demonstrate the application of California pistachios and prunes by creating several special recipes. In total, two seminars were held in Hong Kong, and each seminar was attended by pastry chefs and bakers from local hotels, restaurants, bakeries, cafes and bakery institutes. To further promote APG and California pistachios, growers Diane Wood and Kristi Robinson also traveled to Hong Kong to meet with local media outlets.

AMERICAN PISTACHIO GROWERS

Project Background

About Hong Kong and Hong Kong's Foodservice Market

Hong Kong is an import-dependent market, with 95% of food and beverage products imported from around the world. Local production only accounts for 7.8% of fresh vegetables, 59.5% of live poultry and 7.1% of live pigs consumed in the territory to service the 7.2 million population.

With the influx of investment, from Mainland China particularly, Hong Kong's economy is growing at a steady pace. Its GDP and per capita GDP reached US$310 billion and US$42,437 respectively in 2015.

Hong Kong has a very sophisticated high-end restaurant industry. The market is promising in terms of growth amid huge demand from locals and tourists. As the number one business city in Asia, it is the perfect base for companies that want to do business in Mainland China and across the region.

Hong Kong is a quality and trend driven market with a sophisticated international community where new and high-quality products are readily accepted. Hong Kong restaurant industry's purchase of US$4.32 billion in food and beverages generated sales of US$12.4 billion in 2013.

Hong Kong Venue Decorations

Backdrop (Reception)

Backdrop & Banner

Banners (Dining Hall)

Tote bag & Recipe Binder

Pullup Banner

Hong Kong POS Materials

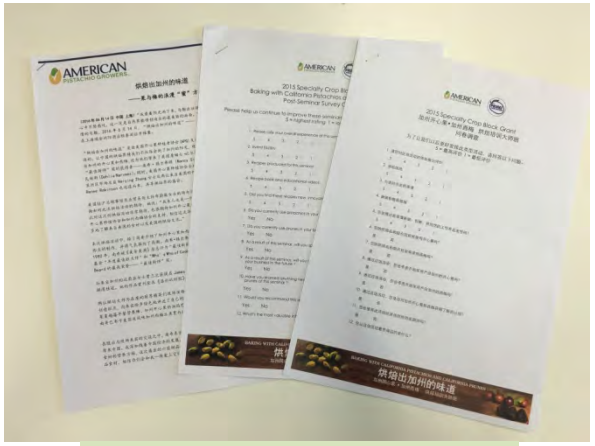
Invitations (Chinese & English) & Envelop

Brochures (Chinese & English)

Folder

Notepad & Flash Drive

Recipe Binder



Questionnaire & Press Release

Hong Kong Advertisement

Advertisements were designed and launched in the Asian Hotel & Catering Times, as well as the Bi-monthly magazine of the Hong Kong Bakery & Confectionery Association. In addition, three Email Blasts advertisements were sent to members of the Hong Kong Chefs' Association to reach out to more industry professionals.

Hong Kong Chefs' Association Email Blast

Asian Hotel & Catering Times (May/June 2016)

Today's Baking (May 2016)

Hong Kong Activity Details

Baking with California Pistachios and California Prunes – Hong Kong
Location: Chinese Culinary Institute, VTC Pokfulam, Hong Kong
Date: June 16-17, 2016
-Session 1: June 16, 1:30pm-4:30pm
-Session 2: June 17, 1:30pm-4:30pm

Introduction by Mr. Roger Zhang, APG China In-Market Representative

Starting off each session, APG In-Market Representative Mr. Roger Zhang welcomed the attendees to the seminar, explain the purpose of the seminar and thanked them for their support. Mr. Zhang also helped introduce special speaker Ms. Melinda Meador, Director of USDA Agricultural Trade Office in Hong Kong.

Opening Speeches from Ms. Melinda Meador and Consul General of the U.S. Embassy in Hong Kong, Mr. Clifford A. Hart

ATO Hong Kong Director Ms. Melinda Meador provided the opening speech for both sessions. On the second day, Mr. Clifford A. Hart, Consul General of the US Embassy in Hong Kong, made a special appearance and spoke to the audience.

Hong Kong Activity Details

Presentation from Ms. Judy Hirigoyen and Ms. Haiying Zhang

APG Vice President of Global Marketing, Ms. Judy Hirigoyen, introduced APG and the background of American pistachios to the audience. APG Asia Marketing Director Ms. Haiying Zhang also provided additional remarks about the American pistachio market in Hong Kong. Two videos produced by APG were played to help further educate the attending chefs about the quality, harvesting and processing of American pistachios.

APG Growers Ms. Diane Wood & Ms. Kristi Robinson Introduced

Growers Ms. Diane Wood and Ms. Kristi Robinson were introduced by Ms. Hirigoyen. Each grower was introduced separately, and they greeted the audience and spoke about their work and experience with the pistachio industry.

Hong Kong Activity Details

Baking Seminar & Demonstration by Chef Nancy Silverton & Dahlia Narvaez

Chef Silverton and Narvaez demonstrated the making of the 6 special recipes created using California pistachios and prunes. The preparation, method, information about the ingredients, skills and techniques, as well as personal tips were shared on stage. A professional interpreter translated to ensure all participants understood the process and to provide communication between the audience and Chef Silverton. Audience members were also invited to join Chef Silverton and Narvaez in taking part of the demo.

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Activity Details

Tasting & Networking Session

At the end of all demonstrations, 5 recipes from Chef Silverton's were offered for tasting. Guests were able to network and mingle, as well as to meet and greet Chef Silverton, Chef Narvaez, Ms. Wood and Ms. Robinson, signing autographs and taking photos for memento. Chef Silverton and Narvaez also answered questions about baking in general as well as questions regarding the recipes. Ms. Hirigoyen and Ms. Zhang also answered questions regarding American pistachio and its availability.

Hong Kong Activity Details

Radio Interview

A radio interview was set up for Ms. Judy Hirigoyen and Chef Silverton in the morning of June 17 in order to increase exposure of the event and American pistachio. The interview was recorded at Radio Three, an English-language radio station under RTHK (Radio Television Hong Kong), the most historic and most listened-to public broadcasting service in Hong Kong. RTHK produces educational, entertainment, and public affairs programs that are also broadcast on commercial television channels. Growers Ms. Diane Wood and Ms. Kristi Robinson also attended and participated in the radio interview.

Post-Event Survey

Participants of the seminars were given a survey questionnaire at the end of each session to fill out in order for APG to learn their feedback and improve on organizing these seminars. Below is the results received from all 160 participants attending the 2 seminars:

5 = highest rating 1 = lowest rating

•Please rate your overall experience at this seminar.
Average: 3.99

•Event facility
Average: 4.06

•Recipes produced for this seminar
Average: 4.16

•Recipe book and educational videos
Average: 4.05

•Did you find these recipes new, innovative, and inspiring to your business?
Average: 3.87

•Do you currently use pistachios in your baking and desserts?
Yes: 79 **No: 36**

•Do you currently use prunes in your baking and desserts?
Yes: 50 **No: 65**

•As a result of this seminar, will you specify pistachios from California in your business in the future?
Yes: 115 **No: 0**

•As a result of this seminar, will you specify prunes from California in your business in the future?
Yes: 115 **No: 0**

•Have you learned anything new about California pistachios and prunes at this seminar?
Yes: 109 **No: 6**

•Would you recommend this seminar to other bakers or chefs?
Yes: 112 **No: 3**

Selected comments from participants:

What's the most valuable information you learned from this seminar?

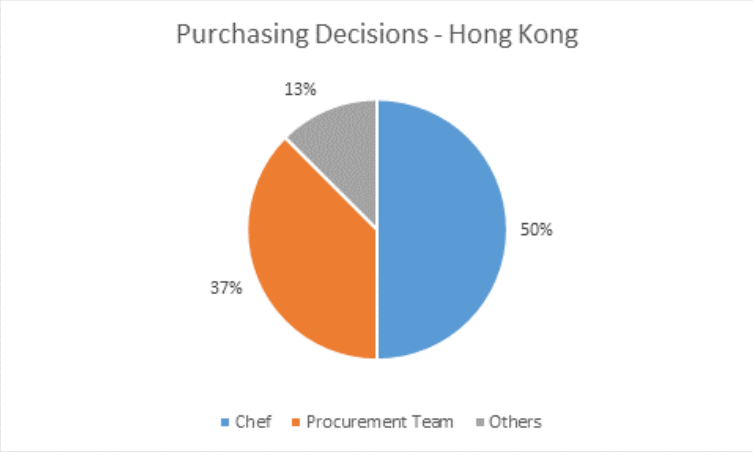
•Can develop some new inspirations for the creation of recipes
•Can generate some new ideas
•Can observe the demonstration of a famous chef, and to know about the production process of pistachios.
•More information about pistachios and prunes, which are good for developing new products
•Can know more about the use of pistachios in baking
•Increased knowledge for pistachios
•Increased knowledge for pistachios and prunes
•Learnt more about the ingredients and how they were produced.
•Learnt that pistachios and prunes are very versatile.
•Techniques and the use of pistachios and prunes
•Cooking Skills, and knowing more about pistachios and prunes
•Can promote more interaction with participants
•Admire Nancy's techniques and the recipes she developed.

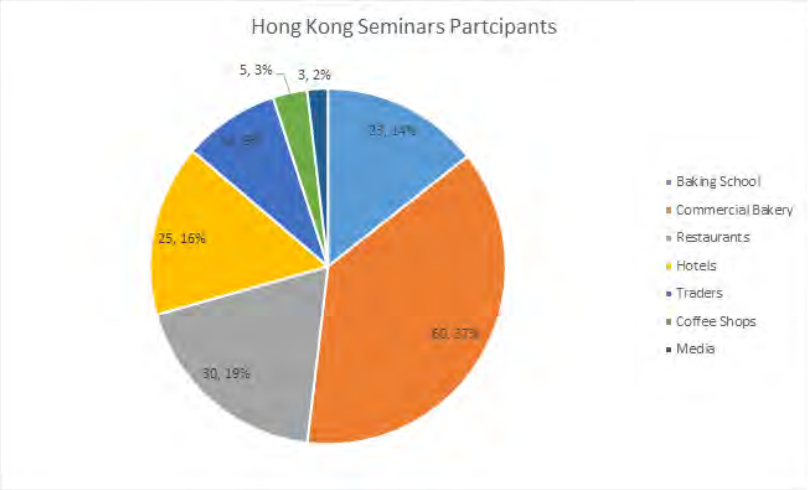
Hong Kong Participant Demographics

The tables and charts below are data from each session's participants. Among the 160 participants that attended the two seminars, 60 of them are from commercial bakeries, 30 from restaurants, 25 from hotels, 23 from Baking Schools, 14 are traders for pistachios/prunes and 5 from coffee shops. 3 media was also present at the seminar. 0 % of chefs whom attended the seminars have the authority to order products. 37% stated that their procurement teams are responsible for making purchasing decisions. 13 % of them stated others, which include R&D, Baking Studio Curator/Manager etc.

Institute (Session 1 & 2)	
Restaurant	30
Traders	14
Baking School	23
Commercial Bakery	60
Hotel	25
Coffee Shop	5
Media	3
Total	160

Position (Session 1 & 2)	
Pastry Chef/Executive Chef	103
Baking Instructor	17
Bakery Owner	33
R&D Manager	4
Bloggers	3
Total	160





AMERICAN PISTACHIO GROWERS

Conclusion

The baking seminar with California Pistachios and Prunes featuring Chef Nancy Silverton was very successful in general. Most of the participants commented that the seminar was successful in raising awareness of pistachios and prunes from the United States, and would definitely consider incorporating them into their products.

They also stated that it was a very good opportunity to attend Chef Nancy Silverton's demonstration was very informative as Nancy provided some very new inspirations and ideas to participants, and could also pass on some new techniques to participants

Participants were also amazed by the different pistachios and prunes products that are available for the baking industry. Most importantly, the seminars had left a very positive impression of the event as well as pistachios and prunes from California to culinary professionals in Hong Kong.

Appendix I: June 16 Attendance List

Hong Kong Attendees – June 16

No.	Company Name	Name	Title
1	Hang Seng Bank Limited	Chan Kam Shing	Head Chef
2		Johnny Lam	Sous Chef
3		Ronald Li	Sous Chef
4		Lam Kam Wah	Dessert Chef
5	Aberdeen Boat Club	Paul Chong	Executive Chef
6		Choi Hon Lam	Assistant Pastry Chef
7	Hong Kong Sanatorium & Hospital Limited	Reineke Wilhelm	Executive Chef
8		Leung Tung Shing	Junior Sous Chef
9	Nova Café Limited	Sze Choi	Founder and Executive Chef
10	Excelsior Hotel	Chan Tsz Tat	Pastry Chef
11		Ku Tsz Kong Henry	Pastry Chef
12		To Wing Man	Pastry Chef
13	Heimao Group	Samantha Tam	Founder
14	Hong Kong Jockey Club	Adrien Duraffourd	Pastry Chef
15	The Racing Club	Shaun Anthony	Chef de Cuisine

Hong Kong Attendees – June 16

No.	Company Name	Name	Title
16	Individual	Valerie Wong	Individual
17	Valerie Pastry Limited	Tracy	Pastry Chef
18		Yam	Pastry Chef
19	Po's Atelier	Mandy Leung	Pastry Chef
20	Café Deadend	Katherine Sin	Café Owner
21	Baking Workshop	Kelly Ho	Head Baker
22		Heidi	Baker
23	Pacific Coffee	Lam Chi Ho	Pastry Chef
24	Bakery & Confectionery Association	Louisa Ho	President
25	Towngas	Nelson Cheung	Head Chef
26		Wong Kai Yu	Pastry Chef
27		Pauline Wong	Chef
28	Mr. B Concepts	David Ng	Pastry Chef
29	2/3 Dolci	Lina Chan	Pastry Chef
30	Ali Oli Bakery	Hazel Cheung	Founder/ Head Chef

Hong Kong Attendees – June 16

No.	Company Name	Name	Title
31	Kolb (H.K.) Ltd.	Catherine Yu	General Manager
32	CitySuper	Christopher Gallaga	Business Manager, Food Service Business
33	Pumpernickel	Joan Yuen	Head baker/founder/director
34	Shelly Cake Express	Shelly Chan	Baker
35	Chef- Bom Cuisine Restaurant	Fong Ho Ting	Pastry Chef
36	Hong Kong Chef's Association	Eddy Leung	President
37	Macfield Limited	Yuen Man Hung	General Manager
38		Lai Kin Chung	Bakery Chef
39		Lee Chi Kwan	Pastry Chef
40	Regal Airport Hotel	Ken Kam	Executive Chef
41		Ricky Wu	Food & Beverage Manager
42	Teresa Festival	Teresa Chiu	Founder and Creative Director
43	Coyote Bar and Grill	Tam Wai Keung	Head Chef
44	Joanne Stylish Baking	Derek Lee	Director
45		Wing	Chef

Contacts – June 16

No.	Company Name	Name	Title
46	MyStarry Kitchen	Sarella Leung	Chef
47		Chan Kin Cheung	Chef
48	Mr and Mrs Fox	Desmond Chan	Cook
49	Jouer	Anne Cheung	Founder
50		Lego Chan	Pastry Chef
51	Baking Story	Jacky Wong	Pastry Chef
52	Foodgears Industrial International Ltd	Gordon Sit	Account Executive
53		Oscar Ng	Senior Technical Advisor
54		Wallace Ip	Baking Specialist
55	PastryGlobal Food Service Limited	Ronny Leung	Chef
56	Bake at Home	Haze Wong	
57	The Cake Minstrel	Maria de Guia	Owner/Head Baker
58	Hyatt Regency	Tony Chan Ka Tsun	Pastry Chef
59	HK Disneyland Resort	Annie Fu Wai Yee	Pastry Chef
60		David Chen Yi Wei	Pastry Chef

AMERICAN PISTACHIO GROWERS

Hong Kong Attendees – June 16

No.	Company Name	Name	Title
61	Dolce Vita	Chloe	Pastry Chef/ Sourcing Developent Manager
62		Gloria	Pastry Chef
63		Ying	Pastry Demi
64		Yan	Pastry Demi
65	Joey Patisserie	Joey Wun	Head Baker
66	Miss abebesucre	Alani Jasmine Ng	Baking Tutor
67	Blossom Cakes	Peggy	Co-Founder
68		Joseph Ip	Co-Founder
69	Hong Kong Young Chefs Organization	T.Y. Leung	President
70	Hong Kong Chef Association	Flora Chen	Member
71	Cafe Deco Group	Man	Cook
72		Ting	Cook
73	Blissful Frostings	Ms. Rashmi	Creative Director
74	HeySoNuts	Leung Wai Yip	Pastry Chef
75	Garden Bakery Limited	Robert Chi Fen	Assistant General Manager

Contacts – Session 1

No.	Company Name	Name	Title
76	Garden Bakery Limited	Liu Chi Yin	Factory Manager – Frozen Bake
77	Billidart	Sou Chau	Head Chef
78	Blogger/ Media	Ardis	Blogger
79	Blogger/ Media	Saio Lee	Blogger
80	W's Entrecote Le Steak House	Yeung Kwei Lam	Executive Chef
81		Ling Li	Chef
82	Baking Workshop Co Ltd	Wong Tsui Shan	Baking Instructor
83		Rebecca B.J. Chan	Baking Instructor
84		Choi Chuk Fan	Baking Instructor
85	Blogger/ Media	Wynnie Chan	Blogger/ Nutrition Consultant

Appendix II: June 17 Attendance List

Hong Kong Attendees – June 17

No.	Company Name	Name	Title
1	Aberdeen Boat Club	Leung Tak Keung	Pastry Demi-Chef
2	Hong Kong Institute of Vocational Education	CHAN CHI HUNG	Lecturer
3	Excelsior	Kevin Chiu	Pastry Executive Chef
4		Wong Ho Fai	Pastry Chef
5		Cheung Hin Kan	Pastry Chef
6		Lee Tsz Ching	Pastry Chef
7	AGE Group	Dion Liu	Executive Chef
8	Hong Kong Institute of Vocational Education	Raymond Wong	Technician (Catering)
9	Hong Kong Institute of Vocational Education	Leung Mei Po	Technician (Catering)
10	Mr. B Concepts	Ocean Wong	Pastry Chef
11	Pivo Czech Bar	Tak Chu	Head Chef
12	Hotel Panorama	Eddie Chan	Restaurant Chef
13	Hong Kong Regal Hotel	Kamtong Lai	Pastry Chef
14	ChocoKoo Cooking Studio	Jeffrey Koo	Owner/ Baking Chef
15	Jockey Club	Stephen Cheung	Pastry Chef

AMERICAN PISTACHIO GROWERS

Hong Kong Attendees – June 17

No.	Company Name	Name	Title
16	Jockey Club	Mr. Chong	Pastry Chef
17	Levain Bakery	K.C. Li	Owner/ Baking Chef
18	Novotel Hong Kong Century	Andrew Lee	Executive Chef
19	Macfield Limited	Wong Lai Man	Chef
20	Mr. and Mrs. Fox	Jerry Thornton	Executive Pastry Chef
21	Mr. and Mrs. Fox	Joey Sergentakis	Executive Chef
22	Hospitality Industry Training and Development Centre	Patrick Lin	Chief Instructor- Food Preparation- Western
23	King Parrot Group	Peter Cheung	Execuitve Chef, Central Kitchen
24	Bakels	Simon Chan	Manager
25	Bakels	Ng Chi Wa	Baking Technical Adviser
26	Hotel Ikon	Danny Ho	Executive Pastry Chef
27	Hotel Ikon	Philip Leung	Pastry Chef
28	Hong Kong Professional Bakery	Miriam Cheung	Baking Instructor
29	Hong Kong Professional Bakery	Mr. Wong	Founder
30	Windy-City International Group	Frank Luong	Executive Chef

AMERICAN PISTACHIO GROWERS

Hong Kong Attendees – June 17

No.	Company Name	Name	Title
31	American Club	Josh Goetz	Town Club Executive Chef
32	Cathay Pacific Catering	Louis Pang	Production Chef
33	Loving It Workshop	Fion Yiu	Partner/ Pastry Chef
34	Necole La Patissiere	Nicole Fung	Founder and Executive Pastry Chef
35	Necole La Patissiere	Joe Leung	Chef Assistant
36	Necole La Patissiere	Lammy Lam	Partie 1
37	家政坊	Ms. Yim Si Mun	Baking Instructor
38	家政坊	Ms. Yim Si Ting	Baking Instructor
39	Classified Foods	Andrew Lloyd	Executive chef
40	Classified Foods	Milos	Chef
41	Khush Life	Poh Hiang TAN	Founder
42	Sogno Café	Mr. Wight	Founder and Pastry Chef
43	Sogno Café	Anna Tang	Founder and Pastry Chef
44	Baker A	Jennifer Ngai	Co-Founder/Baker
45	Tete-a-tete Limited	Susu So	Pastry Chef

Contacts – Session 2

No.	Company Name	Name	Title
46	Tete-a-tete Limited	Metilda Leung	Food Curator
47	Assure Ltd	Kerry Ngan	General Manager
48	Assure Ltd	Kylie Lee	Sales Manager
49	DKSH Hong Kong Limited	Vicky Kwong	Director, Business Development Gourmet Fine Foods
50	DKSH Hong Kong Limited	Ms Jaime Lau	Assistant Marketing Manager
51	Arthur Schuman Incorporation, USA	Mr Gordon Craig	Vice President - Asia pacific and Oceania
52	P&Y Dessert	Yeung Yuen Siu	Pastry Chef
53	P&Y Dessert	Ho Ho Pong	Pastry Chef
54	Snowy Flowercake	Stephanie Chong	Pastry Chef
55	Moei sugar art	Moei	Pastry Chef
56	Kai Tai	Natalie Wan	Purchasing Manager
57	Miu's Cake	Miu Chan	Founder
58	HeySoNuts	Joker Pak	Pastry Chef
59	J'aime Pain Boulangerie	Wong Kam Fai	Founder/ Pastry Chef
60		Lee Man Ho	Shop Manager

AMERICAN PISTACHIO GROWERS

Hong Kong Attendees – June 17

No.	Company Name	Name	Title
61	Sir Hudson Group	Hui Kam Chuen	Pastry Chef
62	Sir Hudson Group	Chiu Chi Chiu	Pastry Chef
63	Maxim's Group	Joe Ho	Supervisor, R&D, Cakes and Bakery
64		Carmen Chan	Senior Supervisor, Cakes and Bakery
65		Kammy Wong	Assistant R&D Officer, Cakes and Bakery
66		Lolita Fung	Assistant Officer, R&D, Cakes and Bakery
67		Henry To	Assistant Officer, R&D, Cakes and Bakery
68	Arome Bakery Room	Brian Lam	Supervisor
69	G&P baking home	Ms. Luk	Pastry Chef
70	Prish Pops	Priyanka Kansara	Baker
71	Grassroots Pantry	Peggy Chan	Executive Chef/ Managing Director
72	Grassroots Pantry	Andrea Lee	Chef Manager
73	COMPLETE DEELITE	Mrs. Wong	Baking Instructor
74	Twinkle Baker Décor	Lau Ka Yan	Baking Instructor
75	Twinkle Baker Décor	Xuan Ying Hui	Baking Instructor

AMERICAN PISTACHIO GROWERS

Thank you!

AMERICAN PISTACHIO GROWERS

PRUNES FROM CALIFORNIA

Bakery Recipe Contest

Shanghai & Hong Kong

October 2016 - January 2017

Activity Summary

Activity Summary

In order to further promote California pistachios and prunes as significant ingredients in baked goods after the 5 baking seminar series held in Shanghai and Hong Kong in June 2016, a recipe contest was held from October 2016 to January 2017 which encouraged HRI professionals all over China to incorporate California pistachios and California prunes in their bakery applications. A total of 180 submissions were received and 5 showing innovation usage of California pistachios and 3 about California prunes were chosen as winners.

Objective

- Further promote California pistachios and California prunes as main ingredients for foodservice and bakery applications as a follow-up activity of the baking seminar series in June 2016;
- Encourage innovation and creativity in using California pistachios and prunes as featured ingredients.

Services of SMH

- Contact with original seminar attendees and design advertisements for recruitment;
- Follow with traders Great Eagle and V-Wiser for ingredient purchase and send to all participants for recipe development;
- Conduct preliminary recipes selection, recipe translation and formatting;
- Release the announcement of winner recipes and organize recipes printing and mailing.

Project Background

About Baking Seminar Series in June 2016:

As part of the Special Crop Block Grant to promote California pistachios and prunes, a series of bakery seminars themed "Baking with California Pistachios and California Prunes" were successfully held between June 14-19 in Shanghai and Hong Kong. Two James Beard Foundation Award recipients: Nancy Silverton and Dahlia Narvaez, were invited to develop and demonstrate the application of California pistachios and prunes during the seminar. Through the 5 baking seminars, American pistachio was greatly promoted in Chinese market, particular in the foodservice market, as a high quality, safe and versatile ingredient to use in bakery applications.

Early results from attendee's post-seminar questionnaires indicated that a considerable number are highly interested in incorporating both American pistachios and California dried plums into their products, menus, and services within the HRI sector. In order to leverage this interest during the seminar follow-up period, APG/CDPB proposed to utilize unspent funds to organize and hold a Bakery Recipe Contest.

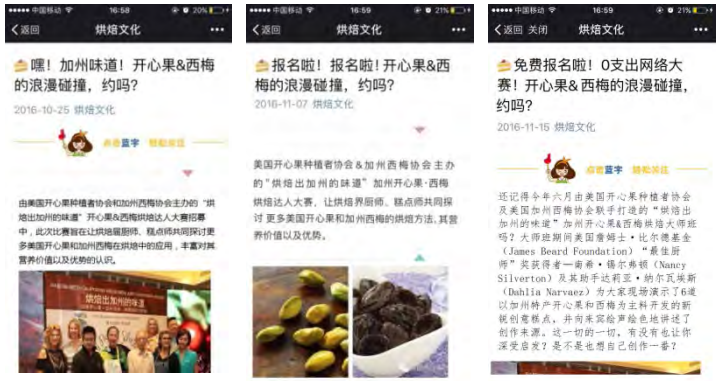
AMERICAN PISTACHIO GROWERS

Activity Timeline

Activities	Date
Recruitment	October 18 – November 4, 2016
Ingredient Purchasing and Distributing	October 31 – November 4, 2016
Recipe Collection	November 4 - 22, 2016
Preliminary Screening	November 23 - 25, 2016
Recipes Translation	November 26 - 30, 2016
Winning Recipes Announcement	January 16 - 31, 2017
Winning Recipes Printing and Mailing	January 16 - 31, 2017
Activity Reports and Invoices Submission	By January 31, 2017

Recruitment

- Advertisements regarding the recruitment of the recipe contest were released through official website and WeChat accounts of APG, China Bakery Association and China Baked Food Industry Association;
- Total 180 entries were collected, half for pistachio and half for prune.



China Bakery Association WeChat Official Account
(10/25/2016, 11/7/2016, 11/15/2016)

China Baked Food Industry Association Official Website
(from 10/18/2016)

China Baked Food Industry Association
WeChat Official Account
(10/21/2016, 10/27/2016, 11/3/2016, 11/15/2016)

Judge and Screening

Preliminary Screening by Mr. Keyuan LIU

About Mr. Keyuan LIU:

- Executive Member of Bakery Committee, All-China Federation of Industry & Commerce;
- Judge, National Vocational Skill Competition, Human Resource and Social Security Department of China;
- Consultant for magazines such as *China Baking*, *Commerce of Baking*, *Baking in China*, *Chinese Bakery Industry*;

Mr. Keyuan LIU devotes himself in the development of bakery industry. Working as a bakery chef for more than 20 years, he established her own bakery training institute – Liukeyuan Cake Baking Training School.

Final Selection was made in United States by US-based Panel

Winning Recipes

Based on the formulation, creativity, and overall quality of submitted recipes, 8 winning recipes with 5 for pistachios and 3 for Prunes were selected.

Recipe	Chef	Category
California Pistachio Banana Mousse	Chao ZHANG	Pistachios
California Pistachio Olive Oil Cake	Zhongwen HU	Pistachios
California Pistachio Coconut Meringue Tart	Sifan CHEN	Pistachios
California Pistachio Cheesecake	Dunhui ZHANG	Pistachios
California Pistachio Butter Biscuit	Songgeng HUANG	Pistachios
Red Wine California Prune Mousse Cake	Daosheng ZHU	Prunes
Lemon-Scented California Prune Roll	Yu WANG	Prunes
California Prune Cheesecake	Zihan PENG	Prunes

AMERICAN PISTACHIO GROWERS

Winning Recipes

California Pistachio Banana Mousse

California Pistachio Olive Oil Cake

California Pistachio Cheesecake

California Pistachio Coconut Meringue Tart

Winning Recipes

California Pistachio Butter Biscuit

California Prune Cheesecake

Lemon-Scented California Prune Roll

Red Wine California Prune Mousse Cake

AMERICAN PISTACHIO GROWERS

Winning Recipes Announcement

Announcement of winning recipes was released through social platforms of APG, China Bakery Association and China Baked Food Industry Association, which was able to reach around 100,000 HRI professionals.

China Baked Food Industry Association Official Website

WeChat Release

Published News Releases with 16 Media Outlets

In addition, news release regarding this recipe contest was published through 16 media outlets with a value of US$48,000 achieved.

News Release Brief:

Winners Come Out for
“Baking with California Pistachios and California Prunes” Recipe Contest!

In order to further promote American pistachios as significant ingredient in baked goods after the 5 baking seminar series held in Shanghai and Hong Kong in June 2016, “Baking with California Pistachios and California Prunes” receipt contest was held by American Pistachio Growers (APG) and California Prune Board (CPB) from October 2016 which encouraged HRI professionals all over China to incorporate American pistachios and California prunes in their bakery applications. After screening by Chinese and U.S. panels, 8 chefs with their recipes were selected as winners from a total of 180 submissions.

By this recipe contest, American pistachios and California prunes are being promoted as healthy baking ingredients. The organizers, APG and CPB, would like to bring the taste of California to more Chinese chefs as well as consumers through this event, spreading the messages of health through healthy food, such as California pistachios and prunes.

Published News Releases with 16 Media Outlets

Media Outlets List:

No.	Media (EN)	Media (CN)	Circulation / Page View per day
1	Y Weekend	青年周末	340,000
2	Stylego	时尚生活指南	180,000
3	Perfect Citylife	都市精品生活	150,000
4	Modern Consumer News	现代消费导报	300,000
5	Instyle Weekly	时尚周刊	200,000
6	Woman's Weekly	女性周刊	300,000
7	163.com	网易	100,920,000
8	sina.com	新浪	5,184,000
9	qq.com	腾讯	819,000,000
10	sohu.com	搜狐	356,940,000
11	online.sh.cn	上海热线	774,000
12	xiaofei.china.com.cn	中国网-生活消费	4,668,000
13	tom.com	TOM	405,000
14	cnfoodnet.com	中国食品网	30,000
15	china.com	中华网	4,668,000
16	china.com.cn	中国网	45,408,000

AMERICAN PISTACHIO GROWERS

Conclusion

The bakery recipe contest featuring California pistachios and California prunes was successfully held in China which attracted up to 180 submission of recipes.

The recognition of California pistachios and prunes is further strengthened among Chinese HRI professionals. The mission of promoting California pistachios and prunes as healthy bakery ingredients has been reflected and emphasized by this activity.

8 Winning recipes will be printed out and mailed to all participants of June baking seminars, which could help further encourage the usage of California pistachios and prunes in bakery application.

The press released has generated a value of US$48,000, and helped gain more exposure and interests from both HRI professionals and regular consumers about California pistachios and California prunes.

Thank you!

CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
SPECIALTY CROP BLOCK GRANT PROGRAM
FINAL PERFORMANCE REPORT

USDA Project No.:	Project Title:	
12	Promoting California Specialty Crops Through Education and Enrichment	
Grant Recipient: California Department of Food and Agriculture, Office of Farm to Fork	**Grant Agreement No.:** SCB15012	**Date Submitted:** December 2017
Recipient Contact: Nicole Sturzenberger	**Telephone:** (916) 900-5123	**Email:** nicole.sturzenberger@cdfa.ca.gov

Project Summary

Many Californians suffer from diet-related diseases, often as a result of not consuming enough specialty crops. Efforts to increase the consumption of California specialty crops are a win-win: they support California specialty crop farmers while promoting a healthier diet for California consumers. This project aimed to promote the consumption of California specialty crops through increased specialty crop nutrition education, inclusion in school meals, and outreach.

This project sought to increase California specialty crop consumption and marketability among school age children and the general public. Although the need for increased consumption of specialty crops is recognized, habits are slow to change, making this project timely in its implementation. Research suggested that changes in consumption are most effective early in life, mainly by engaging young children and encouraging them to develop lifelong healthy eating habits. Therefore, many of the activities in this grant focused on engaging students with specialty crops awareness and nutrition education, and improving access to specialty crops for children through the meals they receive at school. Public schools and their meal programs also represented an effective avenue to connect with needy populations across the state.

This project built upon a previously funded 2014 Specialty Crop Block Grant Program Project 18: *Engaging Agriculture within the Local Community: A Project Addressing Food Access, Agricultural Education and Outreach*. The specialty crop Ambassador Program was continued and expanded to include Southern California. This grant also built upon the Mobile Farm business plan, curriculum, and outreach materials created in Project 18. This grant enabled the transformation of those ideas into a detailed design of the Mobile Farm.

The Child Nutrition Director (CND) Trainings complimented and enhanced the work that was done previously on the California Farmer Marketplace (CFM) in both the 2012 Specialty Crop Block Grant Program Project 70: *Farm to Fork specialty crop database – Phase 1*, and the 2013 Specialty Crop Block Grant Program Project 65: *Farm to Fork Specialty Crop Database – Phase 2*. These trainings not only brought attention and highlighted the CFM as an easy way of finding and procuring local specialty crops, but also how including locally grown specialty crops into their school meals is feasible, practical, and makes their meal programs more successful.

Project Approach

Ambassadors: A sub-award was established with Archi's Institute for Sustainable Agriculture to act as the farm to fork ambassador host organization. The project aimed to support a new generation of future specialty crop farmers and use these new farmers as ambassadors, teaching the next generation of the benefit of farming. The Office of Farm to Fork (F2F) reviewed eight applications for specialty crop best practices guides

and projects submitted by students. F2F staff selected six applicants, of which four completed the project. Student projects were reported through three blog posts shared on Tales from the Field, and included observations on farming practices and continuing on as a farmer after the project. Ambassadors also created best practices guides for working with specialty crops (included in the appendix), which aimed to provide useful information on specialty crop production for the next generation of farmers. Student projects ranged from a dragon fruit farm and veteran rehabilitation center to a niche market bitter melon farm catering to Asian immigrant populations. Each student presented their projects and the financial benefits of farming specialty crops at the San Diego Farm Bureau and to a diverse group of attendees. In the end, two of the six applicants did not finish the program or the required outputs. Overall the project was successful in creating four new specialty crop farmer/veterans entering the workforce and promoting the specialty crop industry to future farmers.

CND Trainings: F2F held a total of three trainings during the project in Central (Stanislaus County), Northern (Mendocino County) and Southern (San Diego County) California. The trainings were held in those locations with the goal of representing as much of the state as possible and highlighting outstanding farm to school programs. Each training had a slightly different emphasis based on the CND leading the training, but all aimed to increase California specialty crop marketability and consumption among school aged children. The agenda of each training was developed by F2F staff in coordination with the CND. Relevant materials were also developed and compiled to provide to participants at the trainings.

The first training took place in Central California by Turlock Unified School District's CND. The CND discussed his journey into procuring locally for his school meal program. The training brought out 14 dedicated school food service staff. The CND described the process of how he developed his school food marketing brand, *real.fresh*, targeting students to take part in school meals and increase fresh fruits and vegetable consumption. The CND also talked about his heavy reliance on the Department of Defense Fresh Fruit and Vegetable program to enable the purchase of local, fresh fruits and vegetables. A portion of the training was reserved to discuss his involvement in the United States Department of Agriculture pilot project for unprocessed fruits and vegetables, which allows him additional flexibility to purchase fresh fruits and vegetables from local producers.

The second training was held in Fort Bragg in Northern California by Fort Bragg Unified School District's CND. The CND discussed the challenges of being a small, remote district without a lot of agriculture in the area. To address this barrier, the CND utilized a local food hub as well as purchased from the school gardens to support the program. There were 11 attendees from school districts throughout the area, some coming as far as Trinity and Plumas County.

The third training was held in Encinitas in Southern California by Encinitas Union School District's CND. The CND discussed the process of how she converted the entire menu to scratch/fast scratch items, eliminating all packaged and highly processed products. The CND talked about working closely with the director at Farm Lab to incorporate the produce into school meals on a daily basis. Encinitas Union School District's Farm Lab is the first school-district owned, certified organic production farm supplying its own school lunch program in the nation. The CND's discussed how they incorporated nutrition education into the program at Encinitas. There were 17 child nutrition staff in attendance at the CND training in Encinitas.

For each of the trainings, the CFM was highlighted in a 30 minute presentation. The presentation focused on the purpose of the CFM, how to sign up, and how to utilize the CFM to build or strengthen their farm to school program. Many of the participants commented on what a great resource the CFM is. One such comment was from a school food service director in Central California "[I] Very much appreciate the explanation of the Marketplace. I intend to use this more regularly now that I'm more aware of what kind of searches can be done."

Overall the CND trainings enabled F2F to reach 351,228 potential students through participating food service directors as well as other relevant nutrition and school staff. Though some schools were unable to attend at the last minute, materials, PowerPoints and other resources were provided to them through email, reaching an additional 63,314 students for a total of 414,542 potential students impacted by the CND trainings. General feedback received about the training was very positive. Many others commented on all the useful, tangible takeaways that they can implement in their school food service operation to advance their farm to school activities.

Mobile Farm: F2F staff developed the scope of work for the design of the Mobile Farm. F2F staff participated in several meetings, as well as numerous emails with the contractor detailing the specifics of the vehicle and displays. The final draft was received on March 30, 2017 which provided details for the design and specific set-up of the vehicle and exhibited as well as materials needs, their approximate dimensions, and cost (see appendix). This design will eventually be able to provide an opportunity for California students without access to school gardens or exposure at home to learn about specialty crops. They will learn about how they are grown, encourage students to eat fruits and vegetables, and teach them to become lifelong consumers of California specialty crops.

The project did not benefit commodities other than California specialty crops. Project staff worked to ensure that only specialty crops were represented in all data, resources, blog posts, curriculum, tours, and CND training content.

CND Trainings: F2F staff coordinated in advance with all site hosts to discuss specialty crop priorities and to profile group attendees, in order to tailor training content. F2F staff helped the various school food service directors prepare the outline for the day of the training as well as go over the content of their presentation to ensure it was solely discussing specialty crops and the work they have done to promote them, i.e. marketing, school gardens, nutrition education, etc. Much of the coordination to the various school sites were set up and coordinated by the school food service directors in their respective districts.

Mobile Farm: The contractor was awarded the bid for the design of the Mobile Farm. The contractor has worked with various agricultural industry partners as well as technology companies. They developed and presented the detailed design of the Mobile Farm.

Ambassador Program: Archi's Institute for Sustainable Agriculture acted as the host organization for a group of Ambassadors. The organization advertised the opportunities to students and helped select the finalists. They also worked directly with students to ensure deadlines were met and specialty crops were solely represented in their projects throughout their duration.

Goals and Outcomes Achieved

The overall objective was to increase specialty crop consumption and marketability among school aged children and the general public. Activities focused on engaging students on specialty crop awareness and nutrition education, and improving access to specialty crops for children through the meals they receive at school. The performance goals established to assess whether the objectives were achieved were: (1) Increase in specialty crop direct farmer/food service director purchases and specialty crop school lunch procurement in California public schools; (2) Increase the number of specialty crop farmers and school districts registered on the CFM; and (3) Increase sales of specialty crop in school lunch programs as measured by targeted districts in California.

F2F staff worked to increase the number of schools registered on CFM, specialty crop direct farmer/food service director purchases and specialty crop school lunch procurement in California public schools through the CND Trainings.

The CND Trainings aimed to increase procurement and demand for California grown specialty crops by learning from their peers. The trainings were completed during the project in Northern, Central, and Southern California. The tours were held in those locations to highlight CNDs who have strong farm to school programs as well as with the goal of reaching a diverse set of CNDs throughout the state. The Central California training in Turlock Unified School District's CND focused on procurement and marketing of California grown specialty crops. During the training, attendees visited Turlock Unified School District's current central kitchen as well as their new central kitchen to better understand how schools can directly support specialty crops growers and can simultaneously help expose children to different types of specialty crops and teach them the benefit of consuming specialty crops.

The Northern California training that took place in Fort Bragg Unified School Districts CND focused on overcoming the challenges of a remote school district and procurement of specialty crops directly from their school gardens. The training showed other CNDs different avenues for procuring local specialty crops in less agriculturally rich regions in California. Attendees learned about the history of the farm to school program at Fort Bragg Unified School District and the challenges they faced. They then visited several of the school gardens and education centers and talked with the garden coordinator about how they created and funded a full time school garden coordinator position to sustain the work.

The training in Southern California hosted by the CND at Encinitas Union School District, focused on exposing other CNDs to fast scratch cooking using local specialty crops. Emphasis was also placed on how to purchase California grown produce during its peak ripeness, and often lowest cost, and process and preserve it for use during the school year. Attendees also visited the Farm Lab where the lettuce for the districts numerous salad bars are grown.

With the specialty crop ambassadors, the F2F supported specialty crop outreach and education. Each of the ambassadors chronicled their experiences through three blog posts each that were posted as part of the web-based stories of specialty crop engagement. The specialty crop ambassadors were a great success, as they showed benefits of growing fruits and vegetables.

F2F staff posted 21 blogs on specialty crop engagement, ranging from the stories told by the specialty crop Ambassadors to the details of each CND trainings. The blog posts helped expose the general public to the

individual experiences within each of the grant projects. The ambassadors also created best practices guides and performed outreach event promoting the benefits of farming specialty crops.

The Mobile Farm project will increase farm to school activities in the future. During this project, F2F staff worked with the contractor for the design of the Mobile Farm.

Many of the projects in this grant were only recently completed so it is too soon to measure their full effect. For example, the CND Trainings were completed in spring 2017, so their effects are still unfolding. CNDs that learned about the CFM have only had a few months in the middle of the school year to explore that resource. Therefore, the true measures of the project's effects are long term and many of the connections made and lesson learned in this grant will take time to come to full fruition.

This project sought to increase specialty crops consumption and marketability among school aged children and the general public. The activities completed showed increased specialty crops consumption and marketability among the target population. This was accomplished by reaching out to CNDs throughout California to educate them about how they can successfully incorporate California grown specialty crops into their school meals. The specialty crop ambassadors all conducted outreach events in their communities to engage consumers and promote direct specialty crop farm to consumer sales and the opportunities of farming specialty crops. The design of the Mobile Farm was completed and aimed to maximize youth engagement with agriculture. It is expected that as time goes by, this new information obtained and connections made will create even more direct sales of specialty crops to school-age children and the general public.

Performance Measure and Target: Increase specialty crop farmers registered on CFM by 20%.
Benchmark: Baseline data collected from the CFM and as of September 30, 2015, there were 30 specialty crop farmers registered on the site www.cafarmermarketplace.com.
Outcome: Sixety-three specialty crop farmers registered, 110% increase from the baseline. As school districts increase their demand for California specialty crop as a result of the CND trainings, more specialty crop farmers are expected to register on the CFM to meet that demand.

Performance Measure and Target: Increase the number of school districts registered on the CFM by 20%.
Benchmark: Baseline data from September 30, 2015 showed seven districts registered on the Marketplace including Pittsburg, Ventura, Fresno, and Natomas Unified.
Outcome: Eighty school districts registered, 1,043% increase from baseline.

Performance Measure and Target: Increase sales of specialty crops in school lunch programs by 10% as measured by targeted districts in California.
Benchmark: Targeted school districts will use benchmark data of the 2014/15 school year for specialty crop procurement.
Outcome: From the reported results of the survey, Santa Clara Unified increased their purchasing of local California produce from $200,000 in 2015/16 to $250,000 for 2016/17 school year, a 25% increase. From the Fort Bragg area, Klamath Trinity Joint Unified School District went from spending $10,000 in 2015/16 on local specialty crops to $25,000 for the 2016/17 school year, an increase of 150%. In southern California Oxnard Union High School went from spending $200,000 in 2015/16 to $300,000 in 2016/17, a 50% increase.

It was difficult for school food service directors to report on the 2014/15 school year purchasing of specialty crops since the CND trainings took place late 2016/2017 school year, project staff used 2015/16 school year as the benchmark as relevant activities for this grant did not start until the 2016/2017 school year. The schools selected as the targeted school district attended one of the CNDs, are signed up on the CFM and completed a pre-survey for the CND trainings. For central California, Santa Clara USD was used as a targeted district, Klamath Trinity Joint USD for Northern California, and Oxnard Union High School for Southern California.

Performance Measure and Target: Number of outreach events held and materials created by ambassadors.
Benchmark: Number of outreach efforts performed by ambassadors in 2014/2015 year was four events (407 individuals reached) and three blog posts per ambassador.
Outcome: Ambassadors completed three outreach events (115 individuals reached), three blog posts per ambassador and four best practices guides total (one per ambassador). Fewer individuals were reached through this project's outreach events than the previous due to the fact that the 2014/2015 year ambassadors organized their own outreach events while the current year ambassadors did three events together, thus fewer individuals were directly impacted. The ambassadors created best practices guides which will have a lasting impact and larger reach in the long run. The ambassadors also created the same number of blog posts as the previous group of students.

This project successfully increased specialty crop consumption and marketability among school age children and the general public.

Beneficiaries

CND Trainings: During the CND Trainings that took place across the state, CNDs, child nutrition specialists, and garden coordinators were taught by their peers about how they developed successful farm to school programs by expanding California specialty crops procurement, education, and marketing to school age children. School CNDs interested in incorporating local produce into school meals directly benefited from these trainings. Students and specialty crop farmers across California stand to benefit from these trainings.

Specialty Crop Ambassadors: The four specialty crop ambassadors received education that has made them equipped to become specialty crop farmers and contribute to the industry. The recipients are also now able to act as ambassadors for future specialty crop farmers. Their best practices guides can be used by individuals looking to grow specialty crops as well. The specialty crop ambassadors created projects that informed the next generation of the benefits of growing and consuming specialty crops, as well as the career opportunities therein. Outreach events reached 115 potential farmers and best practices guides are available to potential farmers.

Mobile Farm: The Mobile Farm design developed during this grant will go on to provide an opportunity for California students without access to school gardens or exposure at home to learn about the benefits of specialty crops.

Forty-two school food service personnel had the opportunity to attend the CND trainings in their region and learn from their peers how to successfully start or enhance their farm to school program by incorporating California specialty crops into their menus. Collectively these 42 school food service personnel have the potential to impact 414,542 California students.

Sixty individuals working with the San Diego Community Health Improvement Partner's Farm to School Task Force had the opportunity to learn about the CFM and how to help school food service directors connect with local farmers in their area.

3,106,462 students in California elementary schools have the potential to experience hands on learning about how specialty crops are grown and the benefits of their nutritional value. This exposure has the potential to create lifelong eaters of California specialty crops when the physical buildout of the Mobile Farm takes place. Greater awareness of resources that enable local, specialty crops purchases allows for a possible 186% return on investment in certain regions in California for money spent on local, direct market products.

Lessons Learned

The biggest lesson learned throughout the course of this project is that peer-led learning is most effective to create behavior change. By bringing together school CNDs and having them learn from their peers, they were able to see that incorporating California specialty crops is feasible, practical, and makes their meal program more successful. In addition, the peer-to-peer learning created an environment where food service staff were able to network and felt free to ask questions and generate conversations that otherwise might not take place. For example, during two of the CND trainings it came up that numerous CNDs were having issues communicating with parents. Low participation rates are often one of the issues many CNDs are up against. What wasn't as obvious was that CND's perception is that a lot is coming from parents who do not know what is being served in the cafeteria. CNDs wanted resources they could give or present to parents at PTA meetings and other school functions to let them know what is actually being served in the cafeteria and educating them on their farm to school program. Being able to educate parents on the healthy food being prepared as well as informing parents that participation from all students is important to help grow the program. This somewhat tangential conversation inspired the project staff to incorporate developing such resources for another grant supporting farm to school work.

During the grant, project staff also came to realize that certain projects are well suited for state agencies to undertake and some are better suited for private entities. The design phase of the Mobile Farm proved to be particularly challenging regarding developing contracts for such services between the state and a private company. Through this process, project staff also realized that the physical buildout of the Mobile Farm, staffing, and running of the vehicle will just not be feasible for a small office of five staff members.

The unexpected outcome was that only four ambassadors completed the program instead of six. If all six of the ambassadors would have finished, it would have increased the number of outreach events and individuals impacted through the events and best practices guides. To maximize reach the project staff suggests holding each ambassador's outreach event separately.

Additional Information

CND Trainings:

- Central California: http://blogs.cdfa.ca.gov/TalesFromTheField/?p=1093
- Northern California: http://blogs.cdfa.ca.gov/TalesFromTheField/?p=1115
- Southern California: http://blogs.cdfa.ca.gov/TalesFromTheField/?p=1157

Mobile Farm: Final design: See attachment 1.

Ambassadors: Best practices guides: See attachment 2.

CND Trainings: Handouts provided at CND trainings and through email

- Pilot Project: See attachment 3.

References

1. California Department of Education. *CalEdFacts*. 2015-2016. http://www.cde.ca.gov/ds/sd/cb/ceffingertipfacts.asp (accessed 7/25/2017)
2. Hardesty, S., Christensen, L.O., McGuire, E., Feenstra, G., Ingels, C., Much, J., Boorinakis-Harper, J., Fake, C., and S. Oneto. 2016. Economic Impact of Local Food Producers in the Sacramento Region. http://sfp.ucdavis.edu/files/238053.pdf (accessed 7/25/2017)

Version *1.3*

02/21/2017

Product Design Specifications

“The Journey Of A Seed”

A Touring “Hands On” Display For

Grades 3 to 5.

VERSION HISTORY

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	*MG Group*	*01/06/2017*	*Group*	*01/06/2017*	Did not meet needs of project.
1.2	MG Group	01/17/2017	Group	01/20/2017	Some aspects were not practical.
1.3	MG Group	01/20/2017	Group	01/20/2017	Focus for students.

TABLE OF CONTENTS

1 INTRODUCTION

PURPOSE OF THE DOCUMENT

THIS DOCUMENT DESCRIBES THE USER REQUIREMENT AND FUNCTIONAL SPECIFICATIONS OF THE MOBILE FARM TO FORK EXIBIT AS LAID OUT IN THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURES OFFICE OF FARM TO FORKS DISCRIPTION IN THE DOCUMENT - CALIFORNIA FARM TO FORK MOBILE FARM BUSINESS PLAN. THE SPECIFICATIONS ARE BASED OFF THE USERS NEEDS AND OUR RESEARCH OVER THE LAST 6 MONTHS. ALL REQUIRMENTS OF DESIGN ARE SUGGESTIONS THAT IN FINAL BUILD MUST MEET THE FUNCTIONAL SPECIFICATIONS AS LAID OUT IN THE CALIFORNIA FARM TO FORK MOBILE FARM BUSINESS PLAN. THIS IS CONSIDERED A WORK IN PROGRESS AND MUST BE TREATED AS SO AND MUST MEET THE NEEDS OF THE END USER.

2 DESIGN GUIDELINES

ASSUMPTIONS:

California Department of Food and Agricultures Office of Farm to Fork assumes no financial responsibility for the construction, maintenance, and operation of the mobile Farm to Fork exhibit. They are only a supporting entity.

The Mobile Exhibit will be constructed in a mobile home or fifth wheel trailer measuring a minimum of 39’.

The Mobile Exhibit must contain an employee bathroom and prep area that meets State standards for the preparation of food.

The exhibit must be green friendly, using solar, air, and bio fuels for operation.

Construction must be completed in 12 months of start date.

The exhibit must comply with all ADA regulations.

CDFA Logo must be part of the final skin that will cover the display to identify their participation in this project. It must be a minimum of 36” by 36” and posted in a prominent location on the exterior skin.

3 GENERAL OVERVIEW:

The Journey Of A Seed:

The Journey Of A Seed is a touring exhibit created to teach children about farming in California and how to make healthy choices when it comes to their diets. The mobile exhibit is broken down into 4 areas:

1) The Journey Of a Seed.
2) Our Friends, Beneficial Insects.
3) Food Adventure.
4) The Planting Of a Seed.

Each area is designed to accommodate up to 15 children, from grade levels 3 to 5, and is designed so that they can start in any room when starting the exhibit experience.

1) The Journey Of a Seed – This exhibit will utilize 3D mapping to create a video presentation that will grab the children's attention and throw them immediately into the action. When the children enter the room it will seem like a normal room with pictures, planked walls, and grass floors. Then, as the show begins, the pictures will come alive, and start interacting with the children. As the show progresses the room will come alive and tell the story of The Journey of A Seed and Farming in California, the room will become the movie. The affect will be achieved by using modern laser projectors, wall treatments, and state of the art video mapping. The presenter will be both the operator and the teacher whose goal is to make the children feel like they are in a normal classroom only to be part of the experience as the characters come alive. The children will sit on the floor with round pads to keep them low to the ground and out of the way of the projectors. After the presentation is done the children will be allowed to ask questions about their experience before being guided to the next exhibit.

2) Our Friends, Beneficial Insects: This exhibit is the transition from The Journey Of a Seed exhibit to the Food Adventure exhibit. The experience will last 5 minutes and allow some time for questions. The children will walk through the area and be given simple instruction on how to identify beneficial insects in California and how they help to keep California crops growing. It will do this through video and wall displays that will guide the children through the experience. The room itself will depict what it is like to be underground with the worms and other insects. The walls will look like dirt tunnels and the ceiling will display roots of trees, turnips, carrots, and other vegetables. The idea is to let the children pretend to be in the home of the insects.

3) Food Adventure. This part of the exhibit will teach children about healthy choices when it comes to eating. This exhibit will show students a couple simple ways to make healthy choices at home for an afternoon snack, and how to help their parents prepare healthy meals. At this stage, we complete the circle of agriculture having shown where their food comes from and why it is important to eat healthy . This room will depict a film studio because this is in fact what it is. When not teaching children about healthy eating we will be using this room to create videos by children for children about what they can do to create healthy snacks and meals. These videos will then be posted through a secure video host/platform and hosted web page where the children can view the videos, download recipes and coupons for healthy food at the grocery store, and learn more about healthy fun eating and California Agriculture.

4) The Planting Of a Seed: This is the final step of the exhibit experience. Here the children will sit at tables and plant their own seedlings in their own pots that they can either take home to their family or take to the classroom. Curriculum will be handed out at this stage to assist the teacher with fun games that the students can play. Then they can have a contest to see whose plant grows the fastest or tallest, use mathematics skills to calculate how long it will take to produce the vegetable, etc. They can then post this information through the online website for other students to see and learn about what the other kids in the State are doing. There

will also be an interactive video playing at this station that will test the children on their knowledge of farming. Asking them basic question and giving them simple ideas on how they can start their own garden at school or at home.

5) Conclusion

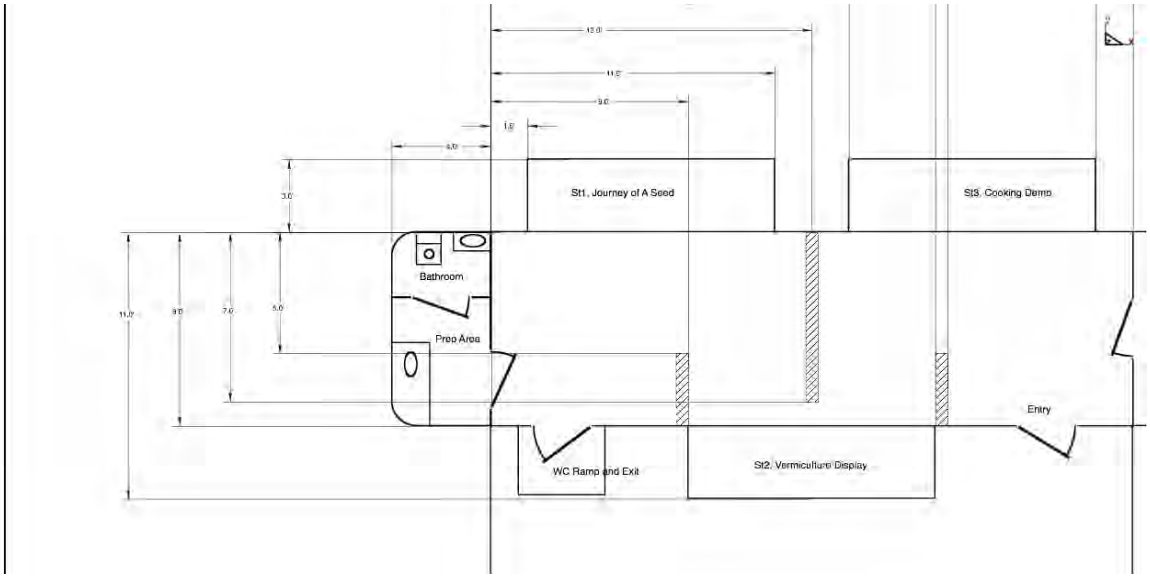
The total time of the presentation should not exceed 50 minutes. Total staff touring with the vehicle will be 3 instructors (1 teacher and 2 student teachers). Each of these instructors should have some knowledge of the California farming industry, and some working experience of elementary education. Additional skills will include; video production, video editing, general vehicle maintenance, enhanced driving ability to handle a heavy truck and trailer on highways, freeways and general urban settings. Curriculum will be developed and strictly followed for the benefit of each class. The goal for the vehicle is to visit as many classrooms as possible during the calendar school year. In addition to classrooms the vehicle will be available for California Ag Day, Farm Bureau Field Days and for commodity groups that can use the facility. The internal content can be adjusted by changing the video in each of the rooms to account for different educational levels or based on the location of the vehicle. All additional and more detailed planning will be developed in Phase II of the program.

4 EXHIBIT DESIGN

4.1 MOBILE HOME LAYOUT

Mobile home layout:

The mobile home will be constructed to the following format. It will be divided into 3 distinct areas and house both a prep room and an employee bathroom. Each of the exhibit rooms will also contain a 10 by 6 pull out wall that will increase the size of the room by 60 sq. feet. Each area should have adequate power feeds to the generator to support all the electrical components. The Journey of A Seed should support 3 laser video projectors and a small sound system. Beneficial Insects should support 3 LED monitors; Food Adventure should support 1 LED monitor and a small sound system. Proper lighting is needed in all areas with exception to the Beneficial Insects area. A single 120-power drop should be available in each room for charging equipment and other items.



(Proper Drawings attached in Appendix.)

Winnebago Journey 40J Custom

Maxum Chassi:

380-hp Cummins ISL 8.9L turbo-charged diesel engine (40R)
Allison® 6-speed automatic 3000 MH transmission
Information display center
NeWay® front and rear air suspension
160-amp. Alternator
Air brakes w/ABS
Engine exhaust brake
Quick-connect air connection w/manual shut off
Automatic hydraulic leveling jacks
7-pin trailer wiring
Stylized aluminum wheels

CAB:

Infotainment Center with Rand McNally RV GPS 10.4" touch screen color monitor w/split screen function, 2nd monitor, Rand McNally RV GPS safe & easy routing, amenities & tools, trips & content, turn-by-turn voice guidance, AM/FM radio w/CD/DVD player, steering wheel and handheld remote, SiriusXM™ (subscription not included), compass, outside temperature, iPod®/iPhone® audio integration, Bluetooth™, color rearview camera, sideview cameras, and house mode feature
Cab seats multi-position armrests, adjustable lumbar support, and multi-adjustable slide/recline/swivel
3-point seat belts
6-way power Versa driver seat
6-way power passenger seat w/manual footrest
Cruise control
12-volt powerpoints
Powered stepwell cover
Powered MCD solar/blackout roller shades (front windshield)
Defroster fans
MCD solar/blackout roller shades (driver and passenger windows)
Chassis/house battery radio power switch
Power mirrors w/defrost, turn signal indicator, and sideview camera

TRW® tilt/telescopic steering column w/foot actuated pedal
Map lights
Keyless entry w/remotes

Interior:

MCD solar/blackout roller shades
Soft vinyl ceiling
Contour™ windows dual-pane, tinted, frameless
Powered ventilator fan (galley)
LED ceiling lights
Powered roof vent(s) (bath(s))
Winegard® Mission® in-motion satellite TV antenna
Winegard Trav'ler® automatic HDTV antenna

Bath and Prep Area:

Corian® countertops and decorative backsplash
Corian sink covers
Pot filler faucet (40R)
Cold water filtration system
Corian countertop w/decorative backsplash
Skylights
Porcelain toilet and sink

Exterior:

Powered patio awning w/motion sensor and LED lighting
KeyOne® lock system
Powered entrance awning w/LED lighting
Lighted storage compartments
Driver's side docking/service light
2 - Lighted stepwell
Slideout storage compartment tray
Storage containers w/lids (4)
2 - Automatic entrance steps
Auxiliary side lamps
Full-width mudguard
Lower front protective mask

Premier clearcoat automotive finish
Rear mud flaps

Heating and Cooling System:

TrueAir® Maximum Comfort air conditioner, 13,500 BTU (2 cooling units 36M; 3 cooling units 40R, 42E)
Air conditioner heat pumps
2-20,000 BTU ducted furnaces (36M)
1-20,000 BTU ducted furnace and 1-25,000 BTU ducted furnace (40R, 42E)
Multi-zone thermostat

Electrical System:

Service Center lighted, cable input, 50-amp. power cord, QuickPort®, shoreline/generator automatic changeover switch, portable satellite hookup
100-watt solar panel battery charger
2,800-watt inverter/charger w/remote panel w/battery disconnect
8,000-watt Cummins Onan® Quiet Diesel™ generator
Cummins Onan Energy Command™ automatic generator start system
Auxiliary start circuit
AC/DC electrical distribution system
6 deep-cycle Group 31 marine/RV AGM batteries
Battery disconnect system w/neutral loss protection (coach and chassis)
PowerLine® Energy Management System
Automatic dual-battery charge control
Chassis battery charger/maintainer
Exterior TV jack and AC duplex

Plumbing System:

Service Center pressurized city water hookup w/diverter fill, freshwater drain, drainage valves, exterior wash station w/pump switch, holding tank flushing system, 20' sewer hose w/QuickConnect®,

QuickPort
On-demand water pump
Tankless water heater 110-volt/LP gas w/motoraid
TrueLevel™ holding tank monitoring system
Winterization Package water heater bypass valve, siphon tube, and diverter valve
Full-coach water filtration system
Permanent-mount LP tank w/gauge
LPG accessory connection (patio area)
Heated holding tank compartment

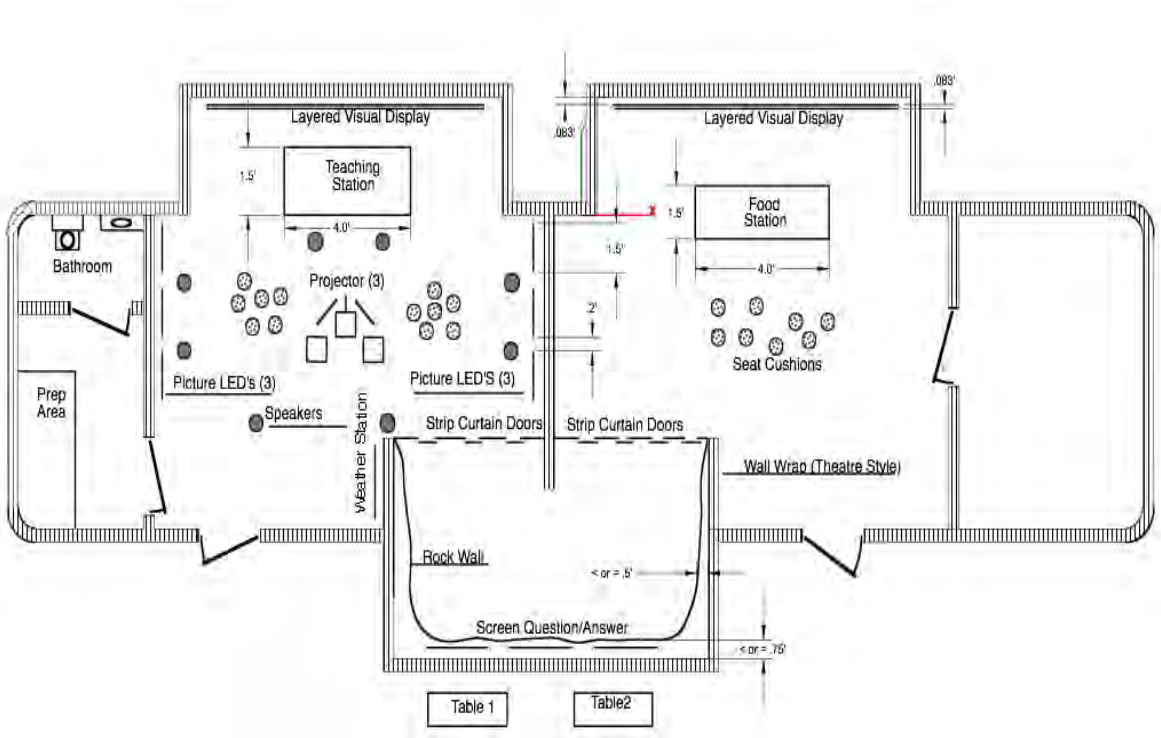
Safety System:

LP, smoke, and carbon monoxide detectors
10 BC fire extinguisher
Ground fault interrupter
Fog lamps
High-mount brake lamps
Daytime running lamps

4.2 EXHIBIT LAYOUT

The exhibit is broken into 4 areas:

1) The Journey Of a Seed.
2) Our Friends, Beneficial Insects.
3) Food Adventure.
4) The Planting Of a Seed.



The Journey Of a Seed:

This will be an audio/visual presentation that will tell the story, The Journey of A Seed. It will follow the journey of our one little seed as he grows to maturity in his California Farm and interacts with other characters, such as beneficial insects, and other seeds and plants. It will be based on a California Farm and will talk about other farms in California as the seed looks for his place. The complete presentation will take 15 minutes and will catch the children's attention by introducing them to the world of image mapping, creating a 3D experience that brings reality to a new level.

Our Friends, Beneficial Insects.

This area will teach the children about California's beneficial insect population, and how these insects help California farmers protect their crops. It will do this through Audio/visual presentations, display boards, and visual effects. The area itself will depict the underground environment of your common earthworm with dirt walls, roots, and other plant items dangling from the top of the tunnel. This is a transition area, should last about 5 minutes and allow time for prep and cleanup for the Food Adventure.

Food Adventure.

This area is where the children will go to learn about healthy eating. The lesion will teach the children about different foods grown in California and how they can be used to make easy after school snakes. This are is also used to video record segments for the web page and for the Google TV show that will teach children, again, about healthy eating in California.

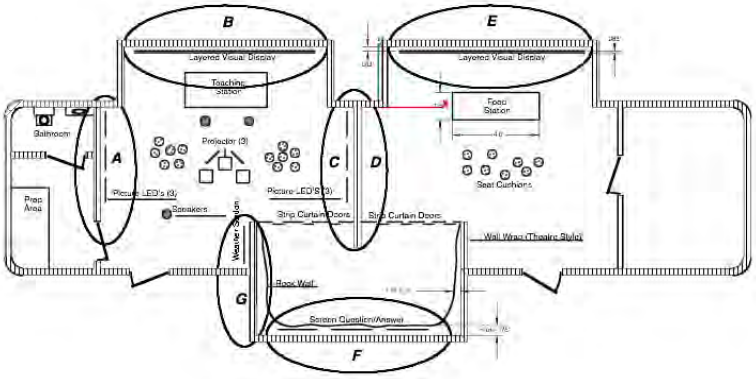
The Planting Of a Seed.

This is the hands on part of the exhibit. Here the children will plant their own seed and learn what it takes to be a farmer in California. They will then be able to take the planted seeds with

them to use either as a project to take home, a science project to see what plant growth is like, or as a class project to see who can grow the tallest plant. There will also be a video playing that will asked kids simple questions about farming, a question and answers game.

4.3 WALL SET AND DESIGN

The following drawing depicts the designation of each wall set and suggested specification.



4.4 WALL LAYOUT AND SPECIFICATION

Trailer Wall A:

1) The 3 frames hanging on wall are to be constructed with ¼" aluminum that will be CNC cut with a western feel in the design. Can have native plants or images cut out within the metal and should have a flowing feel. After production of the frames, the metal should be brushed to give it an aged look.

2) Frames are to be attached to the wall either in a straight line or in some form of zigzag, depending on final build. Frames should be attached with 1" invisible standoffs. Base of standoffs should be attached to the frame with epoxy resin. The standoffs themselves should be attached to wall with screws provided. Installation should follow the manufacturers recommendations.

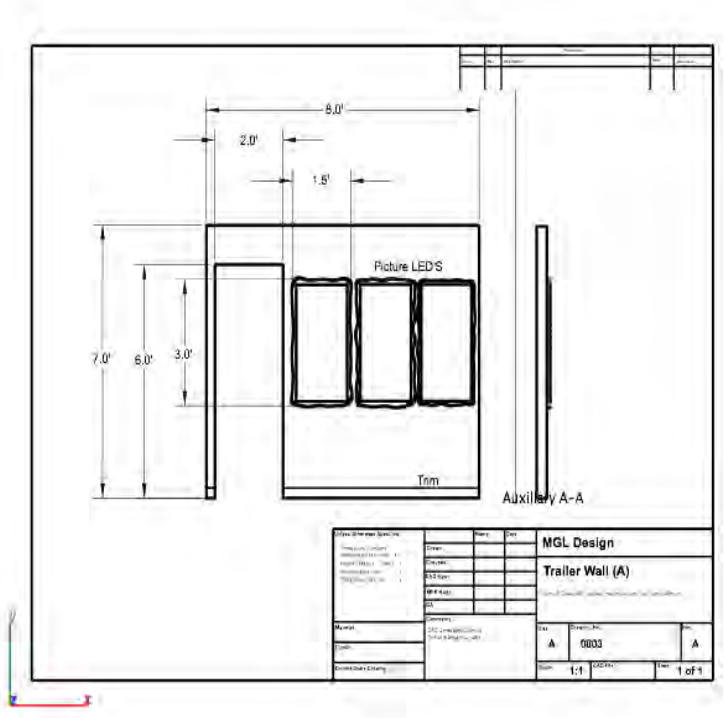
3) There will not be any images in the frames. These will be produced by the video mapping effects and projected into the frame. If dimension is needed, a cut of Studiotek 100 can be secured into the frame to give the image a layered effect.

4) The wall treatment can be one of several things. The cost effective method is to paint the wall with flat latex house paint (either brand of Behr or Valspar will do). You can compare the two products to determine the one that gives the best image. The proper method of prepping the wall

for projection is to use a product such as Projector Screen Paint, Digital Theater White, Q002. Several coats will be needed for best results.

5) Painting the trim with a semi gloss latex paint is the final step in prepping the wall for production; color is up to designer at final step.

6) The door on this wall does not need to be treated but, again, this is up to the discretion of the designer.



(Proper Drawings attached in Appendix.)

4.5 WALL B

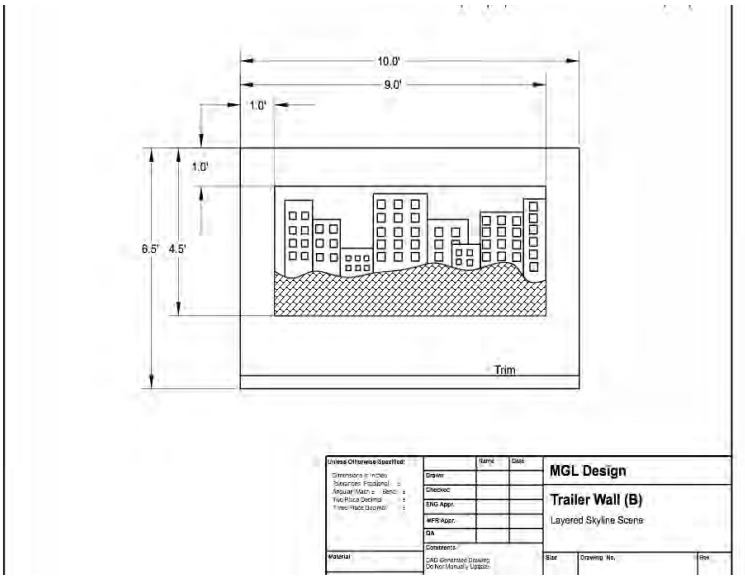
Trailer Wall B:

1) This wall is a push out wall on a trailer with 3 sides. The sidewalls and the area below the visual display should resemble the inside of a barn. This can be achieved by using a custom designed wrap of images taken from an actual barn, or by planking the wall. Added props and display boards can be attached to this wall that tell the story of California Farms. This can be determined at time of build and by the sponsor's request.

2) The visual backdrop will be multi layered and cut from Max-Metal. The first layer will depict valley agriculture, including water features and wildlife. The next layer will depict the skyline of a California metropolis. The final layer will depict the Sierra skyline and will include trees and recognizable features. Each layer should be spaced, by wood framing, at a minimum of 1" from the layer before it.

3) Each frame will then be up lit and side lit with 12 volt LED tape, in either a single color matching the layers surface color or with RGB tape. If RGB tape is used each layer must have individual control.

4) The back layer will then be a frosted sign glass or signboard. This will be lit from the back with blue 12 volt LED tape. It should be lit in such a way as to resemble the California skyline. Cloud stencils can be added, along with bird stencils (California Condor or Red Hawk), to give the wall an added feature.



(Proper Drawings attached in Appendix.)

4.6 WALL C

Trailer Wall C:

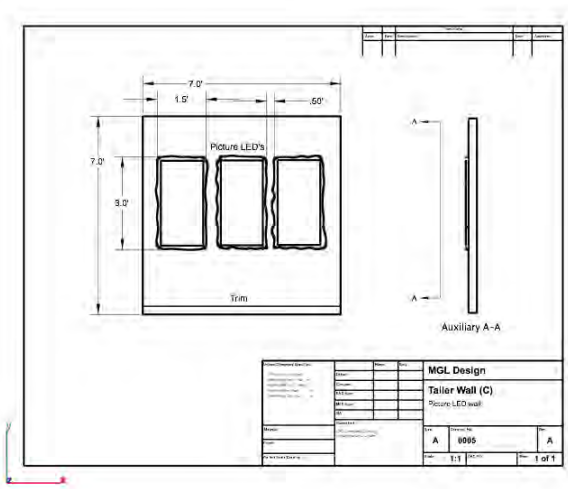
1) The 3 frames hanging on wall are to be constructed with ¼" aluminum that will be CNC cut with a western feel in the design. They can have native plants or images cut out within the metal and should have a flowing feel. After production of the frames the metal should be brushed to give it an aged look.

2) Frames are to be fixed to the wall either in a straight line or in some form of zigzag, depending on final build. Frames should be attached with 1" invisible standoffs. Base of standoffs should be secured to the frame with epoxy resin. The standoffs themselves should be attached to the wall with screws provided. Installation should follow the manufactures recommendations.

3) There will not be any images in the frames, these will be produced by the video mapping effects and projected into the frame. If dimension is needed a cut of Studiotek 100 can be secured onto the frame to give the image a layered effect.

4) The wall treatment can be one of several things. The cost effective method is to paint the wall with flat latex house paint (either brand of Behr or Valspar will do). You can compare the two products to determine the one that gives the best image. The proper method of prepping the wall for projection is to use a product such as Projector Screen Paint, Digital Theater White, or Q002. Several coats will be needed for best results.

5) Painting the trim with a semi gloss latex paint is the final step in prepping the wall for production; color is up to designer at final step.



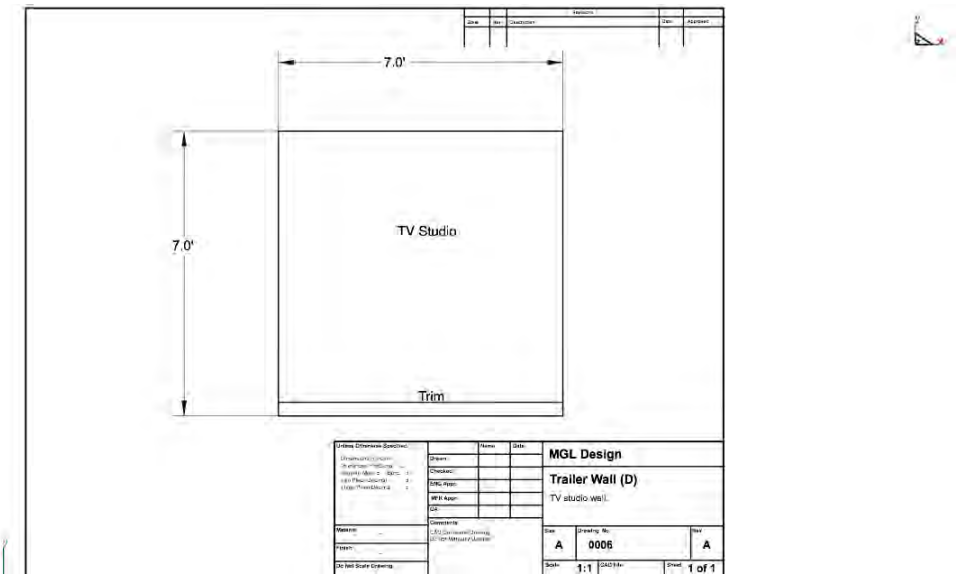
(Proper Drawings attached in Appendix.)

4.7 WALL D

Trailer Wall D:

1) This wall should resemble a film studio. This can be achieved by using a custom designed wrap of images taken from an actual film studio. Added props and display boards can be attached to this wall. They should tell the students about California grown foods and healthy eating. This can be determined at time of build and by the sponsor's request.

2) Painting the trim with a semi gloss latex paint is the final step in prepping the wall for production; the color is up to designer at final step.



(Proper Drawings attached in Appendix.)

4.8 WALL E

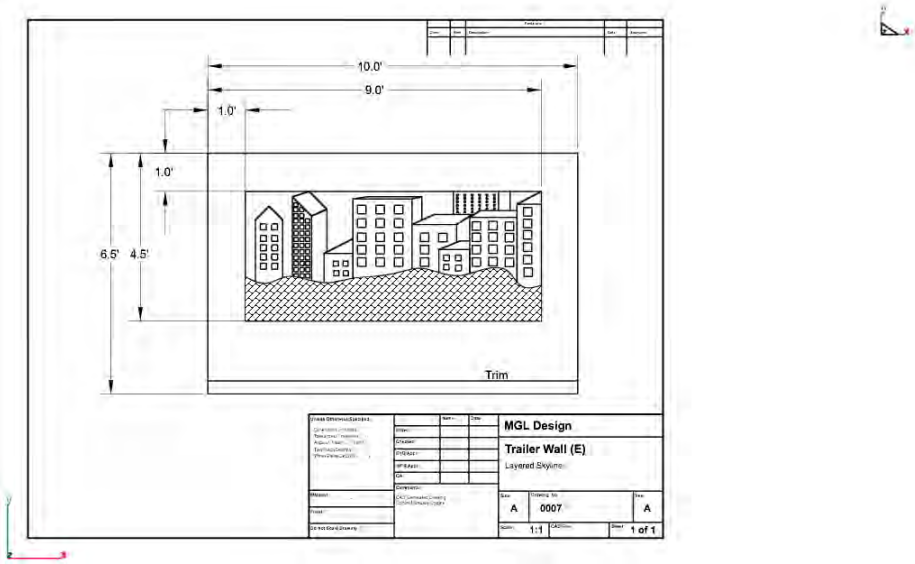
Trailer Wall E:

1) This wall is a push out wall on a trailer with 3 sides. The sidewalls and the area below the visual display should resemble a film studio. This can be achieved by using a custom designed wrap of images taken from an actual film studio. Added props and display boards can be attached to this wall that tell the students about California grown food and healthy eating. This can be determined at time of build and by the sponsor's request.

2) The visual backdrop will be multi layered and cut from Max-Metal. The first layer will depict a field of corn or other product. The next layer will depict farmhouse and farm equipment. The final layer will depict the Sierra skyline and include trees and recognizable features. Each layer should be spaced, by wood framing, at a minimum of 1" from the layer before it.

3) Each frame will then be up lit and side lit with 12 volt LED tape, in either a single color matching the layers surface color or with RGB tape. If RGB tape is used each layer must have individual control.

4) The back layer will be a frosted sign glass or signboard. This will be lit from the back with blue 12 volt LED tape. It should be lit in such a way as to resemble the California skyline. Cloud stencils can be added, along with bird stencils (California Condor or Red Hawk), to give the wall an added feature.



(Proper Drawings attached in Appendix.)

4.9 WALL F

Trailer Wall F:

1) This wall is a push out wall on a trailer with 3 sides. This area will depict what it is like to be a worm under ground. Both entries will be covered with push out doors to block the sound from either side of the trailer.

2) On the main wall there will be 3 video screens. They should be staggered when hung to depict different levels under ground. They should be a minimum of 42", and HDMI.

3) The three walls, after video installations, will be covered with Styrofoam shaped to depict an underground tunnel. Once they are shaped an epoxy hardener must be applied to protect the Styrofoam from damage.

4) Once the Styrofoam walls are prepped, they will be painted with a flat latex paint in such a way as to depict the colors of an underground cave. Browns, blacks, and greens are the primary base.

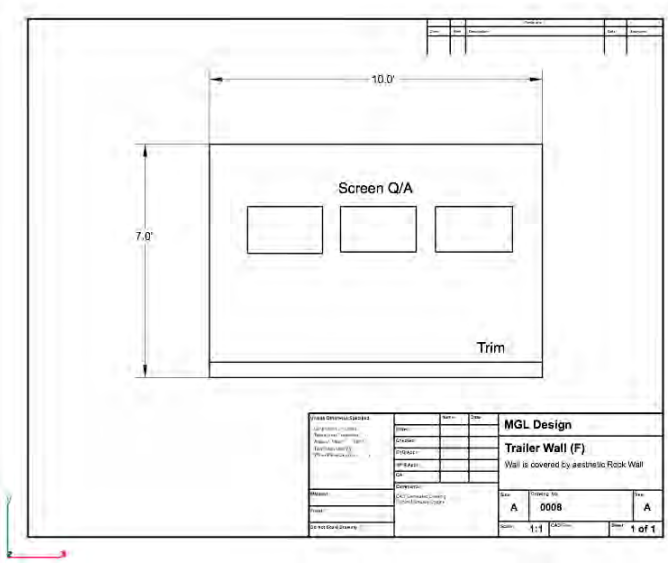
5) Once the latex paint is dried, a high gloss latex polish can be applied to make the walls look wet. This must be latex based and cleanable. This will force the color creating a vibrant look.

6) From the roof there should be items installed depicting what it is like to be under the growing plants. Roots, radishes, and carrots can be some of the items hanging from the ceiling. They should be painted appropriately

and treated with the latex polish to give them a wet sheen.

7) On sidewalls, added props and display boards can be attached. They should tell the students about beneficial insects and how they help their environment. This can be determined at time of build and by the sponsor's request.

8) The videos should be of different beneficial insects shown in their natural environment, and tell the story of how they help our California farms and plant life. This story should last approximately 5 minutes.



(Proper Drawings attached in Appendix.)

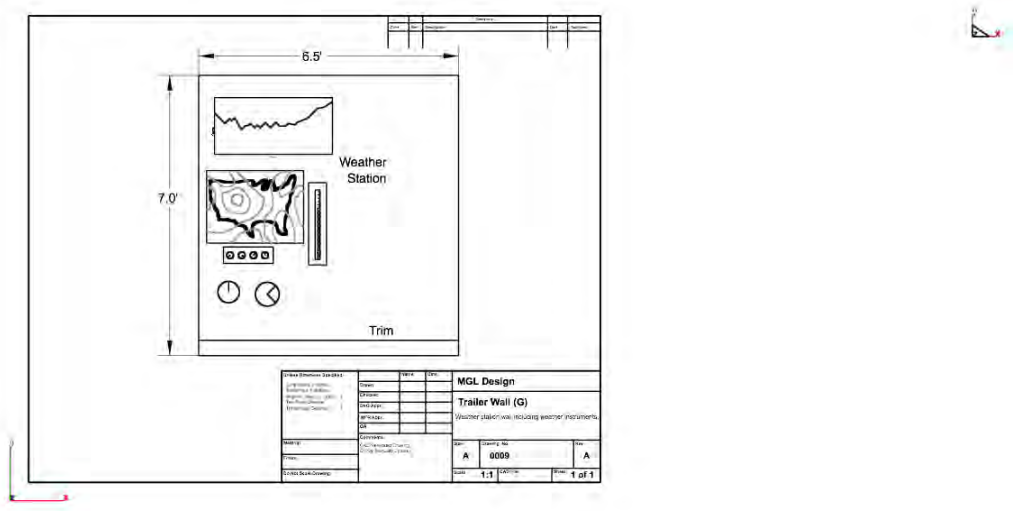
4.10 WALL G

Trailer Wall G:

1) This wall will hold the weather station remote. It will show the readings of the Orion Vehicle Mount Weather Station. The following Parameters will be monitored and wired to the National Weather Service:

- Rainfall
- Temperature
- Barometric pressure
- Wind direction
- Wind speed with gust
- Relative humidity

2) Added props and display boards can be attached to this wall that tell how California weather and different seasons affect crop growth. This can be determined at time of build and by the sponsor's request.



(Proper Drawings attached in Appendix.)

4.11 AV AND SOUND REQUIREMENTS

1) The Journey Of a Seed

Mackie DL1608 iPod-controlled Digital Mixer

4 - CSA-2120 AUDIO AMPLIFIER

8 - 8128 8” Ceiling Speaker

Apple iPod with appropriate software

3 - E-Vision 1080p 4500, Laser Projectors

Proper mountain hardware for projectors

MadMapper software with appropriate laptop to run software

All necessary cables

2) Our Friends, Beneficial Insects

CSMA-180, 80watt, 4 in, 1 out, Mixer-Amplifier

CSA-2120 AUDIO AMPLIFIER

2 - 8124 4” Ceiling Speaker

CD Player or comparable

1 – Samsung DB48E Digital Signage Display

2 - Samsung DC32E 32" Full-HD SMART Signage Display

Proper hanging brackets

3) Food Adventure.

CSMA-180, 80watt, 4 in, 1 out, Mixer-Amplifier

CSA-2120 AUDIO AMPLIFIER

2 - 8128 8” Ceiling Speaker

CD Player or comparable

2 - Wireless microphones or lavalieres

4) The Planting Of a Seed:

Samsung DM55E 55" 1080p Direct-Lit LED Display

CSA-2120 AUDIO AMPLIFIER

2 - 8128 8” Ceiling Speaker

LED screen stand

4.12 EXHIBIT SKIN

The wrap will be determined by the sponsors but must clearly depict the theme of the project and it purpose. CDFA Logo must be part of the final skin that will cover the display to identify their participation in this project. It must be a minimum of 36” by 36” and posted in a prominent location on the exterior of the exhibit. You will find an example of the skin in the appendix.

5 APPROVAL

The undersigned acknowledge they have reviewed the document and agree with the approach it presents. Any changes to this Requirements Definition will be coordinated with and approved by the undersigned or their designated representatives.

Signature: _____ Date: _____
Print Name: _____
Title: _____
Role: _____

Signature: _____ Date: _____
Print Name: _____
Title: _____
Role: _____

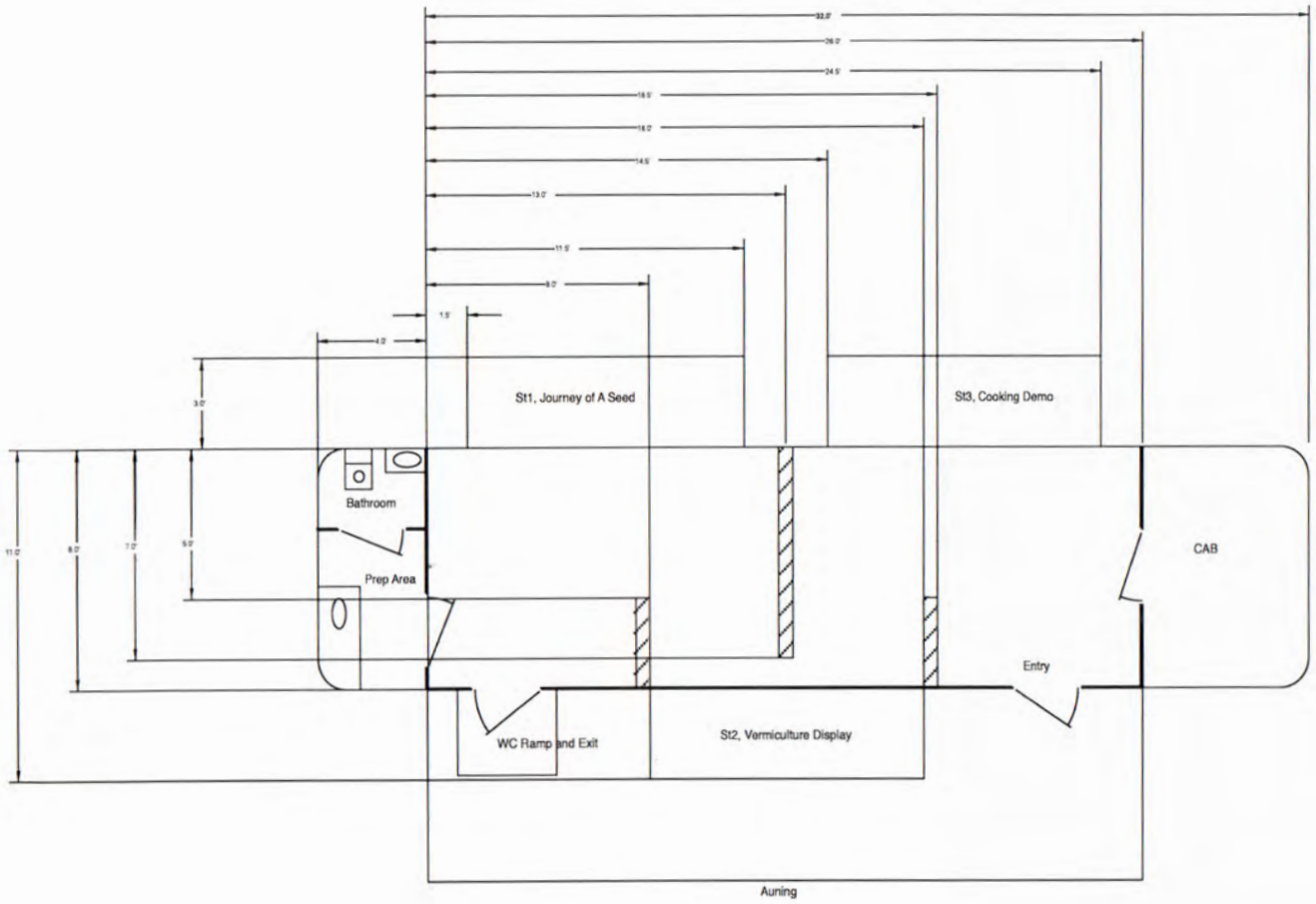
Signature: _____ Date: _____
Print Name: _____
Title: _____
Role: _____

Appendix A: References

The following table summarizes the list of documents referenced in this report and their location in the Appendix.

Document Name and Version	Description	Location
Wall A	Spec wall A	A-1
Wall B	Spec wall B	A-2
Wall C	Spec wall C	A-3
Wall D	Spec wall D	A-4
Wall E	Spec wall E	A-5
Wall F	Spec wall F	A-6
Wall G	Spec wall G	A-7
Counter Mock up	Rough spec of counter tops.	A-8

Revisions				
Zone	Rev	Description	Date	Approved



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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		
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Finish --			
Do Not Scale Drawing			

MGL Design

Motorhome Floor Plan

<Description>

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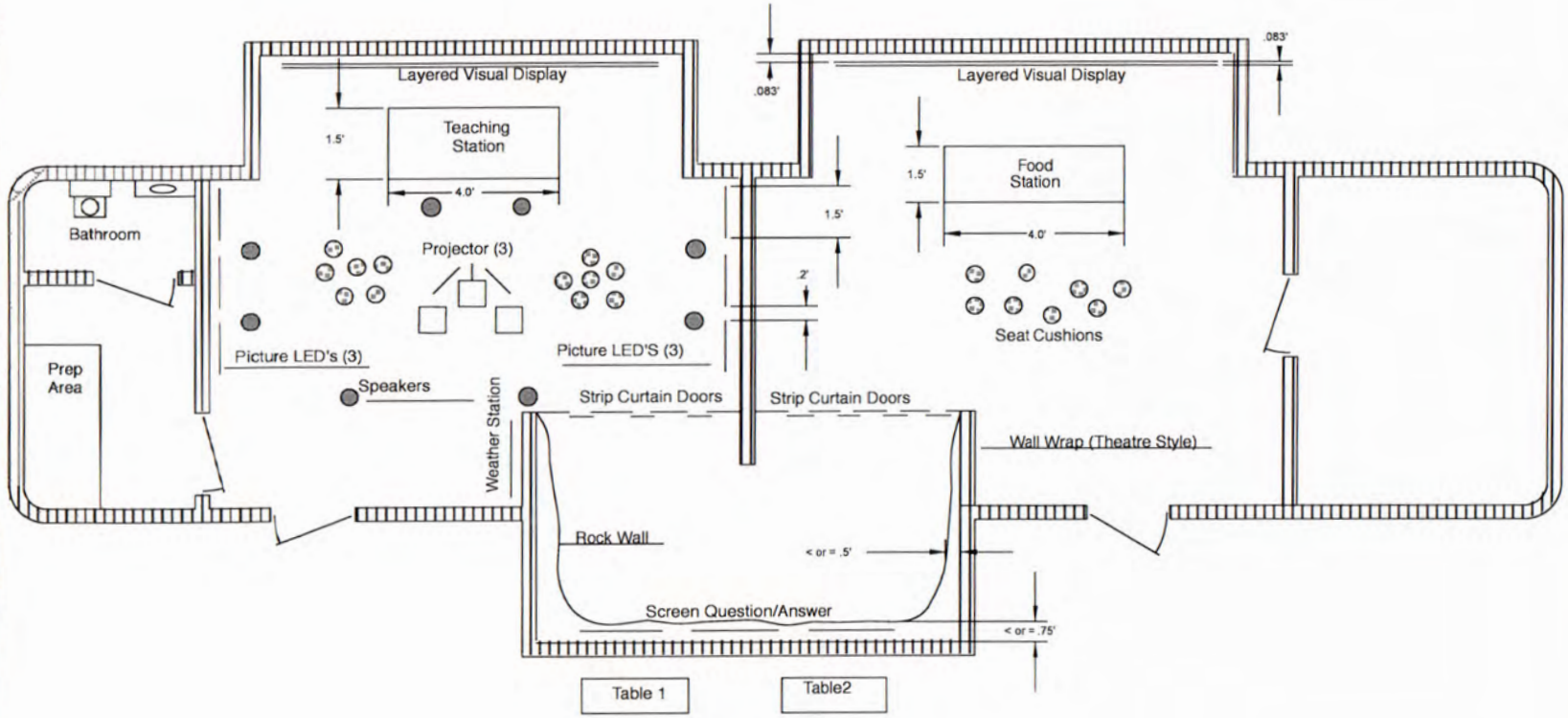
A	0001	A

Scale	CAD File	Sheet
1:1		1 of 1

Revisions				
Zone	Rev	Description	Date	Approved



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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		
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Finish --			
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MGL Design

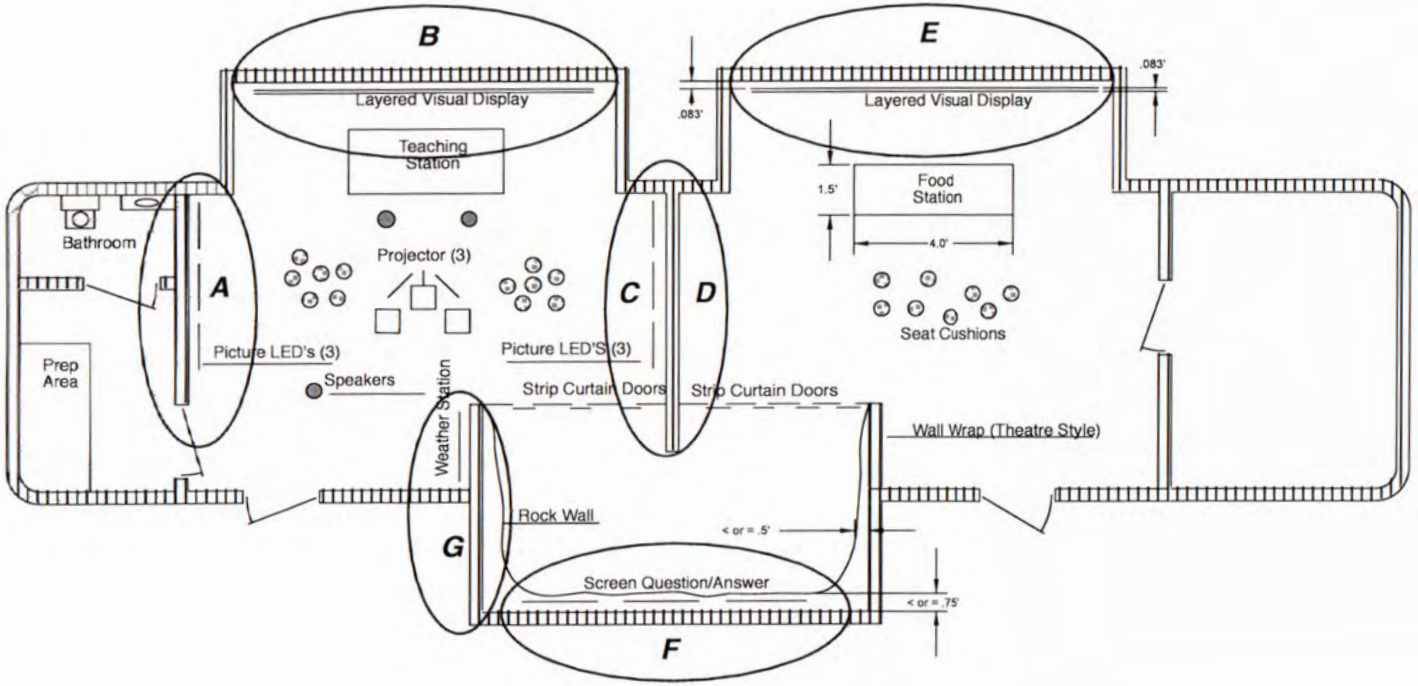
Exhibit Floor Plan

<Description>

Size	Drawing No.	Rev
A	0002	A

Scale	CAD File	Sheet
1:1		1 of 1

Revisions				
Zone	Rev	Description	Date	Approved



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MGL Design

Exhibit Reference

<Description>

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Revisions				
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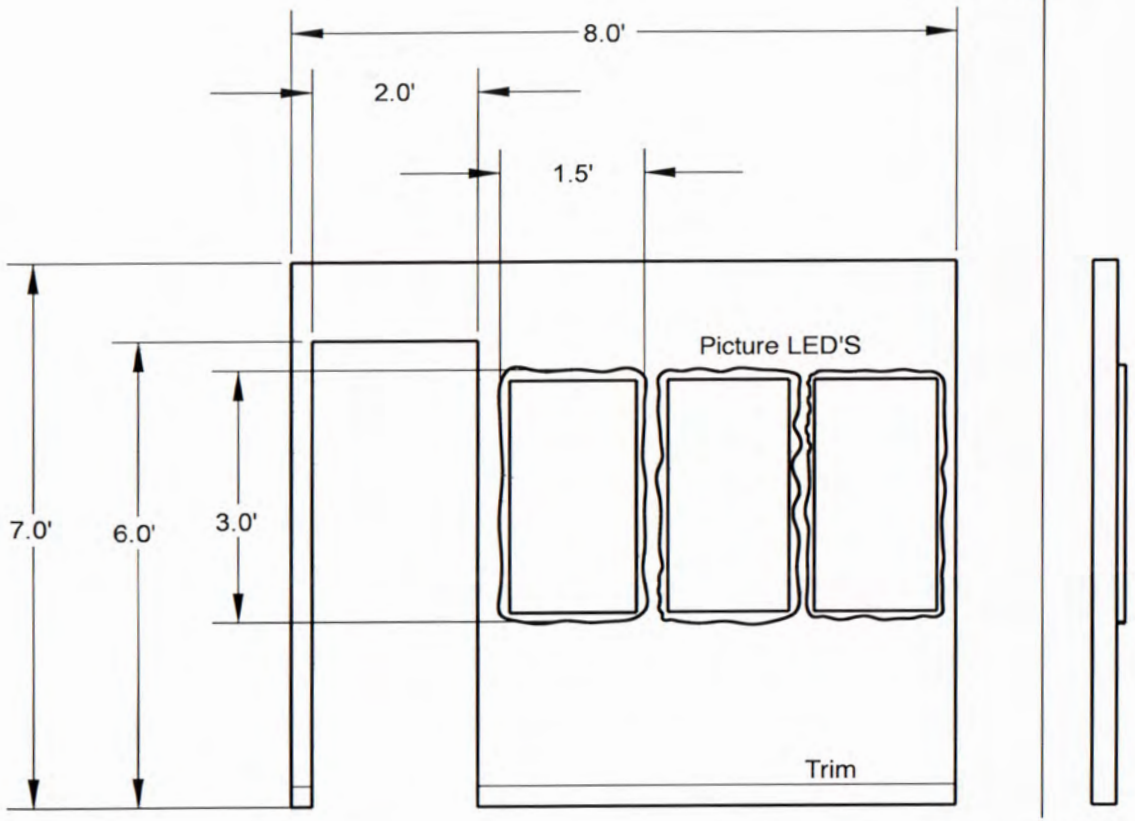

Unless Otherwise Specified:		Name	Date	MGL Design
Dimensions in inches Tolerances: Fractional ± Angular: Mach ± Bend ± Two Place Decimal ± Three Place Decimal ±	Drawn			**Trailer Wall (A)**
	Checked			Picture LED wall with doorway leading to prep room and bathroom.
	ENG Appr.			
	MFR Appr.			
	QA			
Material --	Comments CAD Generated Drawing Do Not Manually Update			Size A | Drawing No. 0003 | Rev A
Finish --				Scale 1:1 | CAD File | Sheet 1 of 1
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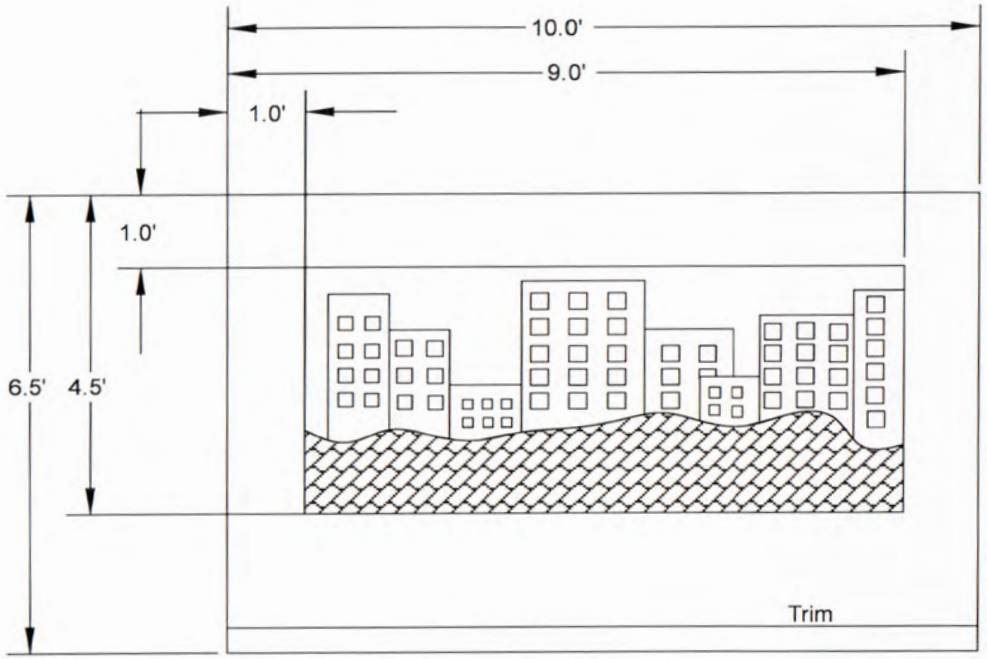
Revisions				
Zone	Rev	Description	Date	Approved



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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		
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MGL Design

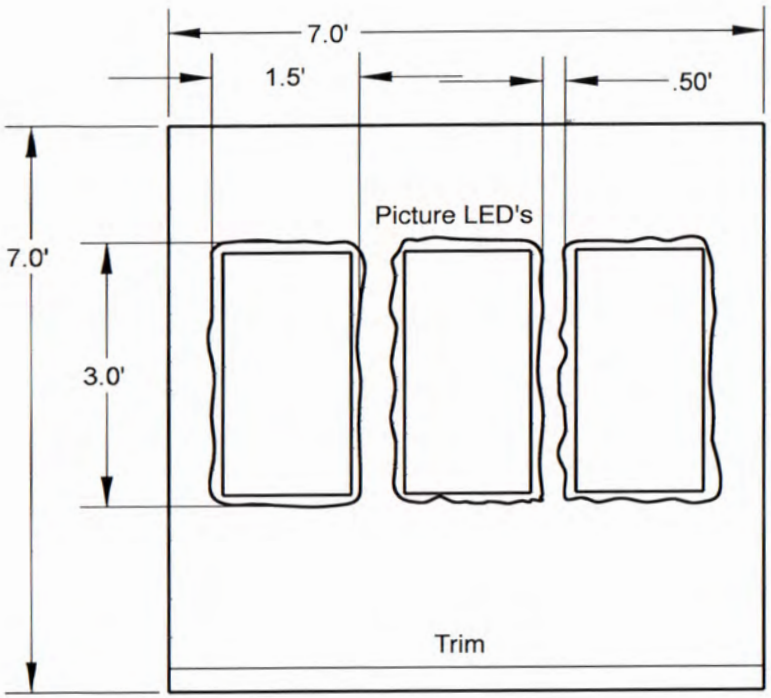
Trailer Wall (B)

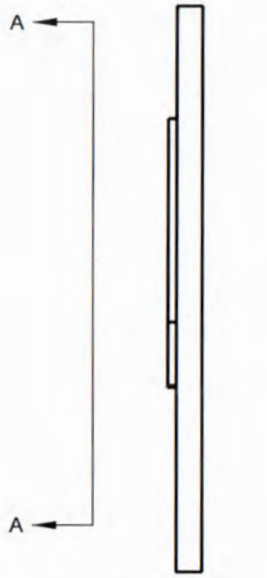
Layered Skyline Scene

Size	Drawing No.	Rev
A	0004	A

Scale	CAD File	Sheet
1:1		1 of 1

Zone	Rev	Revisions: Description	Date	Approved





Auxiliary A-A

Unless Otherwise Specified:		Name	Date
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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		

Material	Comments
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Do Not Scale Drawing	

MGL Design

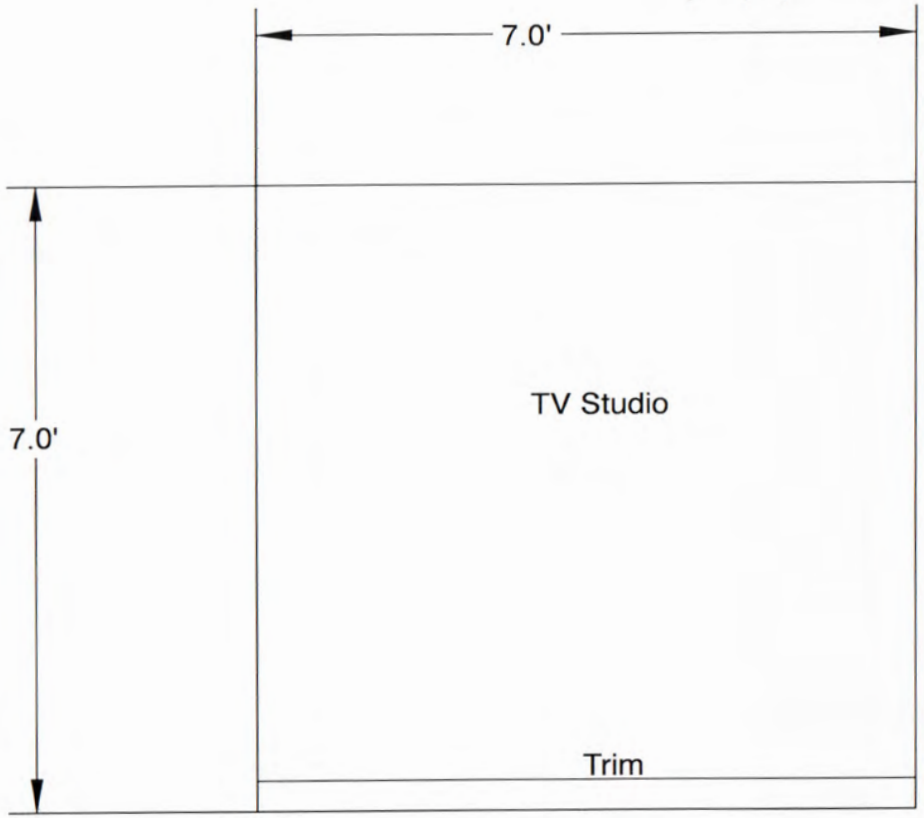
Tailer Wall (C)

Picture LED wall.

Size	Drawing No.	Rev
A	0005	A

Scale	CAD File	Sheet
1:1		1 of 1

Revisions				
Zone	Rev	Description	Date	Approved



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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		

Material	Comments
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Do Not Scale Drawing	

MGL Design

Trailer Wall (D)

TV studio wall.

Size	Drawing No.	Rev
A	0006	A

Scale	CAD File	Sheet
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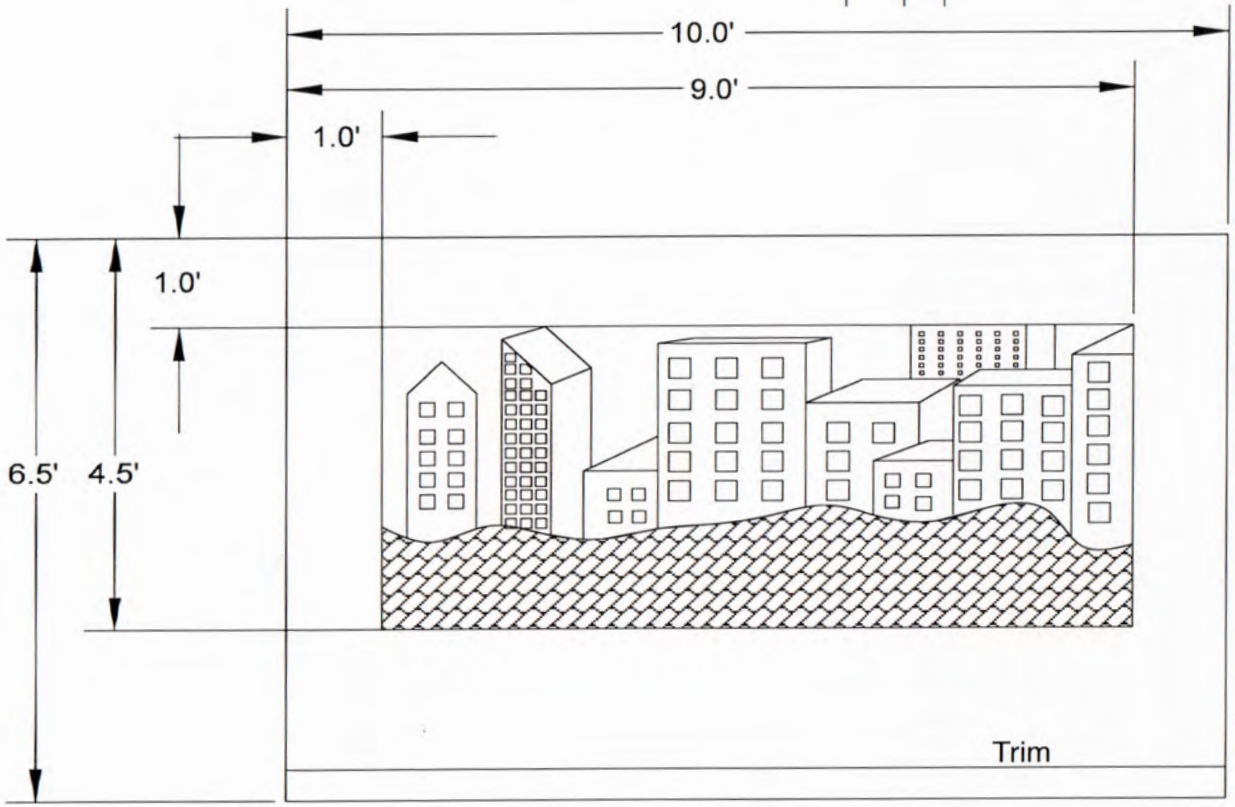
Revisions				
Zone	Rev	Description	Date	Approved



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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		

Material	Comments
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Do Not Scale Drawing	

MGL Design

Trailer Wall (E)

Layered Skyline

Size	Drawing No.	Rev
A	0007	A

Scale	CAD File	Sheet
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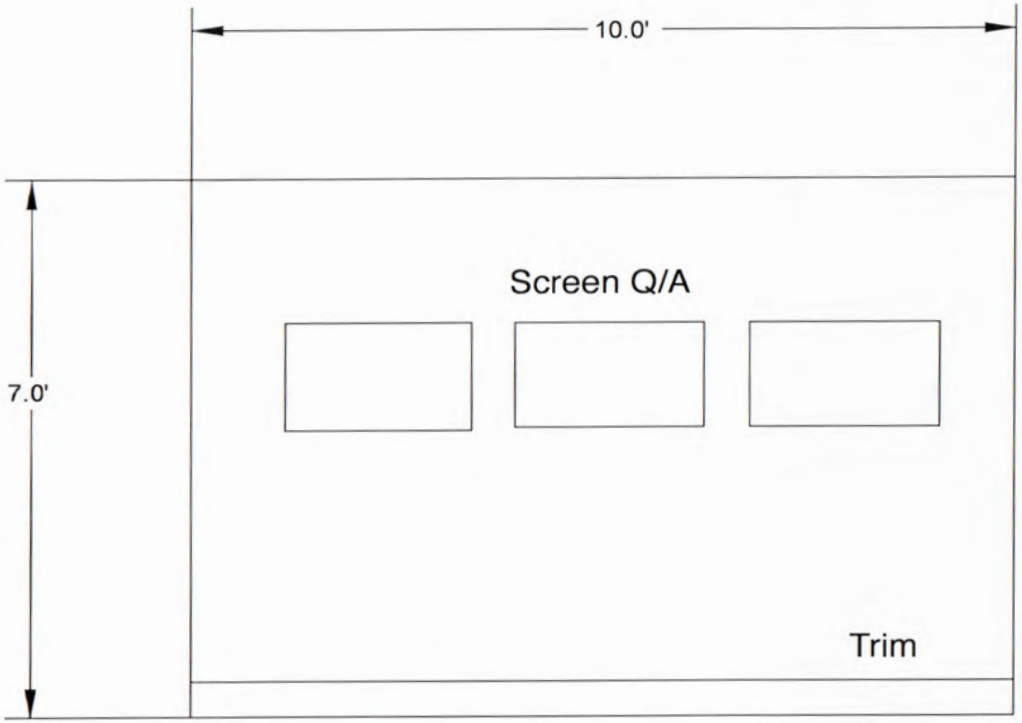
Revisions				
Zone	Rev	Description	Date	Approved



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Two Place Decimal ±	MFR Appr.		
Three Place Decimal ±	QA		

Material	Comments
--	CAD Generated Drawing Do Not Manually Update
Finish: --	
Do Not Scale Drawing	

MGL Design

Trailer Wall (F)

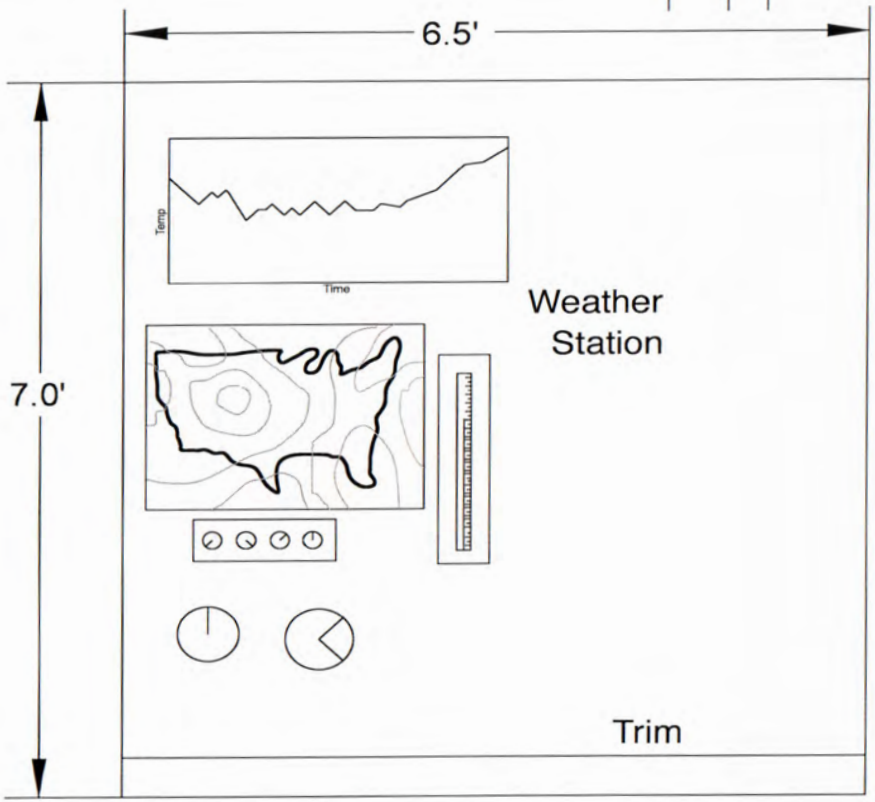
Wall is covered by aesthetic Rock Wall

Size	Drawing No.	Rev
A	0008	A

Scale	CAD File	Sheet
1:1		1 of 1

150

Revisions				
Zone	Rev	Description	Date	Approved



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	MFR Appr.		
	QA		
Material --	Comments CAD Generated Drawing Do Not Manually Update		
Finish --			
Do Not Scale Drawing			

MGL Design

Trailer Wall (G)

Weather station wall including weather instruments.

Size	Drawing No.	Rev
A	0009	A

Scale	CAD File	Sheet
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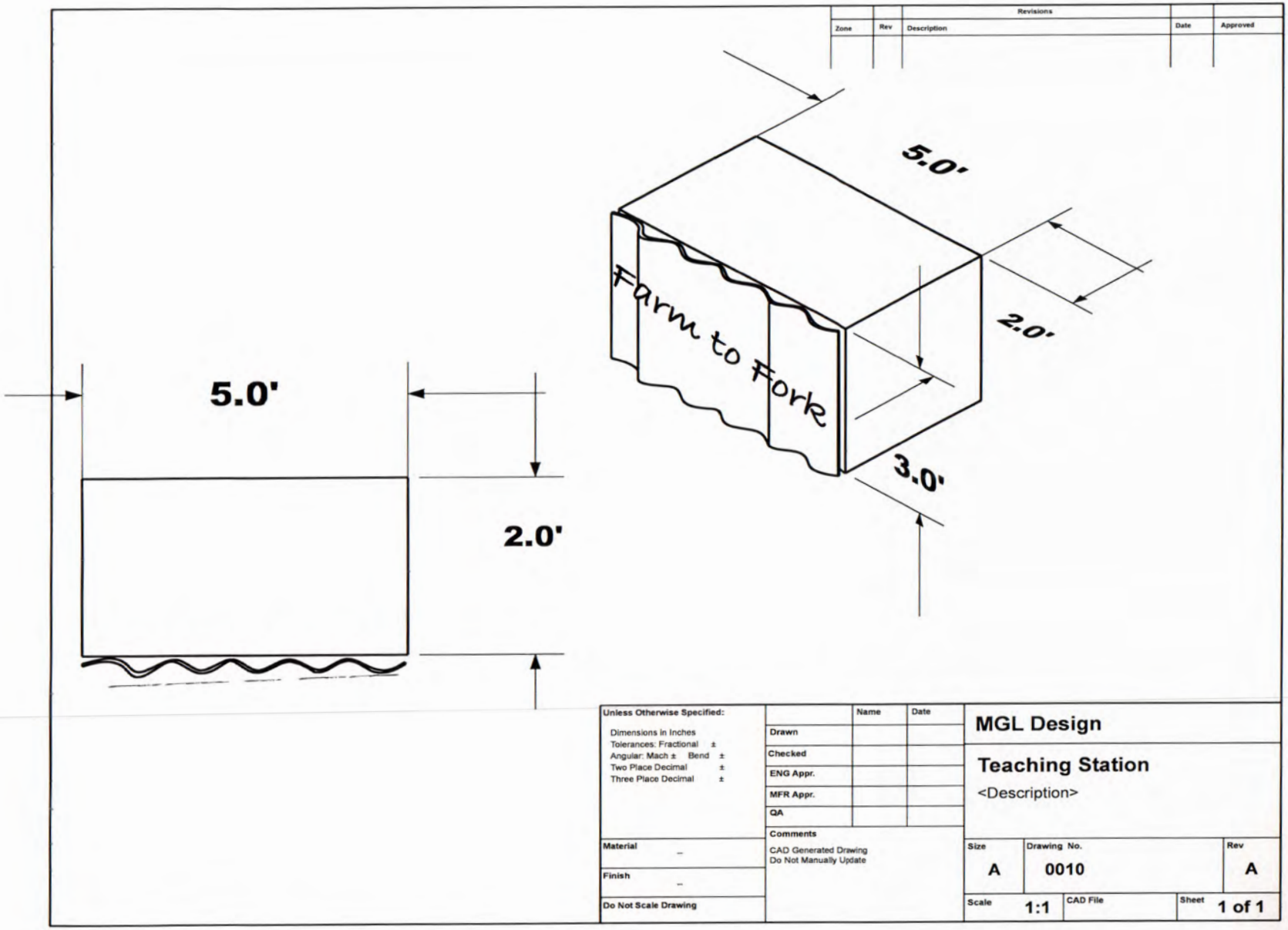
Revisions
Zone
Rev
Description
Date
Approved
5.0'
2.0'
3.0'
Farm to Fork
5.0'
2.0'
Unless Otherwise Specified:
Dimensions in Inches
Tolerances: Fractional ±
Angular: Mach ± Bend ±
Two Place Decimal ±
Three Place Decimal ±
Name
Date
Drawn
Checked
ENG Appr.
MFR Appr.
QA
Comments
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Do Not Manually Update
Material
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Finish
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MGL Design
Teaching Station
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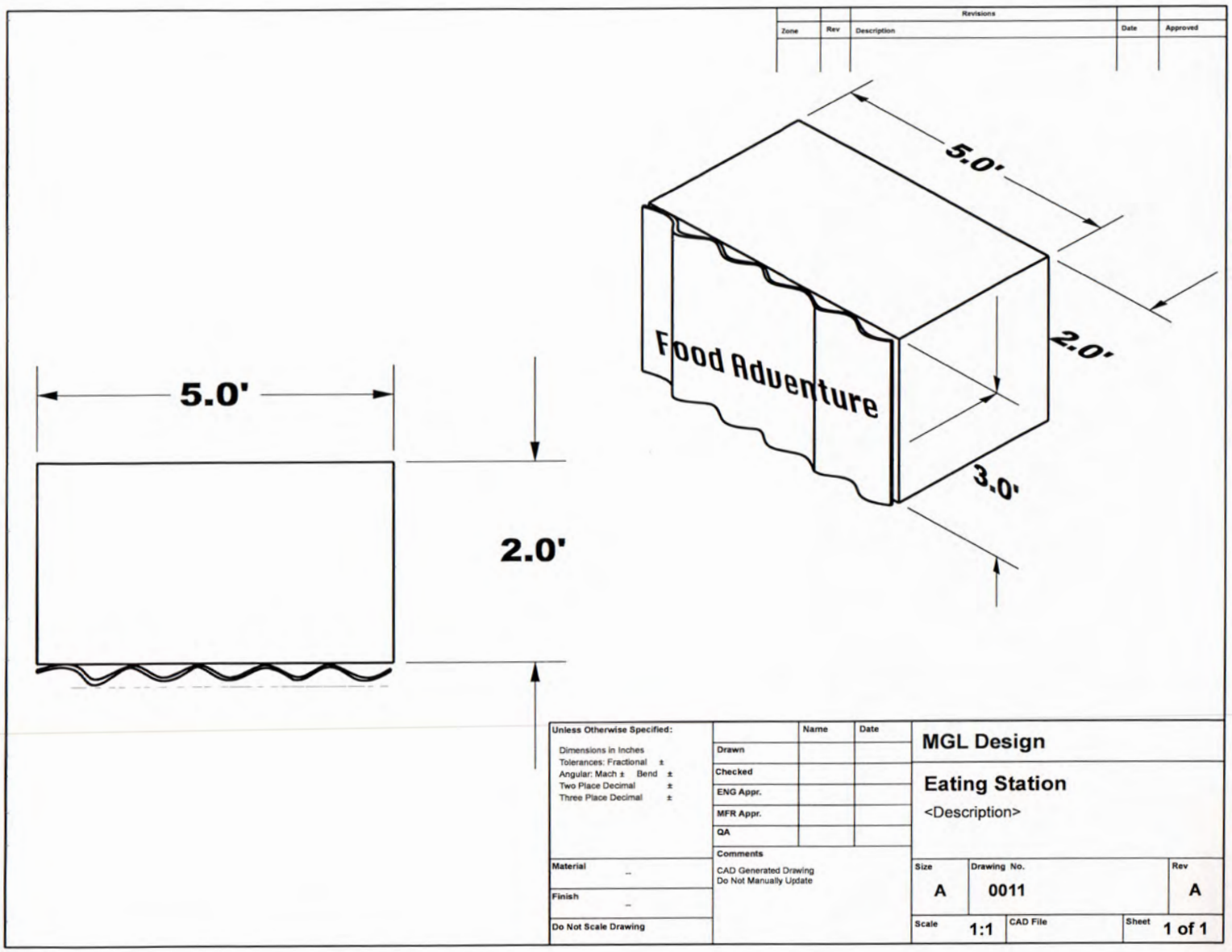
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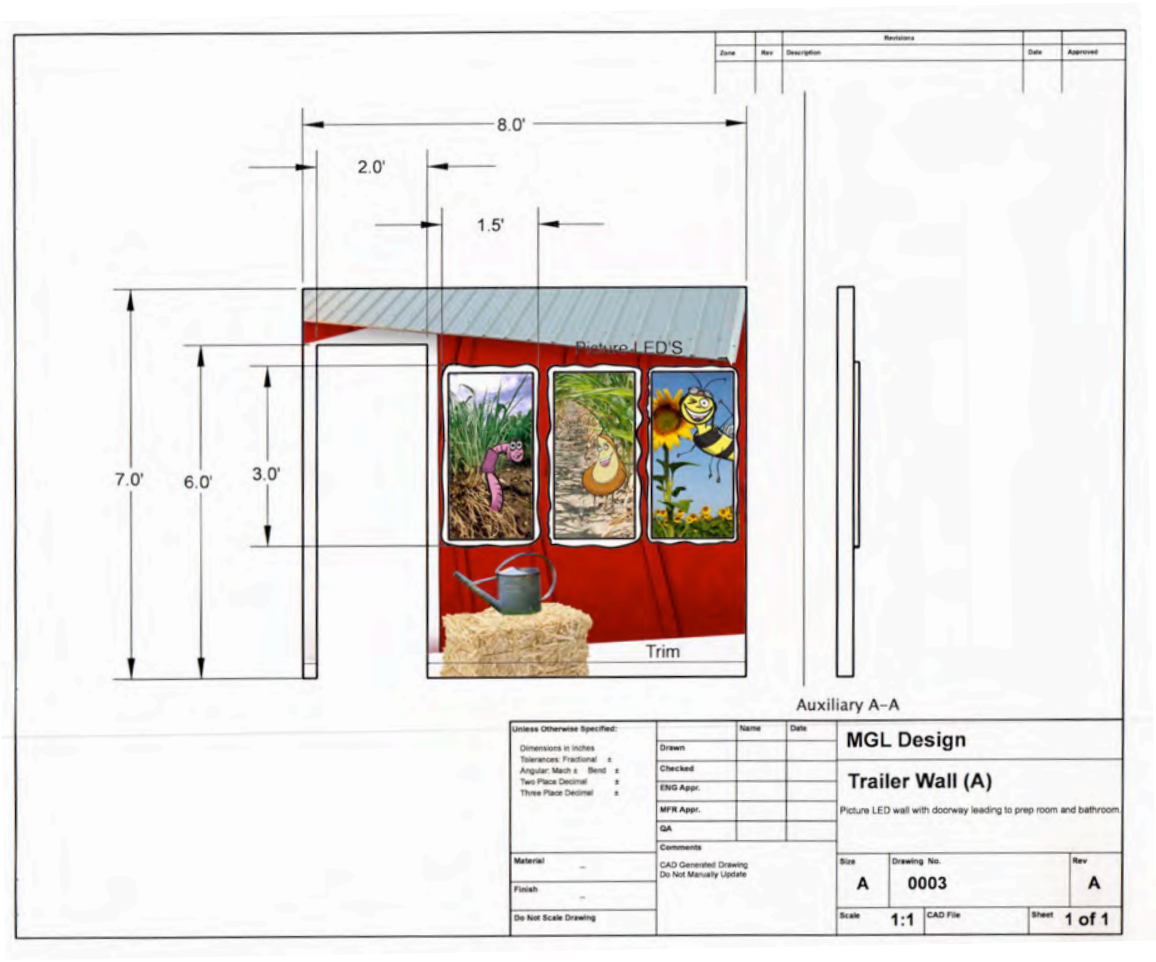
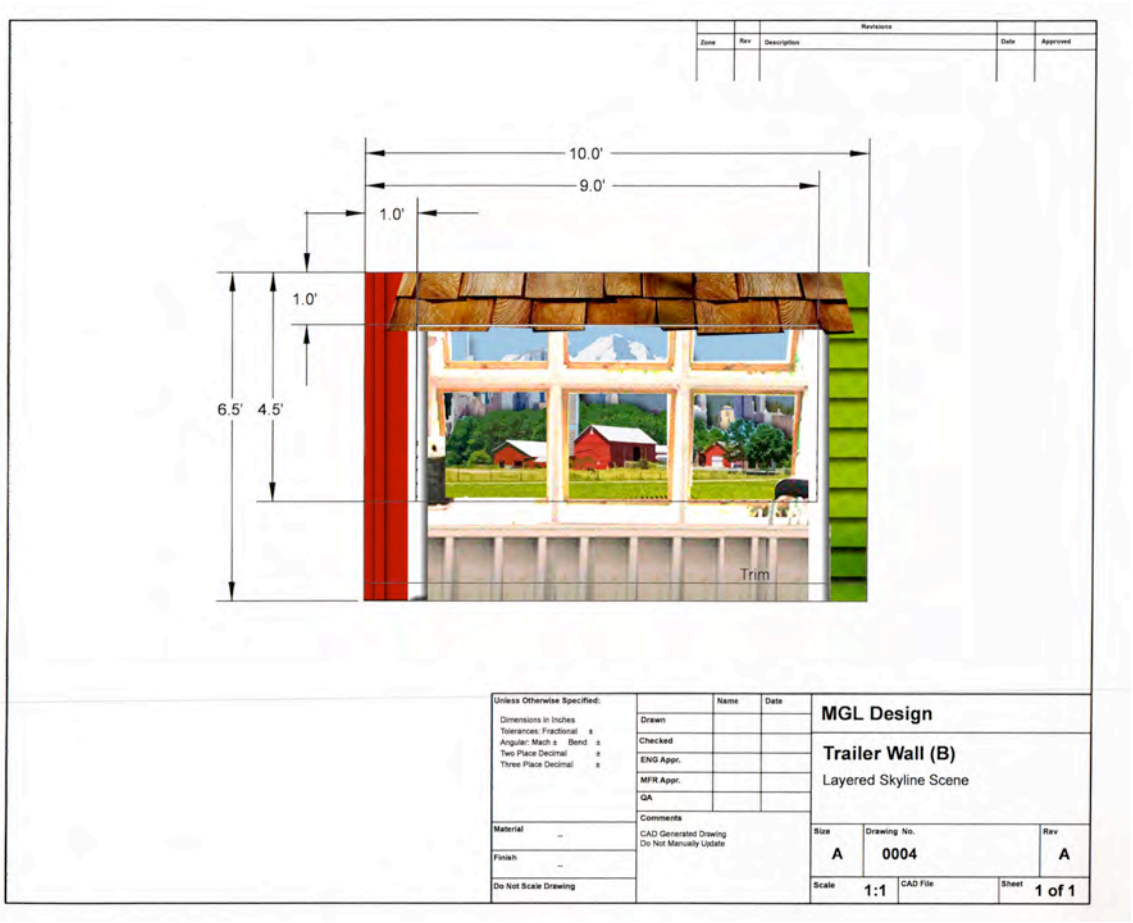
Appendix B: Key Terms

The following table provides definitions for terms relevant to this document.

Term	Definition
CNC	Computer Numerical Control
Studioteck 100	AV cloth for video projection
Q002	Q for quart, 002 for color white balance
Max-Metal	Composite made from Aluminum and PVC
RGB	Red, Green, Blue color possibilities
HDMI	High Definition Multimedia Interface

Appendix C: Artist Renditions

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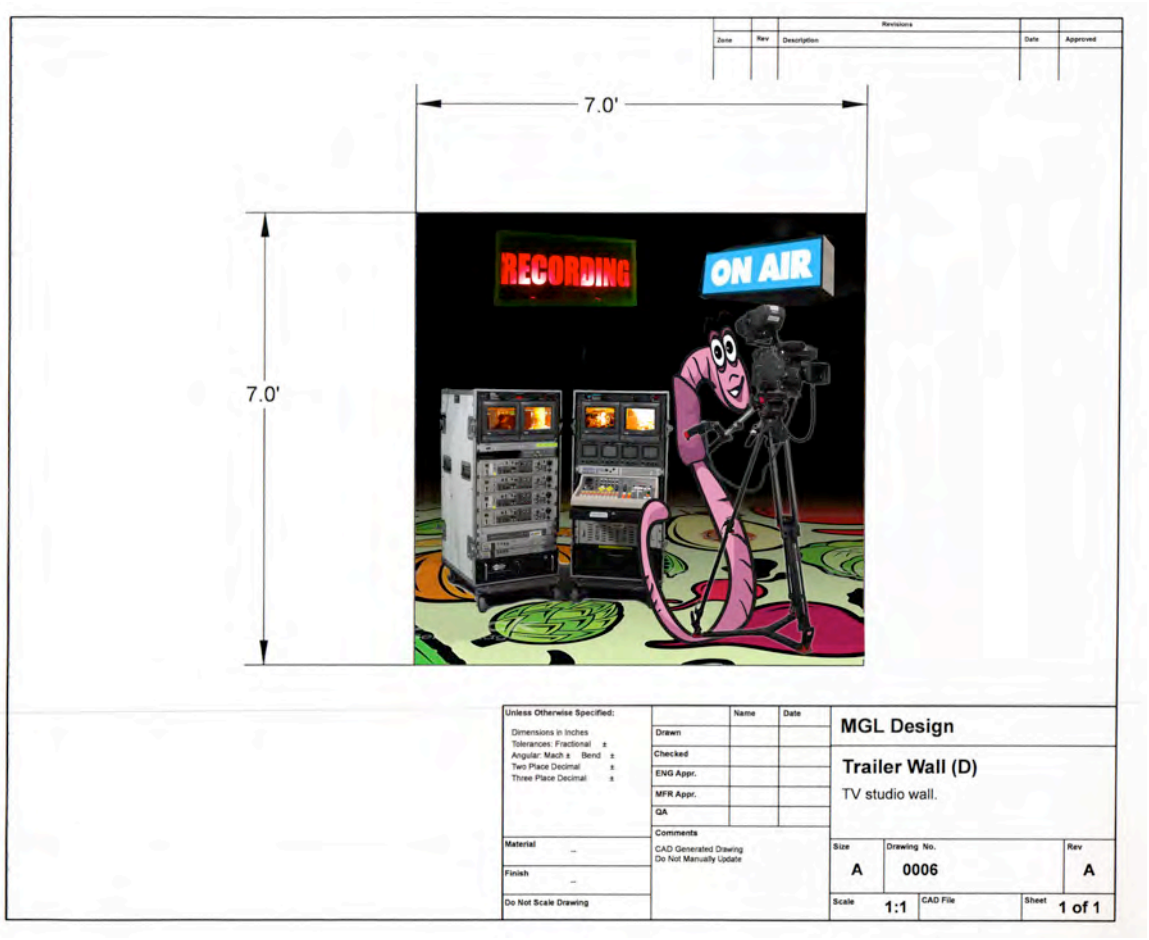
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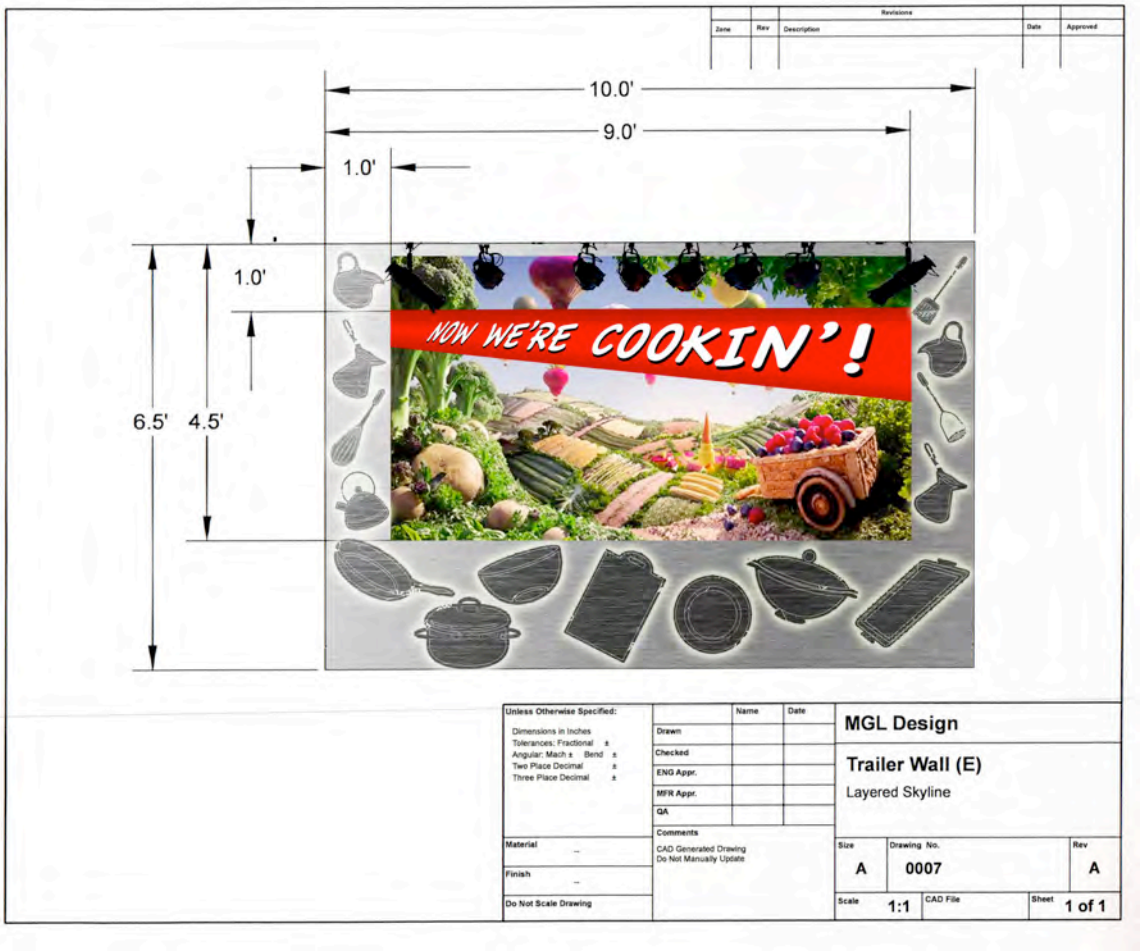
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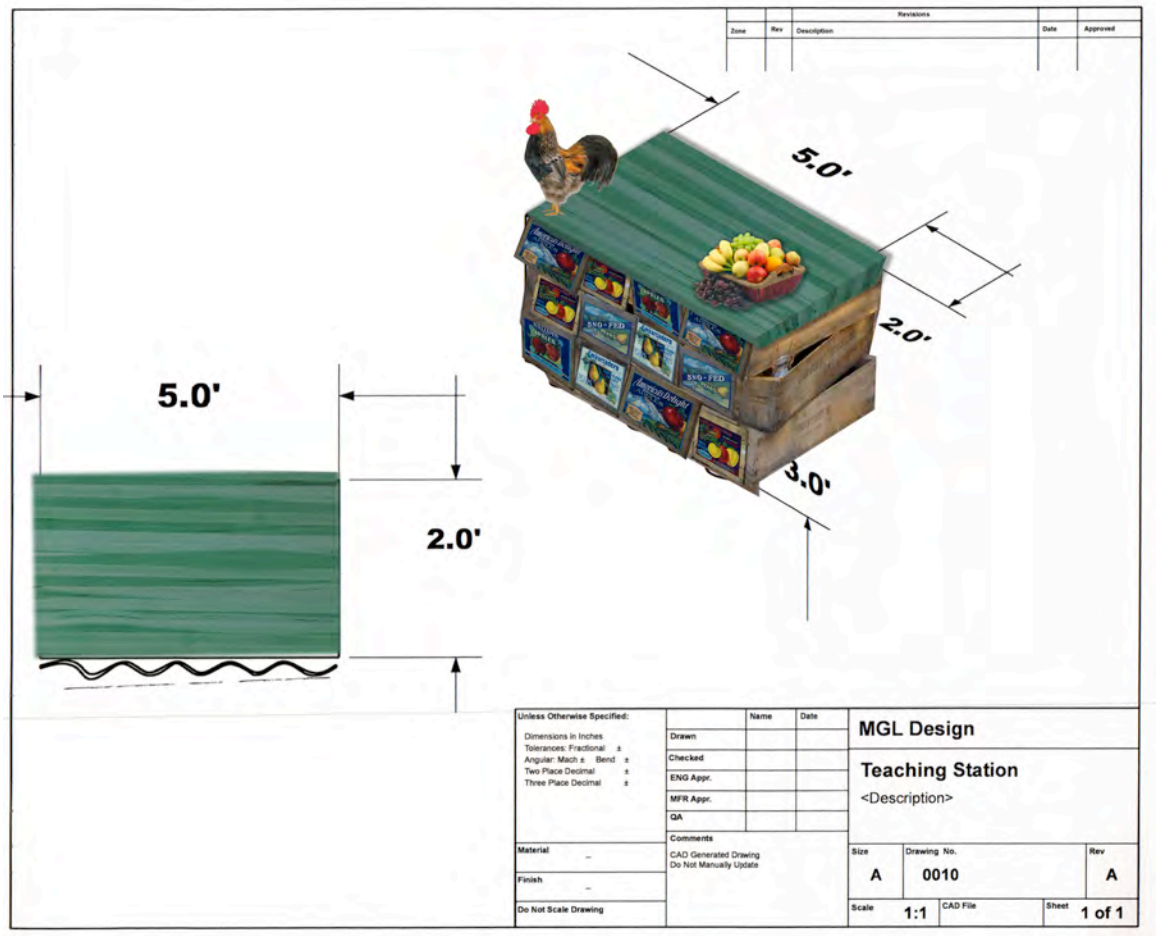
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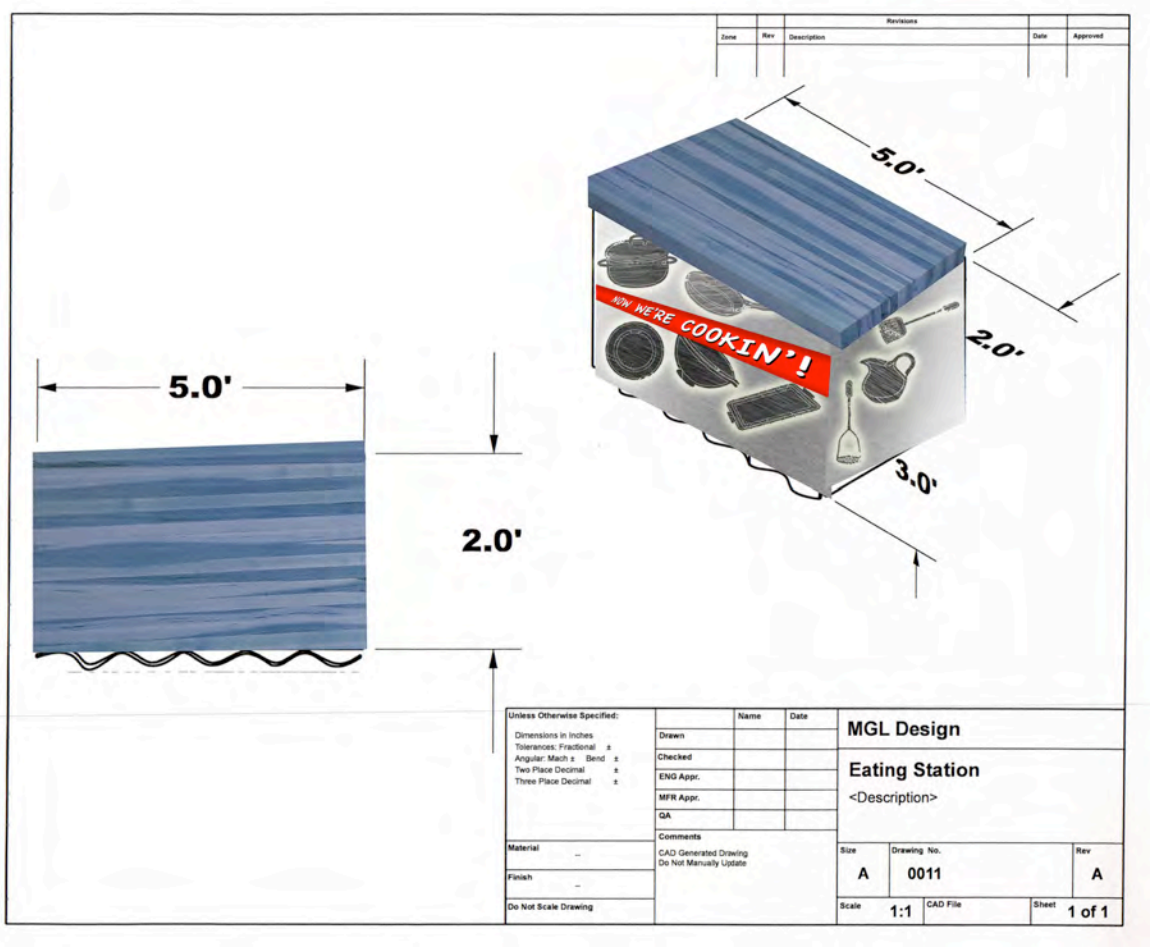
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Appendix D: Estimated Cost

Motor Home w/ Mods	**$370,000**
Materials / Electronics	**$243,000**
1. Journey of a Seed	$75,000
a. Beneficial Insects	$15,000
2. Healthy Eating	$35,000
3. Hands on Area	$5,000
4. Weather Station	$8,000
5. Other, Cameras, Grip, Etc.	$60,000
Advanced Cinema	**$460,000 to $960,000**
1. 3D Animation	$150,000
2. Other tech equipment	$60,000
3. Content development	$250,000
a. Voice overs (Hollywood)	$500,000
Operating Costs (annual)	**$409,000**
1. Gas	$10,000
2. Electricity	$9,000
3. Labor	$270,000
4. Insurance	$65,000
5. Other	$55,000
Total	**$1,482,000 to $2,442,000**

Costs Estimate is based on the dealer prices we have received and our experience in the past doing the same type of work. Total price includes both the cost of the Mobil Farm build and the first years operation cost. Its taken into account that it will take at lease 6 months to complete the Mobil Farm exhibit and adds 12 months for operation cost.

Ambassador Program Best Practices Guide

California Department of Food and Agriculture Office of Farm to Fork
Archi's Institute for Sustainable Agriculture

Dara Morgan

Please answer the following questions regarding your Ambassador Projects. Your answers will be used by Office of Farm to Fork staff to compile best practices guide.

1. What was the focus of your project?
   My application for the grant detailed my passion for working with disabled Veterans and my plans to create a PTSD therapy farm to help in their recovery. My original farming goal was to establish a dragon fruit farm that provides a form of healing for Veterans suffering from severe TBI and/or PTSD. My original intent was to have my best practices guide show the viability of growing dragon fruit in California, which would benefit the industry as a whole, and my efforts would show veterans the healing benefits of farming that would in turn help the community. However, this has changed. Through learning from this course, my plan moving forward is to sale raw / organic honey and organic seedlings and eventually establish therapy portion of the farm at a later date.
2. What did you learn from your project? Explain any that apply:
   a. *expected or unexpected outcomes*
      i. Expected outcome- So far, in my studies I have learned about the various types of growing systems, how to become organic certified, and how to use the land and insects/pests to facilitate the best quality farm.
      ii. Unexpected outcomes- In this course, I learned how to calculate irrigation constraints, which will allow for better planning when growing crops.
   b. *specific findings on growing specialty crop(s)*
      i. A specific finding that I found extremely useful is the demand for microgreens. I had no idea the market for microgreens or how quickly they can be framed.
   c. *new markets identified*
      i. The Sustainable Ag class taught me about how the markets differ from location to location. I learned that a food desert is an urban area in which it is difficult to buy affordable good-quality fresh food; this is a huge market. I plan to work with the local Small Business Development Center to obtain market research on the areas within California that have the highest concentration of food deserts.
   d. *delays or barriers and how you overcame them*
      i. I foresee the biggest delay being funding. At this time, I am collecting as much research as possible so that I can apply for government funding, loans, and VA assistance.
3. What advice do you have for new farmers who will pursue a similar venture?
   a. The advice that I have for new farmers is for them to connect with their local Small Business Development Center at the start of their studies so that they can have the market analysis ready for their business plan project.

4. How will your project continue in the future?
    a. My project will continue through my connections with Archi's Acres. I will continue to work with the farm at Archi's as well as alumni which will strengthen my project.

5. How will other farmers or the community benefit from your project?
    a. Other farmers will benefit from my project from my lessons learned. By sharing my trials, missteps, and successes, I will help to strengthen my local farming community.

6. How did this opportunity affect you and how will it influence you going forward?
    a. The opportunity to participate in the course is extremely beneficial in that it has made me more cautious. I had a very cavalier attitude towards farming before the class. Now I am beginning to understand the amount of hard work and passion that goes into this trade.

7. Please include any additional conclusions or remarks if necessary.
    I am extremely grateful for the opportunity to participate in the Sustainable Agriculture program through the CDFA Grant.

Best Practices Guide from Joe Laguna class 2035

First and foremost I would like to apologize for my tardiness on getting this turned in. I would like to thank all involved for the opportunity to attend this program. The school was beneficial to me, my family and my team as sustainability being in the forefront of our business plan.

From the program I was able to gain insight into the mathematics of watering and maintaining our crops. In turn in states that are drought stricken it is critical to ensure that the water conservation programs run in the most economical manner, being that the school was based on hydroponics

If anyone else is given these grants they would beneficent like me and my family have benefited. Thank you all very much and I hope my input helps the future growth of the SAT Program.

Outline of benefits:

Hydroponics
- Different methods
- Nutrients
- Commercial Side of hydroponics
- School proved the last 6 years of personal experience

Basic Skills
- compost teas
- soil types
- amendments to soil (organic)
- how they work together to make the soil alive

Agribusiness (differences between hydroponics vs. soil, organic vs. synthetic nutrients)
- Ability to grow 12 months out of the year
- speed of growth

hydroponics vs. soil
- cleanliness of hydroponic
- hydroponics flourish in controlled environment, therefore growing them in a green house is key to successful
- ability to be pesticide and herbicide free
- use of predator bugs (i.e., ladybugs) to control the number of insects that could damage your crops.

organic vs. synthetic nutrients
- bringing it back to basics prior to the use of chemicals
- using natural based material to enrich the soil or water is better than using synthetic.
- synthetic causes salt and/or nitrate build up in the soil over time.

Business Plan

- All of the above plus learning everything step by step that it takes to start, incorporate and grow our business.

Bitter Melon Best Practices Guide

Michael Lupacchino

December 22 2016

INTRODUCTION

Bitter gourd (Momordica charantia) is one of the most popular vegetables in Southeast Asia. It is a member of the cucurbit family along with cucumber, squash, watermelon, and muskmelon. Native to China or India, the fast-growing vine is grown throughout Asia and is becoming popular worldwide.

The fruit of bitter gourd fruit is similar in nutritional value compared to other cucurbits, with the notable exceptions that it is much higher in folate and vitamin C. The vine tips are an excellent source of vitamin A. The medicinal value of the gourd in the treatment of infectious diseases and diabetes is attracting the attention of scientists worldwide.

CLIMATE AND SOIL REQUIREMENTS

Bitter gourd grows well under the same conditions preferred by other cucurbits. It is normally grown as an annual crop, but can perform as a perennial in areas with mild, frost-free winters. The plant thrives in the tropics from lowland areas to altitudes of up to 3000 feet. Bitter gourd requires a minimum temperature of 65F during early growth, but optimal temperatures are in the range of 75–80F. It is more tolerant to low temperatures compared to other gourds, but cool temperatures will retard growth and frost will kill the plant. The plant is adapted to a wide variety of rainfall conditions, but regular irrigation is needed to ensure high yield. Bitter gourd tolerates a wide range of soils but prefers a well-drained sandy loam soil that is rich in organic matter. The optimum soil pH is 6.0–6.7, but plants tolerate alkaline soils up to pH 8.0.

PLANTING

Direct seeding is the most common method of planting. In cooler climates, it may be necessary to start the seedlings in a greenhouse to ensure good germination. On raised beds, sow two or three seeds per hole at a depth of 2 cm. Space holes 40–60 cm apart in rows spaced 1.2–1.5 m apart. Plant density using

this spacing will range from 13,600 to 17,300 plants per hectare. When planted in warm soil, seedlings will emerge in a week or less. Thin to one seedling when they have four true leaves.

TRANSPLANTING

Sow seeds in small plastic pots or containers using a potting mix that has good water-holding capacity and good drainage such as peat moss, commercial potting soil, or a potting mix prepared from soil, compost, rice hull, and vermiculite or sand. Plant two or three seeds per container and thin to a single seedling when they have four to six true leaves. Water the seedlings thoroughly every morning to maintain a moist but not wet soil. Seedlings are ready for transplanting 15–20 days after sowing or when they are 10–15 cm tall. Bare-root plants will not survive so pull seedlings with their root balls intact before transplanting. Transplant seedlings into the field at spacing similar to those used for the direct seeding method.

STAKING AND TRELLISING

Bitter gourd grows very fast and vines elongate rapidly within two weeks after planting. Thereafter, the plant sends out lateral stems. Staking and trellising will increase fruit yield and size, reduce fruit rot, and make spraying and harvesting easier. There are several methods of trellising bitter gourd. Bamboo poles, wood stakes, PVC pipes or other sturdy material are used to provide support and keep the fruit and foliage off the ground. The trellis is arranged either in a lean-to or tunnel structure. The trellis should be 3 to 6 feet high, constructed from stakes 3.5 to 4.5 feet apart, which is almost similar to the plant row spacing.

IRRIGATING

Bitter gourd will not tolerate drought. Maintain good soil moisture in the upper 20 inches of soil where the majority of roots are located. Fields are furrow-irrigated every 10 days during the cool dry season, and weekly during the hot-dry season. During the rainy season, drainage is essential for plant survival and growth. In water-limited environment, trickle or drip irrigation is an efficient method of supplying water and nutrients to bitter gourd plantings.

CONTROLLING DISEASES AND PESTS

Bitter gourd is susceptible to many of the same diseases that affect other cucurbits. It is a host of watermelon mosaic potyvirus and is infected by downy mildew, Cercospora leaf spot, bacterial wilt, fusarium wilt, and root knot nematode. Fungal infections often occur during prolonged wet periods. Fungicide sprays may be used under such conditions to prevent infection. The use of resistant varieties is the best defense for most of these diseases.

HARVESTING AND HANDLING

Bitter gourd requires close attention at harvest time. The fruits develop rapidly and must be harvested frequently to keep them from becoming too large or too bitter. Normally it takes 15–20 days after fruit set or 90 days from planting for fruit to reach marketable age, however, bitter gourd can be harvested at earlier stages depending on the purpose for which it will be used. Fruit should be light green, thick and juicy, and the seeds should be soft and white. Harvest every 2–3 days using a pair of scissors or a sharp knife to cut the fruit stalk. If a fruit remains too long on the vine, it will turn spongy, sour, yellow or orange, and split open.

Alyssa Ponce

Best Practices Guide on Growing Organic Lettuce

My final project was based on growing an organic lettuce specialty crop in San Diego, California, specifically in the City Heights area. The two types of lettuces I focused on were the Green Oak leaf and Red leaf. For the production of my specialty crop I plan on starting off with using Nutrient Film Technique (NFT) systems and 1 shade house. Throughout my research I learned the business side of how to manage costs and expenses of a specialty crop and the agriculture side of want a plant needs to thrive in its environment. My next step is to continue talking with local restaurant owners and stores to provide them with the specialty crops they want and need.

Production of Hydro Organic Lettuce

My specialty crop will be focused on restaurants and local supermarkets in San Diego, California, City Heights area. For the production of my organic lettuce I plan on utilizing a $50K microloan from the Farm Service Agency. The specialty crop will be under a 30’ x 40’ ft. shade house in 6 different NFT system located on a ¼ acre of a farm. Each NFT system is capable of holding 360 plant sites and with 6 tables it can produce up to 2,160 plant sites at once. I choose the NFT system because it’s easy to setup, costs are low, it helps to manage water and nutrient uptake and easy to inspect roots for signs of disease and feed adequacy.

To help me maintain the specialty crop I believe I will need 4 employees. For my employees and I to keep our crop within organic growing standards and good agriculture practices we plan to use Certified Organically Grown software to handle records. Our organic seeds, compost soil and ingredients for our compost tea will be purchased from a local nursery

called City Farmers Nursery. For our specialty crop, I plan to use as many resources from the local community as possible.

Lessons Learned

Throughout this course and making this specialty crop I learned a lot of things ranging from managing costs and expenses to keep a farm alive to understanding pH levels and different nutrients and what it does. For the business side of my specialty crop I learned it's important for revenue to be more than your expenses to keep the farm alive. It's important to have a positive cash flow to pay employees and rent and any other expenses it may have. I learned for the production of in the ground food and hydroponic growing have different types of insurance. I never knew crops had insurance but they do in case anything happens to your crop and you're not in a loss of income. I also learned how to look for land and best to look for land with well water because it helps take out a huge expense. What I learned is going to help with the structure of my business.

When it comes to the growing of lettuce I learned there is more to just dropping a seed into soil and just watering it. I learned it's important to understand pH levels because it influences how easily plants can take up nutrients from the soil. I also learned for lettuce it's important to know what the right temperatures it like to be in. For example, Green Oaf leaf lettuce is a winter crop and Red leaf lettuce is a summer crop. I learned the Red leaf lettuce can handle extra heat and production can last longer than the average 3 months. This will do great in San Diego with the long and nice summer weather.

To grow a vibrant and strong plant I learned it's important to have use soil that's high in organic matter. With that being said, I plan to use chicken and worm casting compost soil from

City Farmers Nursey. By using compost soil, I learned that it helps give plants a strong root environment improves water holding capacity, thus reducing water loss and leaching, may control or suppress certain soil borne plant pathogens, improves and stabilizes soil pH and supplies beneficial microorganisms. Everything I've learned from the business aspect of a farm and the raw materials used to grow a good product will contribute tremendously to my specialty crop for local businesses.

Next Step

The next step for my specialty crop is to go out in the City Heights area and talk one on one with local restaurant and grocery owners. When I talk with them I want to ask them what type of produce they are looking for that's difficult to find for them or what is hard to get in fresh. By asking them these questions I am sure to make a strong business to provide for local communities in produce and jobs. With my 6 NFT tables I don't have to only grow 2 different types of lettuce but I can also split the tables in different crops and expand on my varieties.

By continuing to expand on customers and sales I can invest in more space and equipment to provide to schools and even local churches, anyone in the nearby area on a consistent basis. I can provide more people of the local community with jobs and good benefits that we can all benefit from. With the help of diversity in the City Heights area there will always be a different specialty crop someone wants or is in demand and I plan to fill that need. I plan to run an ethical and beneficial business and continue to use the loans through the FSA to make it all happen.

Farm *to* School

The USDA Pilot Project for Procurement of Unprocessed Fruits and Vegetables

California is one of eight states selected to participate in the USDA Pilot Project for Procurement of Unprocessed Fruits and Vegetables, as directed by the Agricultural Act of 2014, also known as the Farm Bill. The pilot enables school districts to use their USDA entitlement funds to purchase locally-grown unprocessed fruits and vegetables. Through this pilot California hopes to strengthen current school-vendor relationships and broaden the diversity of vendors selling to schools.

Food sold through the pilot can include any "unprocessed" produce that has been sliced, diced, chopped, washed, frozen or dried. Foods that have been heat-treated during processing such as canning or pickling are not allowed.

farm opportunity

- Support growing demand for fresh products from local schools in your area
- Develop connections with local Food Nutrition Directors and build a foundation for future business relationships
- Broaden your customer base to schools, students and families in a stable, high-volume market
- Show support for your community and help improve childhood nutrition
- Feature your company as a USDA approved vendor

school opportunity

- Serve more healthy, fresh and locally-procured fruits and vegetables
- Support local economy, build community relationships and promote your food service program
- More flexibility over where and how to spend your entitlement money
- Purchase from vendors with approved liability insurance and food safety practices
- Participate with minor adjustments to standard purchasing practices

How to participate?

Vendors must apply to become a USDA approved vendor. Application details can be found on the USDA-AMS website.

1. Product Liability Insurance
2. Food Safety Certification

   USDA-AMS Specialty Crops Inspection Division or Global Food Safety Initiative (GFSI) recognized

Once approved, vendors will need to contract with schools and are responsible for submitting invoices to USDA at fvpilotinvoice@ams.usda.gov.

Schools can participate by contacting the California Department of Education:

Sherry Tam
USDA Foods Consultant
Nutrition Services Division, CDE
stam@cde.ca.gov
916.324.9875

More info?

Visit the Office of Farm to Fork Farm to School Resources page: http://cafarmtofork.com/FTSResources.htm

USDA-Agriculture Marketing Services

USDA-Food Nutrition Services (FNS)

Adapted with permission from the Washington State Department of Agriculture

School Procurement Process

The USDA Pilot Project for Procurement of Unprocessed Fruits and Vegetables

The pilot supports the purchase of local and regional produce, however standard procurement rules still apply

Schools can only purchase from USDA approved vendors on US-DA-AMS website

Option 1

Modify an existing contract with an USDA approved vendor.

Competitive bids are not required.

School buyers can modify an existing, exclusive contract (i.e. purchases made from only the contracted vendor) if participation in the pilot does not result in a material change.

If that is the case, schools can create an addendum to current contracts which (1) outlines school buyer participation in the pilot and changes to contract, including at minimum, the vendor payment method, and (2) requires the vendor to issue a separate invoice for unprocessed produce sold under the pilot.

? Can I amend a DoD Fresh contract?

DoD Fresh Contracts are held by the Department of Defense (DoD) Fresh Fruit and Vegetable Program. Schools cannot modify this contract unless they have a contract with Rohr Brothers or Valley Fruit and Produce Company outside of DoD Fresh.

Option 2

Solicit a new contract with USDA approved vendors.

Competitive quotes for purchases over $3,500 required (may include Geographic Preference)

≤ Small Purchase Threshold >

(Federal Threshold = $150,000)
(California Threshold = $88,300)

Informal

Small Purchase (requires prices quotes from at least 3 bidders)

new **Micro Purchase**

Noncompetitive Purchase (value of purchase may not exceed $3,500)

Formal

Sealed Bids (IFBs) & Competitive Proposals (RFPs) (requires public advertising)

? How do I use a geographic preference? Example ways to apply:

1. A point system that supplies more points to vendors who can supply produce grown in the specified geographic area (e.g. state, county, mile-radius).

2. A price preference in which the quote from any vendor offering produce from the geographic preference area (usually CA-grown) will be reduced by a specified percentage (usually 5% or 10%, but it is up to the school district) for comparison.

More information on geographic preference:
https://www.fns.usda.gov/sites/default/files/F2S_geo_pref.pdf

Option 3

Recruit new or existing vendors to participate!

Inform vendors of requirements:

1. Liability Insurance
2. Food Safety Certification (USDA-AMS or GFSI accredited)

Additional qualifications may be required for businesses that work with other suppliers, carry non-domestic product and/or plan to sell minimally processed product. Vendors can get help with application and meeting requirements by contacting USDA at unprocessedfvpilot@fns.usda.gov

Adapted with permission from the Washington State Department of Agriculture

Vendor Requirements

The USDA Pilot Project for Procurement of Unprocessed Fruits and Vegetables

See USDA Vendor Eligibility Requirements for further details

1. Product Liability Insurance
2. Food Safety Certification

Which best describes your operation? Certification options vary by vendor type:

Farm

Good Agricultural Practices (GAP)

- USDA Good Agricultural Practices (GAP)
- USDA Harmonized GAP
- Any Global Food Safety Initiative (GFSI) recognized scheme. See GFSI website for options.

Approved Certifiers

- USDA - Agricultural Marketing Service (AMS) - federal division that provides audit and accreditation programs
- Global Food Safety Initiative (GFSI) - collaborative that recognizes various private food safety certifiers based on global quality standards

Distributor

Good Handling Practices (GHP) / Good Manufacturing Practices (GMP)

do NOT repack	*repack or handle produce*
Signed statement certifying that vendor meets GHP/GMP, and has been audited (audit can be other than USDA or GFSI recognized). Must have Food Defense Audit benchmarked by GFSI or USDA.	USDA Good Handling Practices (GHP) USDA Plant Survey USDA Plant Systems Audit (PSA) Any Global Food Safety Initiative (GFSI) recognized scheme. See GFSI website for options.

Processor

Good Manufacturing Practices (GMP)

dried or frozen	*fresh-cut*
USDA Plant Survey USDA Plant Systems Audit (PSA) Any Global Food Safety Initiative (GFSI) recognized scheme. See GFSI website for options.	USDA Plant Survey USDA Plant Systems Audit (PSA) USDA Qualified Through Verification Any Global Food Safety Initiative (GFSI) recognized scheme. See GFSI website for options.

fresh-cut requires a HAACP Plan certified by USDA or other recognized GFSI certifier

- ✓ All distributors and processors must have a USDA or GFSI benchmarked Food Defense Audit
- ✳ Do you have suppliers? Food safety certifications are required for all suppliers, except for produce processed into dried or frozen product.
- ✳ Do you handle non-domestic product? If so, you must submit a Product Segregation Plan to ensure only US-grown produce. Your supplier(s) plan may be requested during an audit.

Adapted with permission from the Washington State Department of Agriculture

Vendor Application Instructions

The USDA Pilot Project for Procurement of Unprocessed Fruits and Vegetables

For vendors with required (1) product liability insurance and (2) food safety certifications

A Complete two forms

Visit USDA-AMS website for vendor application forms, eligibility requirements, list of approved vendors, invoice templates and more resources

(1) Vendor Application Form (electronic signatures accepted)

Attachment A - Company Info

List only products that will be sold through the pilot. All products must be certified through USDA Good Agricultural Practices (GAP) or other approved certifier.

Attachment B - Self-Certification (yes/no check boxes)

Operations that sell more than 2,000 lbs per day and/or operations that negociate the sale of produce on behalf of another person (i.e. a broker) need a PACA license. Farms that handle their own product are exempt.

Operations that manufacture, process, pack or hold food for human consumption need a FDA Food Facility Registration (registration is free). Farms are exempt.

Attachment C - Domestic Origin Requirement (yes/no check boxes)

This pilot is for US-grown food only. If you handle any non-domestic product, you must include your Product Segregation Plan. You are also responsible for your supplier(s) compliance. Their segregation plan may be requested upon audit.

Attachment D - Suppliers

If you plan to sell products from other suppliers, list those suppliers and their products. Only include suppliers that you will use for the pilot. Remember that you must be able to document food safety certifications for each of your suppliers. Vendors can also add more suppliers after becoming approved.

Attachment D is not required if you do not work with any other suppliers.

(2) WBSCM Form (obtain online and save as pdf)

This form registers your business to accept payment from USDA

- Unless your operation is a Farm Service Agency, select "Central Vendor" instead of "International Freight Vendor"
- Requires a SAM (System for Award Management) registration and DUNS number which are both easy and free to obtain on their websites
- Business Type - If unknown or not officially certified, select "small business" or however you identify your business on SAM.gov
- Operation Type - Self-identify based on categories or select "other" and type individual response

B Submit application to fvpilotproject@ams.usda.gov

include

1. Vendor Application Form (Attachments A-D)
2. WBSCM Form (pdf)
3. Additional Attachments

   Food Safety Certification (*for applicant, & supplier(s) if applicable)*
   HACCP Plan *(fresh-cut processors only)*
   Product Segregation Plan (*vendors handling non-domestic product)*

CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
SPECIALTY CROP BLOCK GRANT PROGRAM
FINAL PERFORMANCE REPORT

USDA Project No.:	Project Title:	
14	Effects of California Dried Plums on Bone and Cardiovascular Health	
Grant Recipient: The Regents of the University of California, Davis	**Grant Agreement No.:** SCB15014	**Date Submitted:** December 2017
Recipient Contact: Dr. Robert Hackman	**Telephone:** (530) 752-4004	**Email:** rmhackman@ucdavis.edu

Project Summary

Postmenopausal women are at-risk for developing osteoporosis and cardiovascular disease due to cessation of ovarian hormone production. Certain nutritional approaches can reduce the risk and debilitating effects of these chronic diseases. The consumption of dried plums has been reported to provide some bone health benefits in a limited number of animal models, an observation that has been supported by select in vitro models. As a prelude to a potential long-term feeding trial with dried plums in postmenopausal women, this project examined the effects of short-term dried plum consumption at low and typical levels of dried plum intake. Determining if dried plums (Prunus domestica L.) could help prevent bone loss and reduce cardiovascular disease risk would likely increase market demand nationally and worldwide, and improve the health of Californians.

The aging of the United States population has presented a number of challenges, many of which could be addressed through nutritional approaches. Postmenopausal women are particularly at-risk for a number of chronic diseases such as osteoporosis and cardiovascular disease, primarily due to cessation of ovarian hormone production. By 2020 it is estimated that 50 percent of women at 50 years and older will either suffer from or be at-risk of bone loss, and cardiovascular disease is expected to grow to more than 23.6 million by 2030. Dietary strategies, including targeting specific types of food, will be important to address health issues, now and in the future.

This project did not build upon a previously funded Specialty Crop Block Grant Program project.

Project Approach

The project team sought to study the effects of short-term dried consumption at low and typical levels of dried plum intake on 1) C-telopeptide, beta-cross-linked (CTX), a marker of bone resorption; 2) microvascular function as assessed by peripheral artery tonometry (PAT), and 3) changes in colonic fermentation products (breath hydrogen and methane). Twenty-seven healthy, postmenopausal women were randomly assigned to consume either six dried plums (approximately 42 grams) or two dried plums (approximately 14 grams) per day for two weeks (first half). This was followed by a two week washout period and then crossed over to the other group for two weeks (second half). No significant differences were noted between the six dried plums and the two dried plum treatments with respect to changes in CTX, in two calculated indices of PAT (Reactive Hyperemia Index [RHI] or Framingham RHI), or in breath measures. Similarly, no treatment by half interaction was observed for any of the variables. However, the changes in CTX in the first half (increased in both groups) differed significantly from the second half (no change or decline; $F = 9.26$, $P = 0.006$). The results did not support the hypothesis that short-term intakes of dried plums would provide positive effects on biomarkers of bone resorption in postmenopausal women. However, the trend of a

possible response to treatment was noteworthy, and suggested that a follow-up study with a longer duration of feeding would be warranted.

Media inquiries and sales data (from the California Dried Plum Board) will be monitored for the next three years.

This project solely enhanced the competiveness of specialty crops. All project expenditures were tracked and monitored by the accounting department.

The California Dried Plum Board provided an additional $2,300 in unrestricted funds. These funds were used to purchase breath collection bags and supplies, which were then assessed for breath hydrogen and methane, two measures of intestinal fermentation products. The Executive Director of the California Dried Plum Board, along with the science consultant, attended a meeting at University of California, Davis with the researchers.

Goals and Outcomes Achieved

After completing contract arrangements and obtaining approval to conduct a human study from the University of California, Davis Institutional Review Board, supplies were ordered and staff training was completed. Dried plums were divided into the necessary amounts. Advertising in local newspapers was conducted, and the recruitment of volunteers was commenced. The intervention was conducted and once all participants completed their involvement, data processing and statistical analyses was begun. Following interpretation of the data, an abstract was submitted and accepted for the Eighth International Conference on Polyphenols and Health, Quebec, October 2017. There were approximately 200 people in attendance from over 20 different countries.

The goal of the project was to evaluate the effects of dried plum intake on measures of vascular function and markers of bone health in postmenopausal women. This pilot study was proposed to determine if a short-term study would be a suitable alternative to a longer term, more expensive approach to assessing bone health in postmenopausal women. All tasks were accomplished, including the results showing that a two week intake period, followed by a two week washout and then another two week intake period, did not result in significant changes in markers of bone resorption, blood flow, or breath measures. However, a strong trend was noted for the bone biomarker, suggesting that a longer duration of intake might result in a more favorable outcome.

A total of 121 women volunteered for the study, of which 74 were excluded because they did not meet the eligibility criteria. The remaining 47 women were screened for normal clinical chemistry levels, of which 20 were excluded. The remaining 27 women were enrolled in the study. The University of California, Davis Pathology laboratory was unable to use three blood samples, so only data from 24 women was included in the CTX analysis. Blood flow values from six of the 27 women enrolled in the study were excluded from the final analysis due to insufficient integrity of readings from the analytical equipment.

Based on the pre-study power calculations, the required number of participants completed the study. The most significant finding of the project was the suggestion that the bone resorption biomarker was trending in a favorable direction by the end of the six week intervention. Insights into future study design were also obtained. A manuscript about the study is planned to be submitted to a nutrition science journal in early 2018.

Beneficiaries

As noted above, the first introduction of the results in the public domain was in October 2017. The 27 participants in the study benefitted directly from the project.

Efforts to better understand the health benefits of California dried plums will enable informed health messages and ultimately lead to an increase in dried plum demand, which would benefit the 900 dried plum growers and 25 dried plum packers in California.

Lessons Learned

The project proposed that short term intake of low or normal amounts of dried plums could favorably affect biomarkers of bone and vascular health. The outcomes did not support this idea directly, as no statistically significant changes were noted for either amount of dried plum intake. However, a clear trend toward improvement in the bone biomarker was noted. The results of this study will play an important role in informing a research strategy moving forward (i.e. conducting a long term study, greater than 12 months).

Recruitment was done primarily by newspaper advertisements in the Sacramento, Davis and Woodland papers. While this was cost effective, newer, more targeted methods are now available through social media and newspaper e-mailing lists. Future recruitment through these electronic methods may provide a more cost effective method of recruitment.

The most important lesson learned from this project was that a two or even six week feeding period was not sufficient to detect significant changes in markers of bone or vascular health in postmenopausal women. Further, the crossover design with a washout period (two weeks on; two weeks off; two weeks on) should not be repeated, as it was unclear if a true “washout” occurred after the first feeding period. The gut microbiome may have influenced the measurements in the second two week feeding period, which was unknown at the start of the study. The lessons learned from this project thus suggested that a longer intervention, and at a higher intake of dried plums than was used in this project, would be useful. Further, other markers of bone health, such as indices of bone formation in addition to bone resorption, would be important to assess.

All studies on dried plums and bone health to date were focused on postmenopausal women, whom are at the most risk for bone loss. However, premenopausal and perimenopausal women are also losing bone, albeit at a different rate compared to postmenopausal women. Future studies exploring the role of dried plums in premenopausal women, assessing both bone resorption and bone formation, would provide new insights that have yet to be determined. A study on premenopausal women, if results are favorable, would likely open a new market for the sale of dried plums to a group that has not yet been targeted with bone health messages.

No unexpected outcomes were noted, beyond the results described above.

Additional Information

No additional information.

CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
SPECIALTY CROP BLOCK GRANT PROGRAM
FINAL PERFORMANCE REPORT

USDA Project No.:	Project Title:	
20	Increasing Access to Specialty Crops in Fresno	
Grant Recipient: National Hmong America Farmers, Inc.	**Grant Agreement No.:** SCB15020	**Date Submitted:** April 2018
Recipient Contact: Chukou Thao	**Telephone:** (559) 313-3339	**Email:** cxthao05@gmail.com

The California Department of Food and Agriculture (CDFA) terminated this agreement March 16, 2018 for cause and is currently seeking repayment from the National Hmong America Farmers, Inc. (NHAF) for unsupported costs totaling $116,131.

In April 2017, representatives of NHAF failed to appear at a scheduled site visit. NHAF was unresponsive to efforts by CDFA to resolve this matter and reschedule the site visit. NHAF also failed to provide a biannual progress report due April 30, 2017. CDFA continued efforts to contact NHAF and resolve this matter. When those efforts were unsuccessful, CDFA initiated the process of terminating the agreement in July 2017.

Mr. Chukou Thao, Executive Director of NHAF contacted CDFA after being notified the agreement was being terminated and at his request, the termination was suspended on the condition that Mr. Thao provide the past due report and documentation to support costs incurred on the grant to date.

In August 2017, Mr. Thao provided a progress report that was largely redundant to the NHAF's 2016 annual report and which described costs and activities that were unallowable, including the promotion of Pho in Fresno, CA school lunches and a Thanksgiving turkey giveaway. Mr. Thao also provided documentation to support costs incurred on the grant. That documentation was incomplete, contained irregularities and included receipts for unallowable costs.

Based on the unallowable activities in the report and unallowable costs in the documentation provided by NHAF, the CDFA Audit Office initiated an audit of the agreement in October 2017. The audit found substantial irregularities and unsupported costs of $116,131. A preliminary audit report was provided to NHAF on January 11, 2018. No response was received from NHAF on the preliminary audit report and a final report was published February 15, 2018 (attached). The agreement was terminated on March 16, 2018, after 30 days had passed without a response from NHAF to the final audit report.

NHFA is currently receiving federal funding from other USDA programs, including the National Resource Conservation Service and a recent award from the National Institute of Food and Agriculture Program Beginning Farmer and Rancher Development Program. Based on the audit findings for SCBGP funding, CDFA recommends that the NHFA be reported to the Federal Awardee Performance and Integrity and Information System.

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

AUDIT OFFICE

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NATIONAL HMONG AMERICAN FARMERS, INC.
SPECIALTY CROP BLOCK GRANT PROGRAM
AGREEMENT NUMBER SCB15020

AUDIT REPORT #17-049

FOR THE GRANT PERIOD
OCTOBER 1, 2015 THROUGH MARCH 31, 2017

NATIONAL HMONG AMERICAN FARMERS, INC.

SPECIALTY CROP BLOCK GRANT PROGRAM
AGREEMENT NUMBER SCB15020

FOR THE GRANT PERIOD
OCTOBER 1, 2015 THROUGH MARCH 31, 2017

AUDIT STAFF

Ron Shackelford, CPA	Audit Chief
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Shaiena Singh	Auditor

AUDIT REPORT NUMBER
#17-049

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CALIFORNIA DEPARTMENT OF
FOOD & AGRICULTURE
Karen Ross, Secretary

Chukou Thao
Executive Director
National Hmong American Farmers, Inc.
2904 N. Blackstone Avenue, Suite A2
Fresno, CA 93703

INDEPENDENT AUDITOR'S REPORT

The California Department of Food and Agriculture's (CDFA), Office of Grants Administration Office (OGA) requested the CDFA Audit Office perform a performance audit of agreement number SCB15020 with the National Hmong American Farmers, Inc. (NHAF), covering the grant period of October 1, 2015 through March 31, 2017.

The objectives of the audit were to ensure the NHAF complied with the terms and conditions of the agreement. We verified the accuracy of the service invoices billed under the agreement, identified the basis for discrepancies between the actual charges and billed charges, and provided information to improve compliance with the terms and conditions of the agreement.

We conducted this performance audit in accordance with generally accepted government auditing standards, except peer review. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the billings are supported by the accounting records and are submitted in compliance with the appropriate state and federal requirements and guidelines. An audit includes examining, on a test basis, evidence supporting the amounts included on the billings. An audit also includes assessing the accounting principles used and significant estimates made by management. We limited our test of internal controls to obtaining an understanding of the controls in place related to the grant award, but not to express an opinion on the internal controls of the NHAF. Accordingly, we do not express an opinion on the NHAF's internal controls.

During our audit of the NHAF's compliance with federal regulations and OGA's 2015 Special Crop Grant Management Procedures Manual (2015 GMPM), we noted six instances of noncompliance with the requirements. We have provided twelve recommendations to assist the NHAF resolve and comply with the requirements. The NHAF must provide a written response to the recommendations noted in this report.

Ron Shackelford, CPA
Chief, Audit Office

December 15, 2017

BACKGROUND

The National Hmong American Farmers, Inc. (NHAF) was awarded Specialty Crop Block Grant-Farm Bill funding as a pass through grant from the CDFA. The overall purpose of the United States Department of Agriculture (USDA) federally funded grant program is to assist state departments of agriculture in enhancing the competitiveness of U.S. specialty crops. Specialty crops are defined as fruits and vegetables, dried fruit, tree nuts, horticulture, and nursery crops (including floriculture). The USDA Agricultural Marketing Service (AMS) encourages states to develop projects solely to enhance the competitiveness of specialty crops, pertaining to issues affecting the specialty crop industry. This includes increasing child and adult nutrition knowledge and consumption of specialty crops; fostering involvement of industry representatives at meetings of international standard setting bodies in which the U.S. government participates; improving efficiency and reducing costs of distribution systems; assisting all entities in the specialty crop distribution chain in developing "Good Agricultural Practices," "Good Handling Practices," "Good Manufacturing Practices," and cost-share arrangements for funding of such systems for small farmers, packers and processors; investing in specialty crop research, including organic research to focus on conservation and environmental outcomes; enhancing food safety; developing new and improved seed varieties and specialty crops; improving pest and disease control; and increasing sustainability.

AUDIT SCOPE

The project was awarded $193,496 over a thirty-three month period from the CDFA's OGA. Our office conducted an audit covering the grant period October 1, 2015 through March 31, 2017. For the audit period, six invoices claiming $133,424 were processed by the OGA for reimbursement. Our audit objectives were to determine whether the NHAF complied with the terms and conditions of the Uniform Administrative Requirements, Cost Principles, and audit requirements for federal awards contained in Title 2 of the Code of Federal Regulations part 200 (2 CFR 200) and Title 2 of the Code of Federal Regulations part 400 (2 CFR 400). The accurate reporting of costs on invoices and compliance with state and federal policies, procedures, laws and regulations are the responsibility of the NHAF.

AUDIT METHODOLOGY

The NHAF's accounting and payroll records and supporting documents were examined to determine whether the costs invoiced for reimbursement were properly accounted for, supported and complied with applicable state and federal policies, procedures, rules and regulations. The following specific audit procedures were performed:

- Reviewed applicable policies and procedures and discussed the NHAF's accounting processes with its Executive Director, Bookkeeper, and Program Coordinator to gain

an understanding of the methods used in preparing invoices sent to the OGA for project cost reimbursements.

- Reviewed the NHAF's methodology of billing personnel service costs, fringe benefit costs, supply costs, travel costs, contractor/consultant costs, other direct costs, and indirect costs.
- Reviewed payroll records and other pertinent information to determine whether the amounts invoiced for personnel costs were related to the award project and in compliance with CFR and OGA requirements.
- The NHAF's support for contractor costs were obtained and reviewed.
- Obtained and reviewed source documents for travel, supplies, and other direct costs invoiced to the OGA for reasonableness, allocability, and compliance with applicable CFR's.
- Inquired with NHAF for clarifications and explanations when necessary supporting documents were not available.
- Reviewed costs that were invoiced to the grant project to ensure they were consistent with the project's Scope of Work (SOW).

CONCLUSION

Based on the procedures performed as specified within our audit methodology, the NHAF could not support a majority of the expenses it billed to the grant award for the period of October 1, 2015 through March 31, 2017. This lack of support is further specified in detail within the body of this audit report. A summary of the costs deemed questionable and subject to repayment totaling $116,131 is reflected below:

Expenditure Category	Invoiced Costs	Costs Deemed Questionable
Salary/Wages	$ 79,503	$ 66,892
Fringe Benefits	17,687	16,084
Travel Expenses	6,110	6,110
Supplies	3,603	2,255
Contractors	11,418	11,418
Other Direct Costs	11,970	10,720
Indirect Costs	3,106	2,652
Totals	$133,423	$116,131

In addition, we noted internal control weaknesses and a lack of compliance with the OGA's 2015 Grant Management Procedures Manual (GMPM), agreement SCB15020 and 2 CFR 200. The NHAF should work with the OGA to resolve the findings reflected within this audit report.

FINDINGS AND RECOMMENDATIONS

FINDING 1 – INVOICED COSTS FOR EMPLOYEE WAGES WERE NOT SUPPORTED

For the 18-month period audited, the NHAF (i) did not invoice the actual cost of employee wages as required per its agreement with the OGA, (ii) could not provide payroll records to support the amounts invoiced for employee wages, nor (iii) comply with 2 CFR 200 standards over recordkeeping in documenting personnel expenses. As a result, a total of $66,892 out of $79,503 invoiced and recovered by the NHAF is considered questionable and subject to repayment.

A detailed analysis of the invoiced wages to related payroll records provided by the NHAF noted the following issues:

a. For invoices #1 through #6, the NHAF billed employee wages using the amounts budgeted per the grant award's Scope of Work (SOW) rather than actual payroll costs. The NHAF determined a quarterly invoice amount of $13,251 for wages as follows:

Budget for Employee Wages per SOW:

Employee A - ($18,000 per year) $1,500 per month x 3:	$ 4,500
Employee B - ($35,000 per year) $2,917 per month x 3:	8,751
NHAF Quarterly Billing of Wages to SCB15020:	$ 13,251

NHAF Wages Invoiced to the OGA for SCB15020:

Invoice #1: (10/1/15 – 12/31/15):	$ 13,251
Invoice #2: (01/1/16 – 03/31/16):	13,251
Invoice #3: (03/1/15 – 06/30/15):	13,251
Invoice #4: (07/1/15 – 09/30/15):	13,250
Invoice #5: (10/1/15 – 12/31/15):	13,250
Invoice #6: (01/1/16 – 03/31/16):	13,250
Total Invoiced:	$ 79,503

The OGA's grant agreement SCB15020 Exhibit C, Section 4 - Invoicing and Payment states, "CDFA agrees to reimburse the Recipient for actual allowable expenditures. Invoicing based on budgeted is unallowable."

b. The NHAF's payroll records indicate 100% of the actual costs for Employee A ($21,650) and Employee B ($18,958) for the eleven month period October 1, 2015

through September 1, 2016 (invoices #1 through #4) were for another USDA program (USDA 2501 Program) not SCB15020.

The NHAF provided our office with its Employee Earnings Record for the period 10/01/15 through 09/01/16 which listed that for each bi-weekly pay period Employee A worked for the USDA Grant 2501 and was paid $21,650 during the eleven months. The NHAF's Employee Earnings Record further indicated that Employee B spent 100% of his time on the USDA Grant 2501 and was paid $18,958 during the eleven month period. The USDA identifies the NHAF as a grant recipient during the period October 1, 2015 through September 30, 2016 for its 2501 program (Outreach and Assistance for Socially Disadvantaged and Veteran Farmers and Ranchers Program). The 2 CFR 200.430 requires wages charged to federal awards to be based on records that accurately reflect the work performed.

c. The NHAF did not provide any payroll records to support invoiced wages for Employees A and B for the four-month period September 1, 2016 through December 31, 2016. Despite repeated requests, the NHAF did not provide our office with either payroll stubs, Employee Earnings Records, nor 2016 W-2's or similar records to support the amount of wages billed to the OGA for the four month period September 1, 2016 through December 31, 2016. The 2 CFR 200.430 requires wages charged to federal awards to be incorporated within the organization's official records.

d. For invoice #6 (January 1, 2017 through March 31, 2017), the NHAF's payroll records indicate Employee A's and B's actual wages totaled $12,611. However $13,250 was invoiced to the OGA. The $639 over-billing resulted from budgeted amounts being invoiced rather than as the OGA grant agreement allows for the reimbursement of only actual, allowable costs.

Due to the above mentioned issues, only $12,611 of the $79,500 reimbursed for employee wages was supported and in compliance with SCB15020 terms and conditions and CFR requirements. Therefore, the $66,892 in unsupported personnel costs along with $2,141 of indirect costs ($66,892 x 3.2% indirect costs rate invoiced) collected by the NHAF ($69,033 total) was not verified for appropriateness by our office.

Recommendations:

1. *The NHAF should repay the OGA $69,033 for the unsupported personnel costs and related indirect costs it claimed and was reimbursed on invoice #1 through #6 for the grant period October 1, 2015 through March 31, 2017.*

2. *The NHAF should ensure it complies with 2 CFR 200 and all invoicing and payment terms and conditions contained within its agreement with the OGA when seeking the cost reimbursement for employee wages and related indirect costs.*

FINDING 2 – INVOICED EMPLOYEE BENEFIT COSTS WERE NOT ACTUAL

For the 18-month period audited, the NHAF was reimbursed $17,687 for employee fringe benefits. However, an analysis of the payroll records provided by the NHAF for Employee A and Employee B indicate that only $1,604 of the $17,687 was supported by actual payroll records in accordance with the OGA agreement and CFR requirements. $16,083 in fringe benefits costs invoiced by the NHAF are considered questionable and subject to repayment.

Based on our analysis of the payroll records provided by the NHAF the following concerns were noted:

a. Similar to Finding #1, costs invoiced and reimbursed for fringe benefits on quarterly invoices were budget estimates, not actual costs, ranging from 18% to 30% of invoiced wages.

b. For the period of 10/1/15 through 9/1/16, the NHAF's Employee Earnings Record indicate that Employee A was considered an independent contractor and issued an Internal Revenue Service (IRS) Form 1099, Miscellaneous Income, rather than a Form W-2, Wage and Tax Statement. Independent contractors are not considered employees who earn fringe benefits. Furthermore, the Employee Earnings Record indicate that both Employee A and Employee B worked 100% of their time on the USDA 2501 Program.

c. Similar to Finding #1, the NHAF did not provide any payroll records to support the amounts invoiced for fringe benefits during the four month period September 1, 2016 through December 31, 2016.

The OGA's grant agreement SCB15020 Exhibit C, Section 4 - Invoicing and Payment states … "CDFA agrees to reimburse the Recipient for actual allowable expenditures. Invoicing based on budgeted is unallowable." Furthermore 2 CFR 200 requires costs charged to federal awards to be based on records that accurately reflect the work performed.

Therefore, the $16,083 in unsupported fringe benefit costs along with $515 of indirect costs ($16,083 x 3.2% indirect costs rate invoiced) reimbursed to the NHAF ($16,598 total) was not verified for appropriateness by our office.

Recommendations:

3. *The NHAF should repay the OGA $16,598 for the unsupported fringe benefit costs and related indirect costs it was reimbursed on invoice #1 through #6 for the period October 1, 2016 through March 31, 2017.*

4. *The NHAF should ensure it complies with 2 CFR 200.430, Standards for Documentation of Personnel Expenses and all invoicing and payment terms and*

conditions contained within its agreement with the OGA when seeking the cost reimbursement for employee fringe benefits and related indirect costs.

FINDING 3 – TRAVEL COSTS INVOICED WERE NOT SUPPORTED

The NHAF did not support any travel expenses claimed for reimbursement on invoices sent to the OGA. For the 18-month period audited, the NHAF was reimbursed $6,110 for travel expenses. However, the NHAF did not provide our office with any travel reimbursement claims that indicated it reimbursed employees $6,110 for project related travel expenses. We further requested copies of operating checks or other proof of payment that indicated NHAF employees were reimbursed for actual travel costs; however none was provided. Finally, we requested evidence from the NHAF's accounting system that indicated travel expenses invoiced to the OGA were processed and accounted for correctly; however no requested evidence was provided.

The OGA's 2015 GMPM allows for the actual costs of travel expenses and mileage reimbursement to be substantiated by receipts. The 2015 GMPM further states that costs not substantiated by receipts are unallowable and will not be reimbursed. As a result of no evidence being provided to support the amounts invoiced, all $6,110 in travel expenses was not verified for appropriateness by our office.

Recommendations:

5. *The NHAF should work with the OGA in repaying the $6,110 of employee travel expenses invoiced that cannot be substantiated by reimbursement claims, operating checks or other proof of payments.*

6. *The NHAF should comply with the OGA's 2015 GMPM by ensuring all costs claimed for travel expenses are actual and substantiated by related documents.*

FINDING 4 – AMOUNTS INVOICED FOR SUPPLIES WERE NOT SUPPORTED

The NHAF did not provide valid receipts or sufficient evidence for supply costs invoiced to the OGA. For the periods audited, our office selected $2,255 of supplies costs invoiced by the NHAF to test. An analysis of the records provided and subsequent discussions with NHAF employees, noted the following concerns over all $2,255 in claimed costs:

a. As support for the supplies costs our office tested, the NHAF provided two invoices from a vendor that listed supplies totaling $876 and $728, respectively. However, a closer analysis of the invoices indicated that both appeared unusual in nature. The address listed on the invoices was that of an empty lot, not a physical store. An on-line search did not make any references to the vendor. Our office requested the NHAF to provide an operating check or other proof of payment made to the vendor to demonstrate the authenticity of the invoices, however, no such evidence was provided.

b. On invoice #3 sent to the OGA, the NHAF claimed $305 in costs for its annual conference. The grant award's SOW did not specify that costs for supplies related to the NHAF's annual conference could be reimbursed.

c. In addition, the NHAF provided only a one-page bank statement summary for the remaining $346 in supplies costs claimed on invoice #3. The bank statement summary indicated that a portion of the $346 was to pay for a network fee, not a supply vendor. Itemized receipts for expenses claimed were not provided.

The 2 CFR 200.453 states, "Only materials and supplies actually used for the performance of a federal award may be charged as direct costs." In addition, the OGA's 2015 GMPM states "A cost is unallowable if it is not contained in the approved scope of work and unallowable costs will not be reimbursed." Based on the issues as noted above, the $2,255 in supply costs claimed by the NHAF was not verified for appropriateness by our office.

Recommendations:

7. *The NHAF should work with the OGA in repaying the $2,255 of supplies costs invoiced that were not project related nor substantiated with valid receipts or other proof of payments.*

8. *The NHAF should comply with 2 CFR 200.453 and the OGA's 2015 GMPM by ensuring all costs claimed as supplies expenses are actual, used in the performance of the award, and substantiated by verifiable accounting records.*

FINDING 5 – CONTRACTOR COSTS WERE NOT SUPPORTED

For the 18-month audit period, the NHAF billed a total of $11,418 of contractor costs on invoices #1, #3, and #5. An analysis of the documents provided by the NHAF to support these costs raised the following issues:

a. $2,188 of invoiced contractor costs were not supported by any records or justified by the NHAF as to why the amount was invoiced to the OGA.

b. The NHAF provided our office with a contractor invoice totaling $5,000 for services such as developing evaluation protocols, conducting interviews and writing reports. Our office requested an operating check or proof of payment such as a bank statement that the NHAF did pay $5,000 to the contractor for these services, however, no evidence was provided. In addition, we requested an IRS Form 1099 (required to be issued to contractors who are paid more than $600 per year) or a copy of the NHAF's accounting system showing the $5,000 payment as being processed and recorded, however neither was provided.

c. The NHAF provided our office with an invoice totaling $1,500 representing another contractor that designed flyers, printed ads, and created signs. However, similar to

the invoice purportedly from the contractor noted above, it appeared unusual in nature. The NHAF could not provide our office with an operating check, bank statement, IRS Form 1099 or accounting records that reflected $1,500 in payments to this contractor.

d. The NHAF provided our office with a $2,730 invoice from a third contractor for the cost of presentation services and the preparation of handouts. However, there was no evidence the NHAF paid the contractor for these services. The NHAF could not provide an operating check, nor bank statements demonstrating this was an actual project related expense. Furthermore, an IRS Form 1099 or NHAF accounting system records were not provided despite repeated requests.

The OGA's 2015 GMPM requires grant recipients to maintain adequate records to demonstrate costs claimed on invoices were actual and project related. Due to the lack of support, unusual invoices, missing accounting records, and other concerns noted in a. through d. above, our office cannot determine whether any of the $11,418 in contractor costs were actual NHAF expenses, reasonable, or allowable. As a result, the $11,418 was not verified for appropriateness by our office.

Recommendations:

9. *The NHAF should work with the OGA in repaying the $11,418 of contractor costs invoiced that cannot be not supported by accounting records nor substantiated with valid invoices or proof of payments.*

10. *The NHAF should comply with the related CFR's and the OGA's 2015 GMPM requirements by ensuring sufficient accounting records and related source documents justify and support the amounts claimed on invoices submitted for cost reimbursement.*

FINDING 6 – OTHER DIRECT COSTS INVOICED WERE NOT SUPPORTED

The amounts billed as other direct costs by the NHAF were not supported and did not appear to be project related. Our office tested $10,720 of expenses billed as other direct costs by the NHAF on invoices #1 through #6 and the following issues were noted:

a. On invoice #1 sent to the OGA for the period October 1, 2015 through December 31, 2015, the NHAF invoiced the OGA a total of $3,760. Upon request, the NHAF provided two one-page invoices (invoice A for $1,760 and invoice B for $2,000) that appeared unusual in nature. Invoice A dated November 25, 2016 (one year after the billing period), listed a restaurant as the vendor and listed the expenses for 100 regular meals and 25 vegetarian meals provided to farmers at a workshop. Upon contacting the restaurant, we were informed the invoice was not generated by the restaurant, as they do not offer vegetarian dishes. Invoice B was dated December 23, 2016 (one year after the billing period) and listed the services as taste tests.

However, names, dates and project related services were not reflected on invoice B. The NHAF did not provide operating checks, bank statements or any other evidence of work product to show that these costs represented actual project related expenses.

b. On invoice #3 sent to the OGA for the period of April 1, 2016 through June 30, 2016, the NHAF invoiced the OGA a total of $4,960. When requested to support this cost, the NHAF provided our office with an invoice from a hotel listing $5,746 in costs for hosting the 6th Annual NHAF conference. Costs related to the annual NHAF conference were not included in the grant project's SOW and therefore are not allowable per the OGA's 2015 GMPM.

c. On invoice #6 sent to the OGA for the period of January 1, 2017 through March 31, 2017, the NHAF invoiced the OGA a total of $2,000. When requested to support this cost, the NHAF provided us with various utility bills, its office rent schedule and cell phone bills totaling $3,782. None of these expenses were project related, nor were they included in the project expenses specified within the SOW.

The 2 CFR 200.453 states, "Only materials actually used for the performance of a federal award may be charged as direct costs." Furthermore, the OGA's 2015 GMPM states "A cost is unallowable if it is not contained in the approved scope of work and unallowable costs will not be reimbursed." Based on the concerns noted in a. through c. above, the $10,720 in other direct costs claimed by the NHAF was not verified for appropriateness by our office.

Recommendations:

11. *The NHAF should work with the OGA in repaying the $10,720 of other direct costs invoiced that cannot be supported by accounting records nor substantiated with valid invoices or proof of payments.*

12. *The NHAF should comply with 2 CFR 200.453 and the OGA's 2015 GMPM requirements by ensuring sufficient accounting records and related source documents justify and support the amounts claimed as other direct costs on invoices.*

DISPOSITION OF AUDIT RESULTS

The findings in this audit report are based on fieldwork and analysis that my staff performed between October 2017 and December 2017. My staff attempted to communicate our preliminary findings, recommendations, and other items with the NHAF's management throughout this process, however, the NHAF's management did not make themselves available to address our concerns. The last communication we received from the NHAF was an email on December 20, 2017 stating that they would contact our office the week of December 26, 2019 – December 29, 2019 to address our concerns. However, no follow-up communication was made.

A copy of the preliminary draft audit report was e-mailed to the NHAF on January 11, 2018, requesting a response within 30 days, however, no audit response was received from the NHAF. Our office e-mailed the NHAF on February 13, 2018 to notify them that the audit report will be finalized without the NHAF's ability to respond to our audit findings. The NHAF did not respond to our February 13, 2018 email.

This audit report is intended solely for the information of the California Department of Food and Agriculture and the NHAF's Management. However, this report is a matter of public record and its distribution is not limited.

REPORT DISTRIBUTION

Number	Recipient
1	Executive Director (NHAF)
1	Director, Administrative Services
1	Assistant Director, Administrative Services
1	Branch Chief, CDFA Office of Grant Administration (OGA)
2	Manager, CDFA OGA
1	General Counsel, CDFA Legal Office
1	Chief, CDFA Audit Office

CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
SPECIALTY CROP BLOCK GRANT PROGRAM
FINAL PERFORMANCE REPORT

USDA Project No.:	Project Title:	
39	High Elevation Vineyard Irrigation Model Beta Test	
Grant Recipient: Calaveras Winegrape Alliance	**Grant Agreement No.:** SCB15039	**Date Submitted:** December 2017
Recipient Contact: Carolyn Nelson	**Telephone:** (209) 728- 9467	**Email:** cwagrant2@gmail.com

Project Summary

The purpose of this project was to beta test the computerized high elevation (HE) irrigation model (the Model) developed over the 2012, 2013 and 2014 growing seasons while also verifying a reduction in water usage, without compromising fruit quality or tonnage. HE vineyard experts highly recommended beta testing before the Model and Best Management Practice (BMP) guidelines were released to the general public. Beta testing provided the opportunity to analyze and incorporate selected grower participant (GP) feedback/data and identify and correct potential challenges. The goal was to ensure the Model and protocol would function properly in a real-world setting. This was a necessary preemptive phase before public release to minimize risk in compromising plant health, grape quality and crop production and also identify issues that did not come up during the alpha phase.

Agriculture accounts for 70% of water use in California. As politicians and water experts work on long-term water efficiency regulations for California, it is important to develop practical and beneficial water saving tools for growing HE California wine grapes. It is estimated there are more than 20,000 acres of California vineyards at over 1,000 foot elevation in regions including Lake, Mendocino, Calaveras, Amador, Tuolumne, El Dorado, Napa, Monterey & San Luis Obispo counties. Water saving practices are especially important for growers in HE regions because of the arid climate experienced during the growing season versus that which exists in valley or coastal regions. Using standard irrigation practices in HE vineyards, plant water loss during high temperature episodes can be more than 30% with fruit yield reductions estimated to reach 50%. Efficient water use in HE vineyards could potentially increase a county's tax revenues, as meeting vines optimal moisture needs will improve vine health, grape composition and phenolic attributes; thus enhancing the competitiveness of HE grapes. Strong healthy vines require less invasive vineyard practices which reduces the need to enter a vineyard to apply pesticides, fumigants and chemicals; decreasing dust abatement and soil compaction.

This project built upon the 2011 Specialty Crop Block Grant Program Project 27: *Improving Water Use Efficiency in High Elevation (HE) Vineyards*. The project created a draft water efficient irrigation model that was tested in two vineyards. This project also built upon the 2012 Specialty Crop Block Grant Program Project 42: *Improving Water Use Efficiency in High Elevation Vineyards, Phase II & III*. The project created a computerized model of the draft irrigation model and was tested in four HE vineyard sites, each with different wine grape varietals, rootstocks, and historic irrigation practices. These alpha tests showed that HE vineyards irrigated using schedules based on 10-day high temperature forecasts typically used approximately 20% less water than HE vineyards using a traditional irrigation schedule. The wine and grape quality was also improved. Tests showed higher Yeast Assimilable Nitrogen (YAN) and lower acetic acid bacteria values in vineyards irrigated using the Model. The success and progress achieved during these two prior projects led to the current project - a beta test designed to prepare the Model for release to the public.

Project Approach

Preparation:

The project staff met to determine possible vineyard sites and schedule a monthly staff meeting. The staff then contacted vineyard owners in four HE counties and visited four potential vineyard sites. Two growers were selected based on vineyard criteria and willingness to follow the irrigation Model and submit a section of their vineyard for research. The selection of the participants was then shared with the Calaveras Winegrape Alliance (CWA) membership. The two vineyards selected for the study were in West Point, California and San Andreas, California. The West Point vineyard is at a 2,800 foot elevation and the grape varietal is Syrah. The San Andreas vineyard is at a 1,200 foot elevation and the grape varietal is Zinfandel. The GPs provided historical irrigation data so a baseline could be established. Both participating vineyards were revisited by the Project Manager (PM) to further study the irrigation layout and the modifications necessary to isolate a test and control block in each vineyard. The PM flagged a test block in each vineyard, which included five rows of 10 vines (50 total vines) that would be irrigated using the Model. The GPs were instructed to irrigate the remainder of the vineyard as they have historically. Fifty adjacent vines were marked and labeled as the control block. Three CWA Assistants (CAs) were hired to assist with office and field work. Soil pits were dug in the West Point vineyard on April 2, 2016 and in the San Andreas vineyard on April 7, 2016. The Industry Consultant (IC) sent soil samples to A&L Labs and the results were received May 3, 2016. Soil profile information was used to properly install soil moisture sensors as well as to calculate the water holding capacity of the soil. The San Andreas vineyard had an estimated 6.4 inches total of available water to 62 inches (10% water holding capacity). In West Point, there was an estimated 6.8 inches total available water to 52 inches (13% water holding capacity). The PM modified the irrigation systems on April 11, 2016 so the GPs could irrigate the test and control block separately. All supplies necessary for testing (porometer, plant moisture stress (PMS) instrument, soil moisture sensors and a tape measure) was procured before testing began on April 18, 2016. Additionally, soil moisture probes were installed in April in the test and control block in each vineyard at a 16-inch and 36-inch depth.

Ongoing activities and outreach:

Monthly project staff meetings were held and the CAs gave updates on data collection progress and grower feedback. The IC and the Technical Manager (TM), were often present to help interpret data and advise the team. A CA also gave a grant update at the monthly CWA Board of Directors and Educational Meetings. The County Agricultural Commissioner and University of California Cooperative Extension (UCCE) Farm Advisor were generally present at the meetings and were available to disseminate the information when requested. GP feedback was collected periodically in order to inform the grant staff of adjustments to the Model regarding user-friendliness and consistent directions. The PM and PDs kept careful track of the project timeline and gave reminders and instructions at the monthly meetings, by email, and/or phone. The PM and CAs instructed the GPs on irrigation Model protocol in person. Instructions were given and questions answered during follow up visits, emails and phone calls. The CAs also monitored the GPs in person on a biweekly basis. The PM sent emails to the GPs bimonthly to remind them to carefully document all irrigation dates and duration using the designated spreadsheet. The CAs collected and documented plant health and cane growth data biweekly starting on April 18, 2016 until harvest. A CA checked the online directive on a daily basis and documented the directive and forecast.

Data collection and analysis:

Petiole samples were taken on June 13th (during bloom) and sent to A&L Laboratories. The results showed a 0.37% lower potassium level in the control block of the San Andreas vineyard. As a follow up, leaf samples

were taken from both vineyards a week before harvest. The results showed no significant change or deviation within Cation Exchange Capacity (CEC) values. The CEC is the ability of the soil to hold essential nutrients. Weather monitoring sensors were installed at the West Point vineyard on June 13, 2016 and had already been installed in the San Andreas vineyard. Staff documented any confusion or suggestions from the GPs regarding the use of the website and Model.

The CAs organized and executed a rigorous pre-harvest testing put together by the PM, IC and TM. Brix measurements were taken biweekly starting in the beginning of August. Shortly before harvest, juice and whole grape samples were taken and sent to ETS Laboratory for a Basic Juice Panel, Grape Phenolics Panel and Grape Water Content analysis. Sixty pounds of grapes from each block were also harvested and delivered to the TM to be made into wine. At the end of fermentation the samples of wine from each block were shipped to ETS Laboratory for a Rapid Phenolics Panel. The results were received back from ETS Laboratory and were analyzed by the contracted wine analyst and IC. In general, data showed that treatment effects were negligible or conflicting. The Rapid Phenolics Panel showed slightly higher tannin levels in the test block of the West Point vineyard - 163 mg/L higher than in the control block. The results suggest that the different irrigation practices used in the test and control block did not significantly modify grape composition.

Follow up, evaluation and final BMP:
At the end of the season, staff met with the GPs to discuss their experience with the Model and to document any challenges or confusion they faced. Both GPs indicated that they would use the Model again if a few changes were made to the website. First, they requested that the program have memory to eliminate the need for growers to 1) Track that irrigations occur no more than once every six days and 2) Track that irrigations occur at least once every 16 days. This was the primary mistake made by GPs while using the Model during this trial. Second, The GPs also requested that the website include a feature enabling them to review their irrigation history for the season. Third, the GPs suggested that the website give only one irrigation directive per day instead of changing throughout the day as the forecast changed. This would eliminate confusion that occurred when the GP checked the directive more than one time per day. Fourth, the GPs required clarification of what to do when the Model indicated “Irrigate Tomorrow” and the following day’s directive did not state “Irrigate Today.” The BMP was adjusted to address the GPs recommendations and concerns.

Website adjustments:
In April 2016, the online irrigation Model and website was evaluated and the following changes were made to the texts and directions:
1.) Directives were shifted so they appear directly under the zip code so growers can see it easily at the top.
2.) Directions that were generated were changed so that only one directive appeared below the zip code.

Following the final meeting with the GPs and evaluation of the program, the contracted computer programmer was contacted to make the following necessary website modifications that came to light during the beta test:
1.) A new website was created with memory that allows for individual accounts for each grower. Growers will no longer need to manually track days between irrigations. A list of all past irrigation days from the current season will also be listed.
2.) A change was made so the directive given the first time the grower checks the Model each day will be the directive shown for the whole day, eliminating the directive changing throughout the day.
3.) The only directives given will be “Irrigate Today” or “Do not irrigate at this time.”

These changes will significantly decrease the chance of human error and were incorporated into the BMP. To access the new site go to http://irrigationtool.calaveraswines.org.

Dissemination:
PowerPoint presentations were provided at the CWA Educational Meeting on February 3, at the CWA Board of Directors meeting on February 16, at the Calaveras County Farm Bureau Board of Directors meeting on March 14 and at the Calaveras Grown Board of Directors meeting on March 15. A total of 85 were in attendance. Informational pamphlets were available at every meeting and the presentation remains available on the CWA website (the presentation and pamphlet are attached). Brochures were also distributed to the Departments of Agriculture in Tuolumne, Calaveras and Amador Counties, neighboring winegrape grower and vintner associations and the Calaveras County Master Gardener training class. A press release was written and sent to the local papers and other interested parties.

The project did not benefit commodities other than HE wine grapes, a California specialty crop.

Significant contributions and role of project partners include:
- The CWA provided office space and website assistance. They will continue to provide support in the form of ongoing website maintenance.
- The Calaveras County Agricultural Commissioner's office provided necessary contact information for growers.
- The Agricultural Commissioner and UCCE Farm Advisor attended educational meetings and received updates on the project in order to disseminate the information in the HE counties in which they work.
- Calaveras Grown and the Farm Bureau allowed the grant staff to present grant updates and a final presentation to their membership during monthly meetings.
- Retired Calaveras County Agricultural Commissioner, contributed a practical approach to grower outreach and acted as a communication liaison with the CWA Board of Directors.
- Technical Manager and Model developer, gave crucial advice and background. He also created statistical graphs to represent soil moisture, irrigation, porometer, PMS and cane length data.
- Vineyard Manager, executed soil sampling and gave ongoing advice and support to the grant staff. He also aided with analysis of the petiole and leaf samples as well as the soil moisture, irrigation, porometer, cane length and PMS data.
- Viticulture and Plant Science Advisor, UCCE Mendocino County, recommended this beta testing phase of the project.
- The GPs were local vineyard owners, CWA members and active members of the community. Their diligence, cooperation and thoughtful feedback was critical to the success of this project.
- Contracted wine analyst, analyzed all juice, wine and whole grape test results and gave a detailed report.
- Vineyard owner and biologist, gave support and a scientific approach to the development of the Model.

Goals and Outcomes Achieved

Following the identification of the vineyard sites in San Andreas and West Point, historical vineyard irrigation data was collected from the GPs in order to calculate a "normal amount" that must be established in order to use the Model. In April, the IC dug soil pits and conducted testing in order to calculate the soil water holding capacity and identify the soil horizons. This data was used to properly install the soil moisture sensors. Previously installed weather monitoring sensors recorded daily temperatures, reference evapotranspiration, solar radiation, wind speed, wind direction, rainfall and relative humidity. The GPs documented all irrigation

dates and durations on a spreadsheet and were responsible for using the Model properly with minimal intervention from the grant staff. At the end of each month the GPs sent their most recent irrigation data to the PM. This data, along with online directives and feedback, was reviewed at monthly staff meetings. From April 18th until harvest, the CAs visited the vineyards biweekly and conducted comprehensive testing. The data was used to compare the test and control block in each vineyard to prove that use of the Model does not compromise vine health and/or vigor. CAs measured PMS and stomatal conductance levels as well as cane growth and soil moisture. Furthermore, biweekly photographs were taken of test vines to monitor plant growth and health. Feedback from the GPs was documented biweekly and a survey was sent out in July to all 43 CWA growers to indicate their potential adoption of the Model. Only one grower stated he/she was not interested in using the Model. Information about the Model was also disseminated at CWA Educational Meetings.

Following harvest, water usage data was compiled and analyzed carefully by staff. It was revealed that 138 gallons per vine more water was used in the test versus the control block in the San Andreas vineyard. Part of the cause was discovered to be that the GP unintentionally followed the Model incorrectly in some cases. Even so, if he had followed the Model directives perfectly he still would have used 10% more water in the test block than the control. This result could indicate that this Model is not effective in vineyards where the normal irrigation amount is so high. Standard irrigation in an HE vineyard usually ranges between four and six gallons per vine per week. This vineyard used a normal amount of 18 gallons per vine per week. The TM looked at many other possible reasons for this anomaly, including elevation and weather data, and was not able to determine the cause.

Water usage in the West Point vineyard test block was also greater (32.5 gallons per vine, more) and the cause was discovered to be an error in calculating the baseline data. Due to a computing error, the “normal amount” used to calculate the duration of irrigation was three times what it should have been. If the GP had followed the irrigation directives perfectly and the “normal amount” had been calculated correctly, 32% less water would have been used in the test block, further proving the effectiveness of the Model. PMS, stomatal conductance levels, cane growth, crop yield, and photographs were analyzed and showed no significant differences between the test and control blocks in each vineyard. The IC noted slightly higher tannin levels and a ¾ ton per acre increase in yield in the control block of the West Point vineyard which received less water than the test block. Wine phenolics, anthocyanins, brix and thermal analysis of grape juice and whole grape samples showed negligible or conflicting differences between the test and control blocks.

The long-term outcomes of this project were expected to be an increase in growers' irrigation knowledge and a reduction in growers' water usage, which would encourage widespread adoption of this new irrigation model. Through outreach and education during this grant period, many growers gained knowledge about efficient irrigation practices. This work also demonstrated that plant growth can be improved by applying irrigation at the proper time relative to forecasted temperatures. Public outreach also created an awareness and anticipation of the Model. Eighty-five were in attendance at the final presentations. A list of possible interested growers has been established and the new website will monitor who is using the Model. Some growers who used the Model during past grant periods have continued to do so and have reported continued water savings of up to 38% and some even reported improved quality.

The goal of a 20% water savings was not accomplished in either vineyard but would have been accomplished in West Point without human error (32% savings). In San Andreas the goal was not achieved as 10% more (10

gallons) water would have been used even without human error. An improved BMP and public outreach was accomplished during this reporting period.

The expected measurable outcomes of this project were to beta test the Model to substantiate a reduction in water, to improve the Model, to survey growers to indicate interest in participation and provide online availability of the Model.

The beta test was initiated at the start of the growing season and concluded at harvest. Water usage would have been reduced in only one of the vineyards if there was no human error.

The Model was confusing to use for the GPs. The GPs had to manually track days between irrigations and multiple directives were provided. The Model has been improved to eliminate the confusions.

The results of the survey indicated that only one grower was not interested in using the Model. The Model was released to the public through the CWA website and will continue to be monitored by CWA employees.

Major successful outcomes include:
Without human error, there would have been a 32% water savings in the West Point vineyard. Eighty-five HE growers and other interested parties attended presentations and are now familiar with the Model and better irrigation practices. All but one of the 43 CWA growers surveyed indicated they would be interested in adopting the irrigation Model. Both GPs from this year and two past GPs still use the Model and indicated they would be interested in participating again. So far, 375 brochures have been distributed to CWA members, the Departments of Agriculture in Tuolumne, Calaveras and Amador Counties, neighboring winegrape grower and vintner associations, etc.

Beneficiaries

All HE winegrape growers in California could benefit from the completion of this project by saving up to 20% of their normal water use. As a result, the county and state could also benefit by achieving increased tax revenue and greater water savings.

To date, five of the 43 growers in Calaveras County have committed to using the model. Per the 2016 Calaveras Crop Report, there are 700 acres of winegrapes. Not all acres are considered high elevation, making it difficult to determine potential for monetary savings. It is estimated there are more than 20,000 acres of California vineyards at over 1,000 foot elevation in regions including Lake, Mendocino, Calaveras, Amador, Tuolumne, El Dorado, Napa, Monterey & San Luis Obispo counties. By using this model, a HE grower can potentially realize savings of $138/acre with a state-wide impact that could reach $2.7 million.

This project will improve the economic viability of wine grapes by decreasing water cost, thus decreasing the startup costs for beginning growers. By reducing the cost burden on current growers, money saved could be used to improve and/or expand wine grape production. Increased vineyard productivity could potentially increase a county's tax revenues, as meeting vines optimal moisture needs will improve vine health, grape composition and phenolic attributes; thus enhancing the competitiveness of HE wine grapes.

Lessons Learned

During the final months of this project, the project staff was reminded that the lessons learned and challenges overcome during a beta test is more important than the ultimate outcome. They were also reminded that any worthwhile endeavor takes time and refinement. Negative results taught the staff that directions need to be so simple and clear, that there is very little chance of human error. They also learned the importance of checking any calculations or important baseline data. Positive experiences taught them that people are willing to try and learn something new. They were also pleased to learn that the foothill communities are eager to conserve water and are willing to put forth effort to accomplish water savings.

The only unexpected outcome was the failure of the Model to reduce water usage in the San Andreas vineyard.

Lessons learned to help others expedite problem-solving:

- Check, double check and triple check any important calculations or baseline data.
- Make sure the tool is user-friendly and simple to follow.
- Monitor the project closely so mistakes can be detected and corrected immediately.
- Make plans and budget for further testing if the project outcomes are unexpected.

Additional Information

Please see attachments:

1. Best Management Practices Document
2. Powerpoint Presentation
3. Brochure
4. ETS Laboratories Results Summary
5. Statistical Graphs
6. Microphotos

CALAVERAS
WINEGRAPE ALLIANCE

High Elevation Vineyard Irrigation Model
Best Management Practices Manual

April 2017

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HISTORY

Since 2011, the Calaveras Winegrape Alliance (CWA) has studied irrigation efficiencies in eight high-elevation vineyards (above 1,000 ft). The project is a result of three U.S. Department of Agriculture Specialty Crop Block Grants.

The goal was to create an irrigation model that is based on forecasted daily high temperatures. It was anticipated that vineyards irrigated using schedules based on 10-day projected high temperatures would save water as compared to vineyards irrigated traditionally. Furthermore, it was anticipated that use of the efficient irrigation model would not compromise the quality or quantity of the grapes.

During the first phase in 2012, a draft model was created and tested in two vineyards. Forecasted high temperatures were manually noted, calculations were performed and a determination was made indicating when to irrigate and at what irrigation rate. The normal weekly irrigation amount was determined based on how the vineyard was irrigated historically. The Model directed the participant to irrigate at either the normal amount, 1.5 times or twice the normal amount.

During the next two phases of the project in 2013 and 2014, the Model was computerized and placed on the CWA website, eliminating the need to manually note the 10-day forecasts and perform calculations. On the website, the grower was instructed to enter their zip code and a recommended irrigation directive appeared on the screen stating to either *Irrigate today*, *Irrigate tomorrow* or *Don't irrigate at this time*. In addition, it gave a warning that you may need to irrigate in the near future. The Model also stated how much irrigation water should be applied. During these phases the Model was tested in four vineyards over a two-year period.
The purpose of the fourth phase during 2016 was to beta test the online Model in two vineyards while also verifying a reduction in water usage without compromising fruit quality or quantity. Beta testing provided the opportunity to analyze and incorporate feedback and data from growers and identify and correct potential challenges. The goal was to ensure the Model would function properly in a real-world setting. The participating growers indicated they would use the Model again if the website provided a history of their irrigation over the season, eliminated the need to manually track the days between irrigations and provided only one of two irrigation directives each day: *Irrigate today* or *Do not irrigate at this time.* The Model was improved accordingly.

Phase I – 2012 The draft Model was successfully used in two vineyards. Each vineyard realized a 26% reduction in water usage.

Phase II – 2013 The computerized Model was created and successfully implemented in two vineyards. Each vineyard realized a 28% reduction in water usage.

Phase III – 2014 One vineyard realized a 38% reduction in water usage. The second vineyard had soil with high water-holding capacity and saw a 27% increase in water usage. It was determined that using the Model in vineyards with high water-holding capacity soils or that irrigate only a few times per season may not be beneficial.

Phase IV – 2016 There would have been a 32% reduction in water usage in the West Point vineyard if not for an error in calculating the normal weekly irrigation amount. There would have been a 10% increase in water use in the San Andreas vineyard even if the Model had been followed exactly. The quality and quantity of the grapes was not compromised.

Results 2012-2016

•Model used in eight tests sites
•Successful in six of the eight vineyards – 75%
•Grape quality or quantity was not compromised
•Realized water savings of up to 38%

Model Conditions for use:

It is critical that a historical irrigation frequency and quantity is known or established (such as a normal weekly amount of 4 gallons/vine/week). Please see the page "Establishing Weekly Normal Amount".

In vineyards where soil has a high water holding capacity or irrigation occurs only once or twice a season, this Model may not be applicable. However, using the Model in these types of vineyards to irrigate just prior to a temperature spike may still provide an increase in irrigation efficiency.

Under drought conditions, a lack of winter rains may require earlier irrigation than the Model directs.

To obtain your area recommendation:

1. The first time you use the Model, you will need to create an account.
    a. Below the user login on the home page, click on the link "create new account".
    b. Enter your email address, zip code and create a password. Accept the terms and conditions. Only one zip code can be monitored per account. If you need to monitor more than one zip code, you will need to create another account with a second email address.
2. Thereafter, log in using your email and password. You will need to login each day to refresh the directive. You will be logged out automatically after 20 minutes.
    a. Start checking the directives around April 1st.
    b. Do not irrigate until the first "Irrigate today" directive appears.
    c. It is imperative that you check the website daily during the irrigation season.
3. To the right of the zip code, you will be given a directive of "Irrigate Today" or "Do not irrigate at this time".
4. If the directive states "Irrigate Today", you MUST irrigate.
    a. Apply all irrigation water on that day. Do not irrigate over several days.
    b. Refrain from irrigating in the heat of the day.

5. To the right of the directive, there are three possible irrigation amounts based upon your normal watering history (Click the tab at the top fo the page, “Calculating Normal Amount” to learn how to calculate your weekly normal amount).
    a. 1X = the normal amount .
    b. 1.5X = one and a half times the normal amount.
    c. 2X = twice the normal amount.
6. Below the zip code, a list of all past irrigation days from the current season will be displayed. The history is refreshed on December 31st of each year.
7. Click on the “wunderground” link at the bottom of the page to view the ten day forecast.

CALCULATING THE WEEKLY NORMAL AMOUNT

A “normal amount” of weekly irrigation must be established in order to use this Model. This is best accomplished by calculating the total amount of water applied to the vineyard from first irrigation to final irrigation during past seasons. The total should then be divided by the number of weeks from first irrigation to final irrigation during that season. This will give you the “normal amount” of irrigation water per week for your vineyard. If possible, keep track of your “normal amount” for several seasons and calculate an average.

Formula: total # of gallons used last year / weeks of irrigating =

gallons applied per week (“normal amount”)

For example, last season a total of 5000 gallons of water was applied between first irrigation and final irrigation. If the first irrigation occurred around April 15 and final irrigation was on September 9, it was a 21 week season. By dividing 5000 by 21 you get a weekly normal amount of irrigation of 238 gallons. When the Model tells you to “Irrigate Today” at 1X normal you should apply 238 gallons. If the Model tells you to irrigate at 1.5X normal, you would irrigate 357 gallons, etc..

To obtain the number of hours to irrigate you must know or calculate your water system flow rate. The water system flow rate is equal to the number of drip emitters times their individual flow rates. By dividing the system flow rate into the number of gallons to be applied, you obtain the time to apply 238 gallons.

Formula: # of gallons per week applied / (number of emitters x flow rate of emitter)

= normal irrigation hours per week (or “normal amount” of time)

Assume in the example that there are 1000 emitters and each has a flow rate of .5 gallons per hour. Therefore, our system flow rate is .5 X 1000 = 500 gallons per hour. Now divide the total gallons to be applied (238) by the system flow rate (500) and you come up with .48 hours or 29 minutes is required (60 min. x .48 = 28.8). If the Model instructs you to water 1.5X the normal amount you should water your vineyard for 43 minutes, and 2X the normal amount would be 57 minutes.

If irrigation history is not available, a grower may estimate the “normal amount” by using the average number of hours per week irrigated. For example, in past years the grower normally irrigated 4 hours approximately every 2 weeks. That would be an average of two hours per week (4 hours divided by 2 weeks). The “normal amount” for that vineyard would be 2 hours.

"Normal Amount" Ratio = hours irrigated : 1 week

Calculating your "normal amount" is critical to the success of this Model. If you need help or have further questions please contact the Calaveras Winegrape Alliance at calaveraswines@att.net or through the website www.calaveraswines.org.

CALAVERAS
WINEGRAPE ALLIANCE

IBOT Summary Report

(Irrigating Based on Temperature)

Improving Water Use Efficiency in Established High Elevation Vineyards

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Calaveras Winegrape Alliance

Acknowledgment of Support

USDA SCBG15039
Improving Water Use Efficiency in High Elevation Vineyards

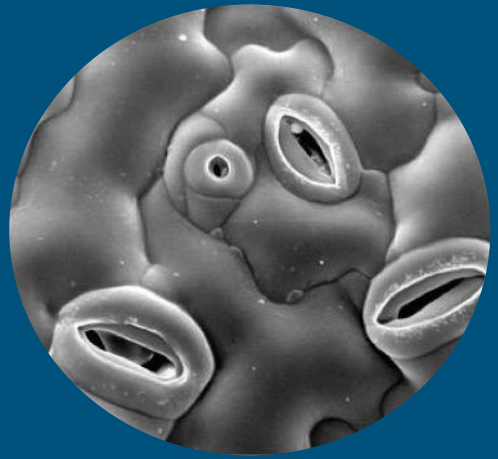
This publication and project was supported by the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service through Grant 15-SCBGP-CA-0046. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA.

Background

Grant Objective

To test whether irrigating prior to a high temperature episode will increase irrigation efficiency.

Stomatal Action



Source: Arabidopsis thaliana, *Encyclopedia of Earth, Fred Sack*

- Stomata close at night
- Stomata close at low temperatures
- With sunlight stomata open; photosynthesis takes place and leaf growth occurs
- Stomata close at high temperatures which prevents leaves from losing excess water
- In grape leaves the stomata close at approximately 95º F

Hypothesis

- Available water to the leaf stomata affect leaf transpiration rates
- Higher transpiration rates increase stomatal cooling
- Cooling will keep the stomata open longer and photosynthesis will take place longer as a result
- When water is in the ground before a high temperature event, roots will absorb additional water, stay cooler and vine growth will improve

Results

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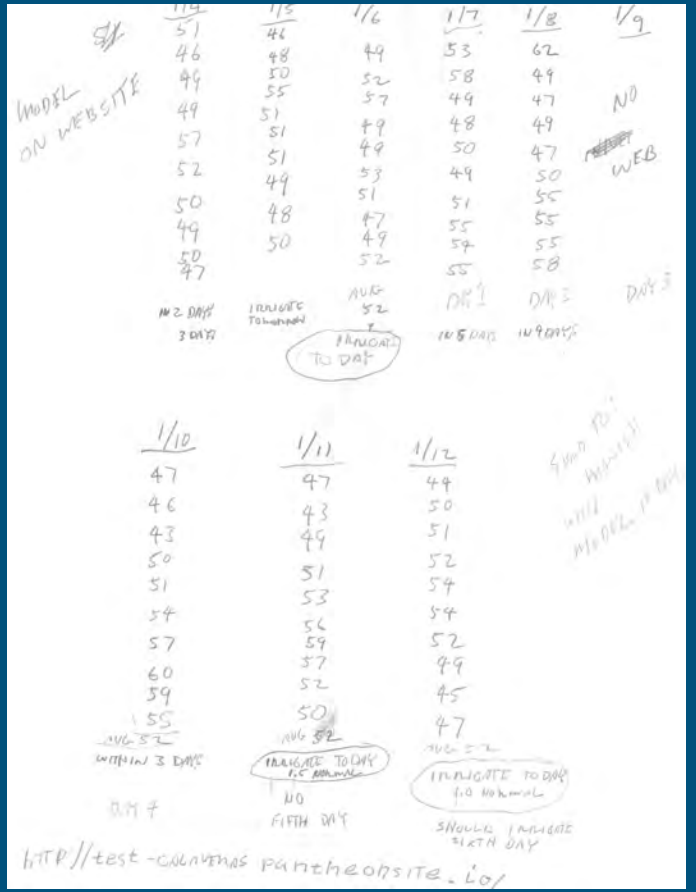
Calaveras Winegrape Alliance

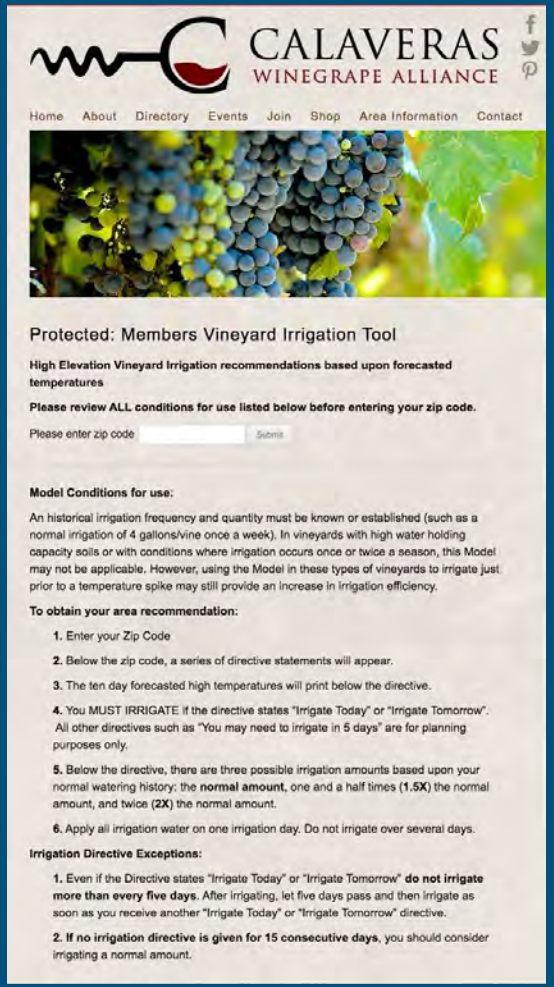
2012 Results

- Used paper and pencil to figure out how often and when to irrigate based on forecasted high temperature
- **26% reduction** in water use in both vineyards tested



2013 Results

- Computerized the Model
- Enter zip code and the Model performs the calculations indicating when and how much to irrigate
- **28% reduction** in water use in both vineyards tested



CALAVERAS WINEGRAPE ALLIANCE

Home About Directory Events Join Shop Area Information Contact

Protected: Members Vineyard Irrigation Tool

High Elevation Vineyard Irrigation recommendations based upon forecasted temperatures

Please review ALL conditions for use listed below before entering your zip code.

Please enter zip code Submit

Model Conditions for use:

An historical irrigation frequency and quantity must be known or established (such as a normal irrigation of 4 gallons/vine once a week). In vineyards with high water holding capacity soils or with conditions where irrigation occurs once or twice a season, this Model may not be applicable. However, using the Model in these types of vineyards to irrigate just prior to a temperature spike may still provide an increase in irrigation efficiency.

To obtain your area recommendation:

1. Enter your Zip Code
2. Below the zip code, a series of directive statements will appear.
3. The ten day forecasted high temperatures will print below the directive.
4. You MUST IRRIGATE if the directive states "Irrigate Today" or "Irrigate Tomorrow". All other directives such as "You may need to irrigate in 5 days" are for planning purposes only.
5. Below the directive, there are three possible irrigation amounts based upon your normal watering history: the **normal amount**, one and a half times (**1.5X**) the normal amount, and twice (**2X**) the normal amount.
6. Apply all irrigation water on one irrigation day. Do not irrigate over several days.

Irrigation Directive Exceptions:

1. Even if the Directive states "Irrigate Today" or "Irrigate Tomorrow" **do not irrigate more than every five days**. After irrigating, let five days pass and then irrigate as soon as you receive another "Irrigate Today" or "Irrigate Tomorrow" directive.
2. **If no irrigation directive is given for 15 consecutive days**, you should consider irrigating a normal amount.

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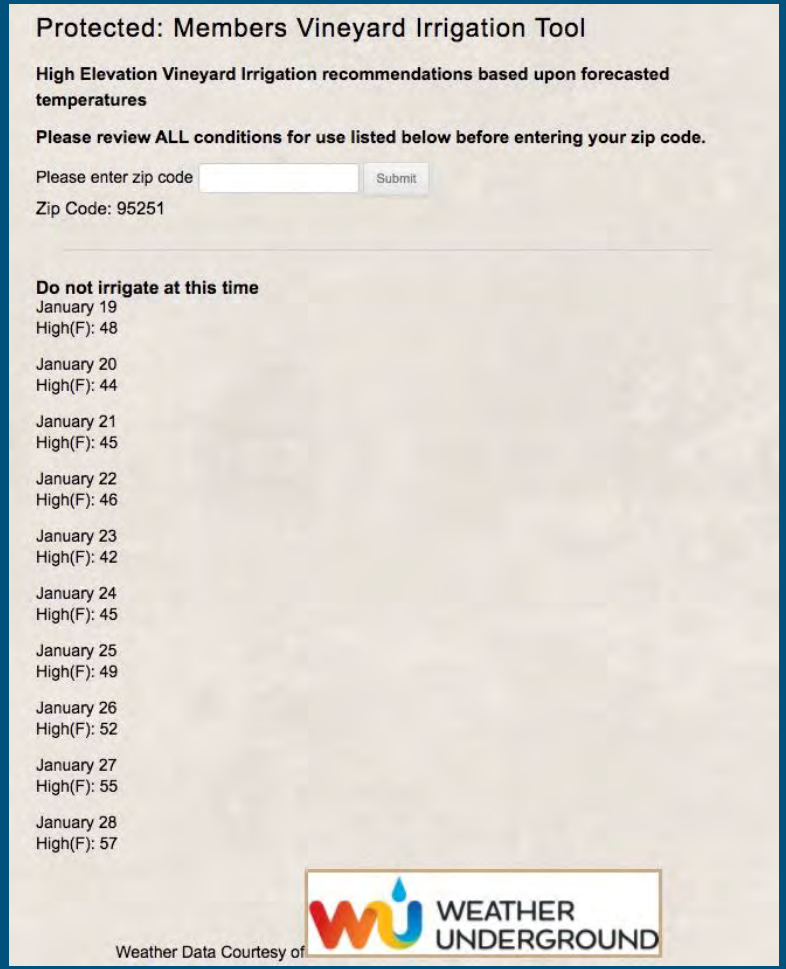
2014 Results

- Used the computerized Model again
- **38% reduction** in water use/a cabernet sauvignon vineyard in Murphys
- **27% increase** in water use/a petite syrah vineyard in Murphys

  -Results showed not all vineyards can use this Model successfully

  -Soil had high water-holding capacity

  -Normal irrigation for this site is a few times per season



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Results of 2016 Beta Test

Syrah vineyard in West Point

- Would have been a **32% reduction** in water use if not for error in calculating “normal amount”.
- Little or no effect on vine health, grape quality or yield.

Zinfandel Vineyard in San Andreas

- Would have been a **10% increase** in water if Model was followed exactly.
- Little or no effect on vine health, grape quality or yield.

Summary of Results

- Used the model in eight tests sites
- Successfully used in six of the eight vineyards – 75%
- Quality and quantity was not compromised
- Realized savings of up to 38%





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Modifications

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Calaveras Winegrape Alliance

Improvements to the Model

- Created new website
  - Individual accounts and memory
  - More user-friendly
  - Decreased chance of human error
    - No need to manually count days between irrigations
    - Only “irrigate today” or “do not irrigate today”
- Updated instructions and best management practices.

So what’s next?

So What's Next?

- Great opportunity for another test/grant
- Weather stations
- Supplies available to CWA members
  - Porometer, Refractometer, Pressure Moisture Stress Machine, pH Meter, Auger
- Model available, but we recommend one more testing period

Thank you for your support!

CALAVERAS WINEGRAPE ALLIANCE

Thank you to our supporters:

The Calaveras Winegrape Alliance

The Calaveras County Agricultural Commissioner's office

Manish Champsee, contracted computer programmer

Mary Mutz, retired Calaveras County Ag Commissioner

Bert MacDonald, Technical Manager and Model developer

Steve Collum, Consultant

The Grower Participants

Steve Price, contracted wine analyst

HISTORY

Since 2011, the Calaveras Winegrape Alliance (CWA) has studied irrigation efficiencies in eight high-elevation vineyards (above 1,000 ft). The project is a result of three U.S. Department of Agriculture Specialty Crop Block Grants.

The goal was to create an irrigation model that is based on forecasted daily high temperatures. It was anticipated that vineyards irrigated using schedules based on 10-day projected high temperatures would save water as compared to vineyards irrigated traditionally. Furthermore, it was anticipated that use of the efficient irrigation model would not compromise the quality or quantity of the grapes.

During the first phase in 2012, a draft model was created and tested in two vineyards. Forecasted high temperatures were manually noted, calculations were performed and a determination was made indicating when to irrigate and at what irrigation rate. The normal weekly irrigation amount was determined based on how the vineyard was irrigated historically. The Model directed the participant to irrigate at either the normal amount, 1.5 times or twice the normal amount.

During the next two phases of the project in 2013 and 2014, the Model was computerized and placed on the CWA website, eliminating the need to manually note the 10-day forecasts and perform calculations. On the website, the grower was instructed to enter their zip code and a recommended irrigation directive appeared on the screen stating to either *Irrigate today*, *Irrigate tomorrow* or *Don't irrigate at this time*. In addition, it gave a warning that you may need to irrigate in the near future. The Model also stated how much irrigation water should be applied. During these phases the Model was tested in four vineyards over a two-year period.

The purpose of the fourth phase during 2016 was to beta test the online Model in two vineyards while also verifying a reduction in water usage without compromising fruit quality or quantity. Beta testing provided the opportunity to analyze and incorporate feedback and data from growers and identify and correct potential challenges. The goal was to ensure the Model would function properly in a real-world setting. The participating growers indicated they would use the Model again if the website provided a history of their irrigation over the season, eliminated the need to manually track the days between irrigations and provided only one of two irrigation directives each day: *Irrigate today* or *Do not irrigate at this time.* The Model was improved accordingly.

RESULTS AT A GLANCE

Phase I – 2012 The draft Model was successfully used in two vineyards. Each vineyard realized a 26% reduction in water usage.

Phase II – 2013 The computerized Model was created and successfully implemented in two vineyards. Each vineyard realized a 28% reduction in water usage.

Phase III – 2014 One vineyard realized a 38% reduction in water usage. The second vineyard had soil with high water-holding capacity and saw a 27% increase in water usage. It was determined that using the Model in vineyards with high water-holding capacity soils or that irrigate only a few times per season may not be beneficial.

Phase IV – 2016 There would have been a 32% reduction in water usage in the West Point vineyard if not for an error in calculating the normal weekly irrigation amount. There would have been a 10% increase in water use in the San Andreas vineyard even if the Model had been followed exactly. The quality and quantity of the grapes was not compromised.

Results 2012-2016

- Model used in eight tests sites
- Successful in six of the eight vineyards – 75%
- Grape quality or quantity was not compromised
- Realized water savings of up to 38%

HOW TO USE THE MODEL

To access the Model, go to www.calaveraswines.org and click on the "Area Information" tab and select "Vineyard Irrigation Tool". The new version of the website has not yet been field tested. Therefore, **it is to be used at one's own risk.**

Obtaining Your Area Recommendation:

1.The first time you use the Model, you will need to create an account. Only one zip code can be monitored per account.
2. Thereafter, log in using your email and password. You will need to log in each day to refresh the directive.
3. To the right of your zip code you will be given the directive to *Irrigate today* or *Do not irrigate at this time*.
4. A link to the 10-day forecast and your irrigation history for the season will be displayed.
5. You **MUST IRRIGATE** if the directive states *Irrigate today*. Apply all irrigation water on that day. Do not irrigate over several days. To the right of the directive, there will be three possible irrigation amounts based upon your normal watering history:

1X = the normal amount
1.5X = one and a half times the normal amount
2X = twice the normal amount.

Best Practices

- Start checking the directives on the website daily around April 1st.
- Do not start irrigating until the first *Irrigate today* directive appears.
- The online directives will instruct you to water no more than once every 6 days and at least once every 16 days.
- Refrain from irrigating during the heat of the day.

Establishing the Weekly Normal Amount

A normal amount of weekly irrigation must be established in order to use this Model. This is best accomplished by calculating the total amount of water applied to the vineyard from first irrigation to final irrigation during past seasons. The total should then be divided by the number of weeks from first irrigation to final irrigation during that season. This will give you the normal amount of irrigation water per week for your vineyard. If possible, keep track of your normal amount for several seasons and calculate an average. ***Formula: total # of gallons used last year / weeks of irrigating = gallons applied per week (normal amount)***

To obtain the number of hours to irrigate you must know or calculate your water system flow rate. The water system flow rate is equal to the number of drip emitters multiplied by their individual flow rates. ***Formula: # of gallons per week applied / (number of emitters x flow rate of emitter) = normal irrigation hours* per *week (or normal amount of time)***

Without irrigation history, a grower may estimate the normal amount by using the average hours per week generally irrigated. Calculating your normal amount is critical to the success of this Model. Please see the website for more detailed instructions and examples.

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CALAVERAS WINEGRAPE ALLIANCE

High Elevation Vineyard Irrigation Model

Photo courtesy of E. Mayberry

This publication and project was supported by the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service through Grant 15-SCBGP-CA-0046. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA.

ETS Laboratories Data

	SA Control	SA Test	WP Control	WP Test
juice panel	**60830039 4**	**60830039 5**	**609130527**	**60913052 6**
titratable acidity g/L	6.0	6.4	4.4	4.3
pH	3.59	3.58	3.86	3.91
L-malic acid g/L	2.01	2.65	3.24	3.16
tartaric acid g/L	7.60	7.00	4.3	4.1
brix degrees	24.2	24.1	26.8	26.9
glucose + fructose g/L	252	250	284	286
ammonia mg/L	35	22	10	13
alpha-amino compounds (as N) mg/L	119	118	102	101
yeast assimilable nitrogen mg/L (as N)	148	136	106	112
potassium mg/L	2250	2260	2250	2360
grape pehnolics	**60830039 6**	**60830039 7**	**609130517***	**60913051 6**
catechin mg/L	45	39	10	10
quercetin glycosides mg/L	56	74	185	180
tannin mg/L	556	679	876	857
polymeric anthocyanins mg/L	11	12	22	21
total anthocyanins mg/L	743	768	1012	950
catechin/tannin index	0.081	0.057	0.011	0.012
polymeric anthocyanins/tannin index	0.020	0.018	0.025	0.024
grape water	**60830039 8**	**60830039 9**	**609130520**	**60913051 9**
grape water content %	72.5	72.2	69.6	69.0
wine phenolics	**60925010 6**	**60925010 7**	**610070723**	**61007072 4**
catechin mg/L	49	48	1	1
tannin mg/L	567	684	1003	840
polymeric anthocyanins mg/L	16	19	45	38
total anthocyanins mg/L	156	146	463	399
catechin/tannin index	0.086	0.070	<0.01	<0.01
polymeric anthocyanins/tannin index	0.028	0.028	0.045	0.045

*sample 609130517 was reanalyzed and results shown differ from reported results in group 938283

An analysis of laboratory results for the Calaveras Winegrape Alliance

Two irrigation treatments, a “control” and a “test” were applied to two sites in Calaveras County, West Point (WP), a Syrah vineyard and San Andreas (SA), a Zinfandel vineyard. Grape and wine samples were collected by the Alliance and submitted to ETS Laboratories for analysis. The following discussion is based on the results only as Price Research Services was not involved in design or implementation of the trials.

Juice Panel

The ETS Juice Panel is designed to give growers a comprehensive view of sugar, acid and nitrogen composition of grapes. When grape samples are submitted they are pressed by hand in a plastic bag until all berries are broken then the juice is drained off for analysis. There is no deliberate skin contact time.

The two sites differed greatly with the SA Zinfandel site having higher acidity and lower pH than the WP Syrah site with the greatest difference in tartaric acid where the SA site was around 3 g/L higher. Sugar was higher at WP with both Brix and the sum of glucose and fructose higher. Yeast available nitrogen (YAN) was slightly higher at SA with both ammonia and alpha-amino nitrogen slightly higher at SA. Site, variety and picking date are all responsible for these differences.

Differences between treatments within a site were minimal. At the SA site, malic acid was higher in test vines than the control. This could be due to more vigor on the test vines but other data below is contradictory (see quercetin glycoside discussion). A check of pruning weights on the two treatments at both sites could add to the discussion. Sugar and nitrogen components are similar for both treatments.

Juice treatment effects were even less different at the WP sites with no apparent differences in juice parameters.

Grape Phenolics

The ETS Grape Phenolic panel uses a wine-like extraction in 15% alcohol to mimic extraction that could occur during normal winemaking. Extracts are analyzed by HPLC to quantify individual phenolics. Please note that results for sample 609130517 (WP Control) are different in the table than from the original ETS reports. A data review associated with this report found a sampling error in the original report and the sample was re-analyzed.

Catechin is a marker for seed extraction. Grapes with more seeds and grapes with less ripe seeds have higher catechin levels. Quercetin glycosides are a measure of grape sun exposure. Quercetin is synthesized in grape in response to UV light so grapes with lighter canopies, looser clusters or smaller berries tend to have higher quercetin levels. Tannin comes from both skins and seeds and is an important component of red wine quality affecting wine mouthfeel, color and stability. Polymeric anthocyanins are red pigments that have become attached to tannin.

Generally riper grapes have higher levels of polymeric anthocyanins. Total anthocyanins are the red pigment in grapes and are an excellent quality indicator. Anthocyanins are apparently involved with tannin extraction. Higher anthocyanins in grapes often result in higher tannin in wine. The catechin/tannin index is an indicator of the degree of tannin that comes from seeds. As the index value increases the proportion of seed tannin increases as well. The polymeric anthocyanin/tannin index is a marker for tannin modification. Generally the index increases with ripening.

Site and variety effects were again much greater than treatment effects. The WP Syrah site seemed to have riper seeds (lower catechin and lower catechin/tannin index), higher quercetin (lower vigor, smaller berries?) higher anthocyanins and higher tannin than the SA Zinfandel site. These results are all expected when comparing Syrah to Zinfandel. Syrah seeds are almost always very ripe by harvest.

Treatment effects were less but present. At the SA site, test vines had higher tannin, higher quercetin, higher total anthocyanins and lower catechin suggesting better red wine potential. At the WP site differences between treatments were less. This may be due to the Syrah vine being picked “riper” where small differences in ripening are minimized.

Water Content

There were no treatment effects at either site but the WP site had lower water content, data that would go along with the higher sugar and phenolics at this site. All these effects are probably being effect by vigor differences and berry size between sites.

Wine Phenolics

Wine phenolics are measured by HPLC like the grape phenolics but there is no extraction step. Wine is centrifuged and directly injected into the HPLC. Generally the components in the wine panel have similar significance as in the grape panel with the exception of total anthocyanins which become interesting only as pigments and polymeric anthocyanins where wine making variables, particularly oxygen additions, become more important to the final value than grape ripeness.

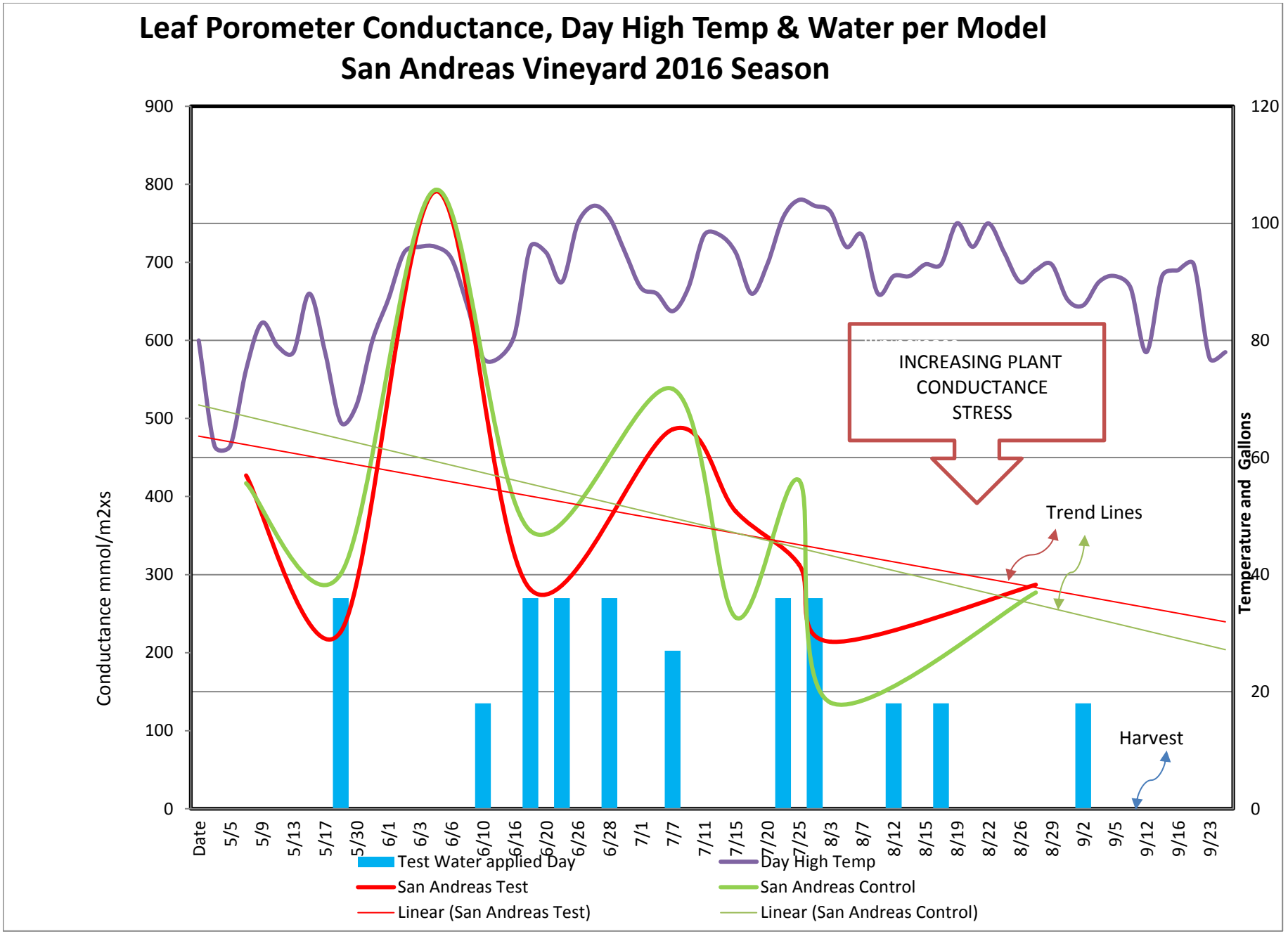
The site and variety effects were again far larger than treatment effects for all the phenolics measured. Treatment effects are contradictory as tannin is higher in the test treatment at the SA site and in the control at WP

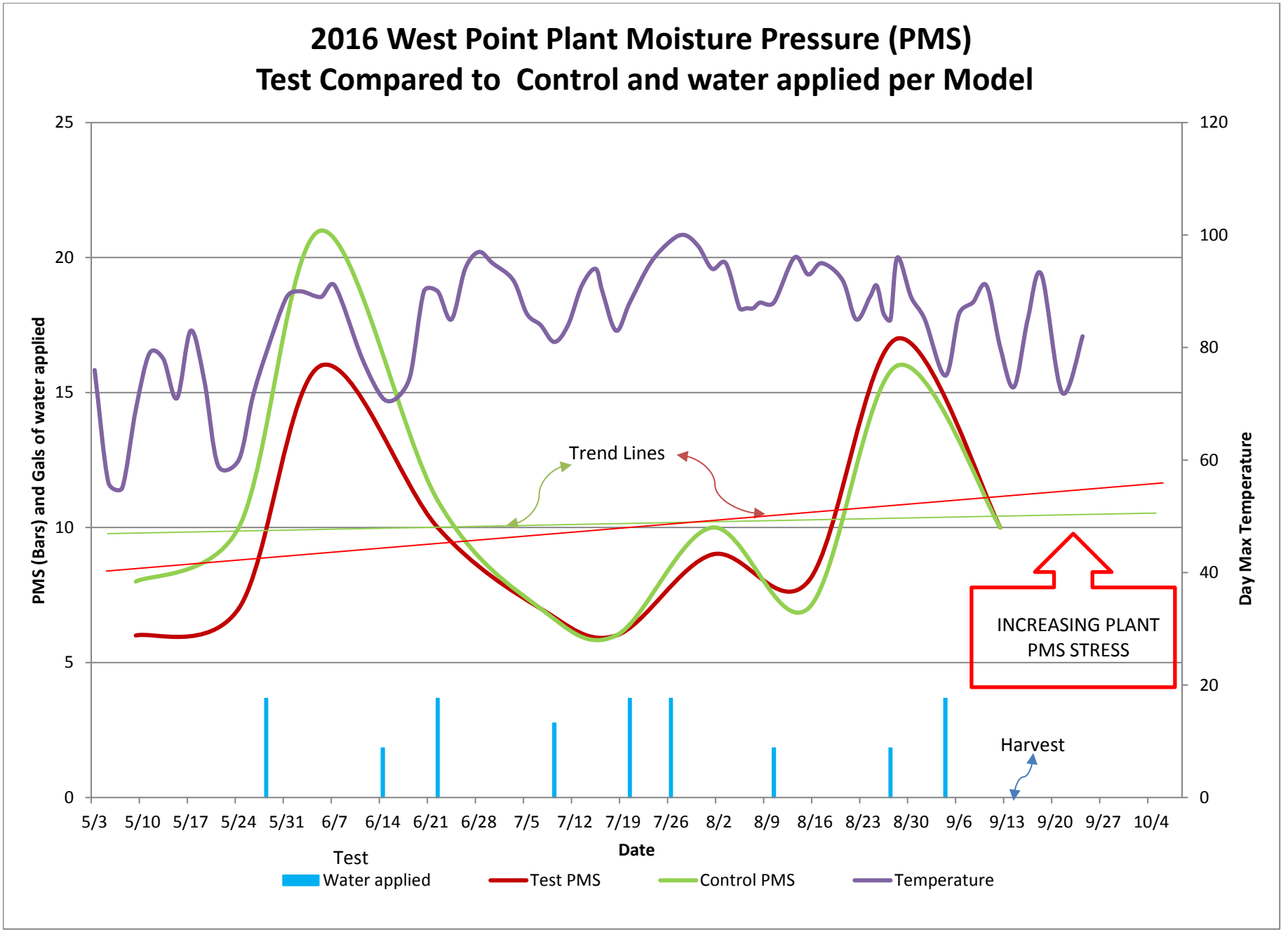
The grape extraction tool was able to predict wine phenolic differences between sites, correctly predicting lower wine catechin and higher wine tannin, polymeric anthocyanins and total anthocyanins. Within sites differences were also predicted in the WP site data set and to a lesser extent at the SA site even though differences were less.

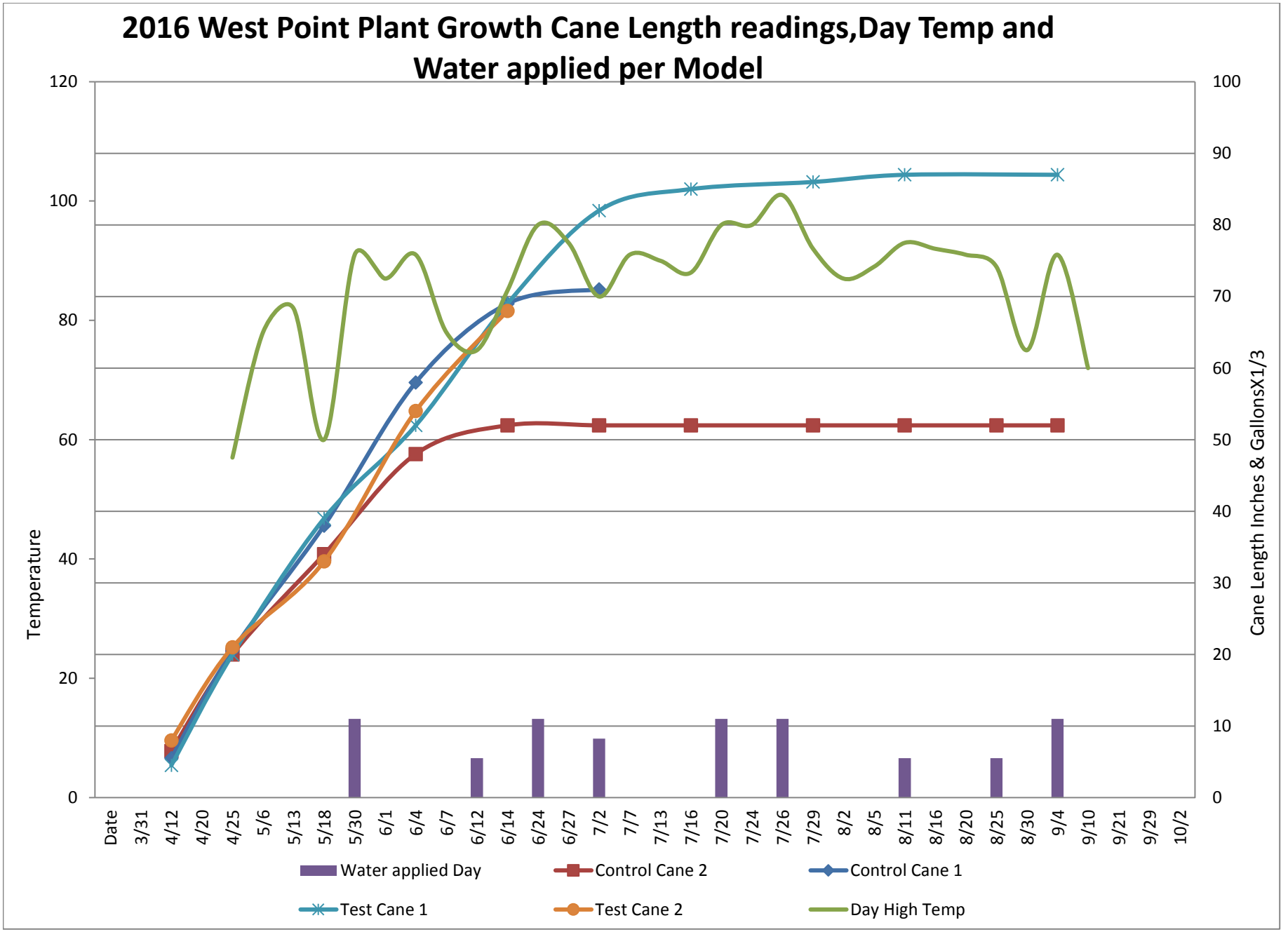
Summary

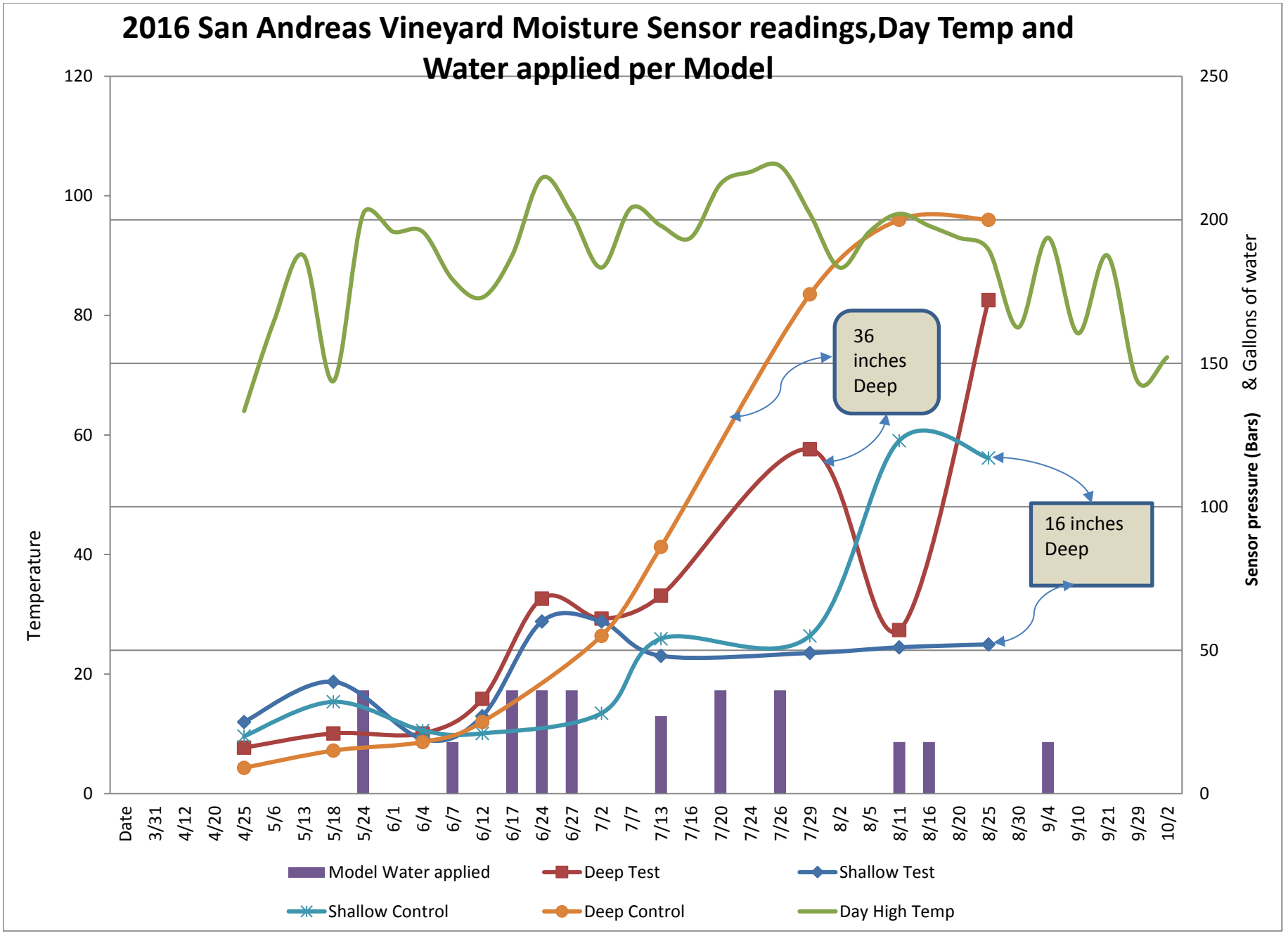
In general, treatment effects were negligible or conflicting. This suggests that the differences between the test and control were not great enough to greatly modify grape composition. The lack of replication in the experimental design make it impossible to assign “significance” to any of the data. The magnitude of the difference is the only tool available to determine if treatments had any effect. While in many cases the magnitude of the differences are far greater than would be expected by analytical variation, the origin of the differences are not clear. Particularly in the wine data, both field variation and wine making effects could easily account for all the observed treatment effects.

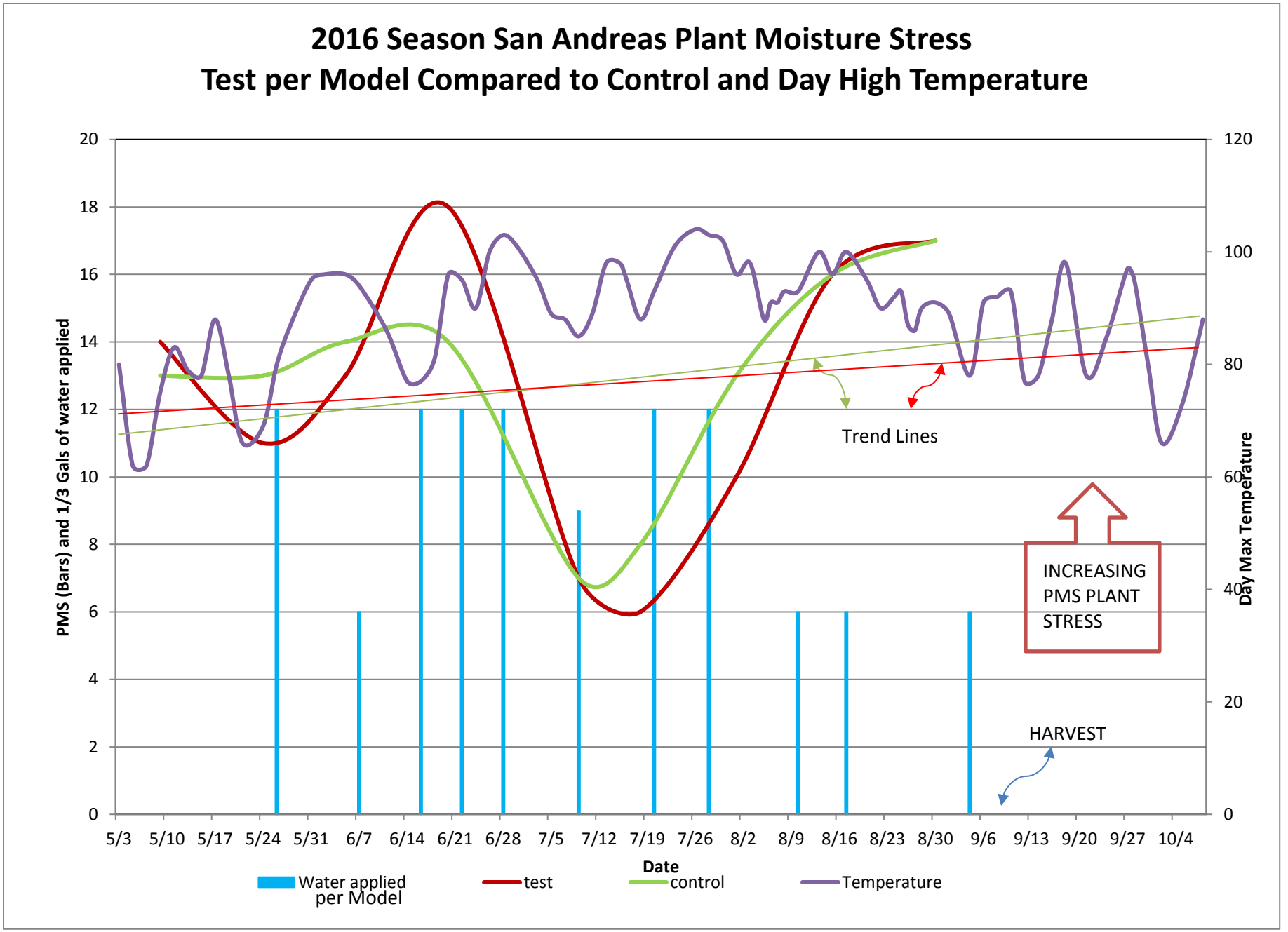
The most interesting aspects of the data are the site/variety differences. These have significant educational value for growers and could be used to help them understand the nature of the varieties they grow and their sites. Further experimentation on irrigation variables will need review both to insure that treatments are likely to have an impact and that the experimental design is appropriate to detect these differences.

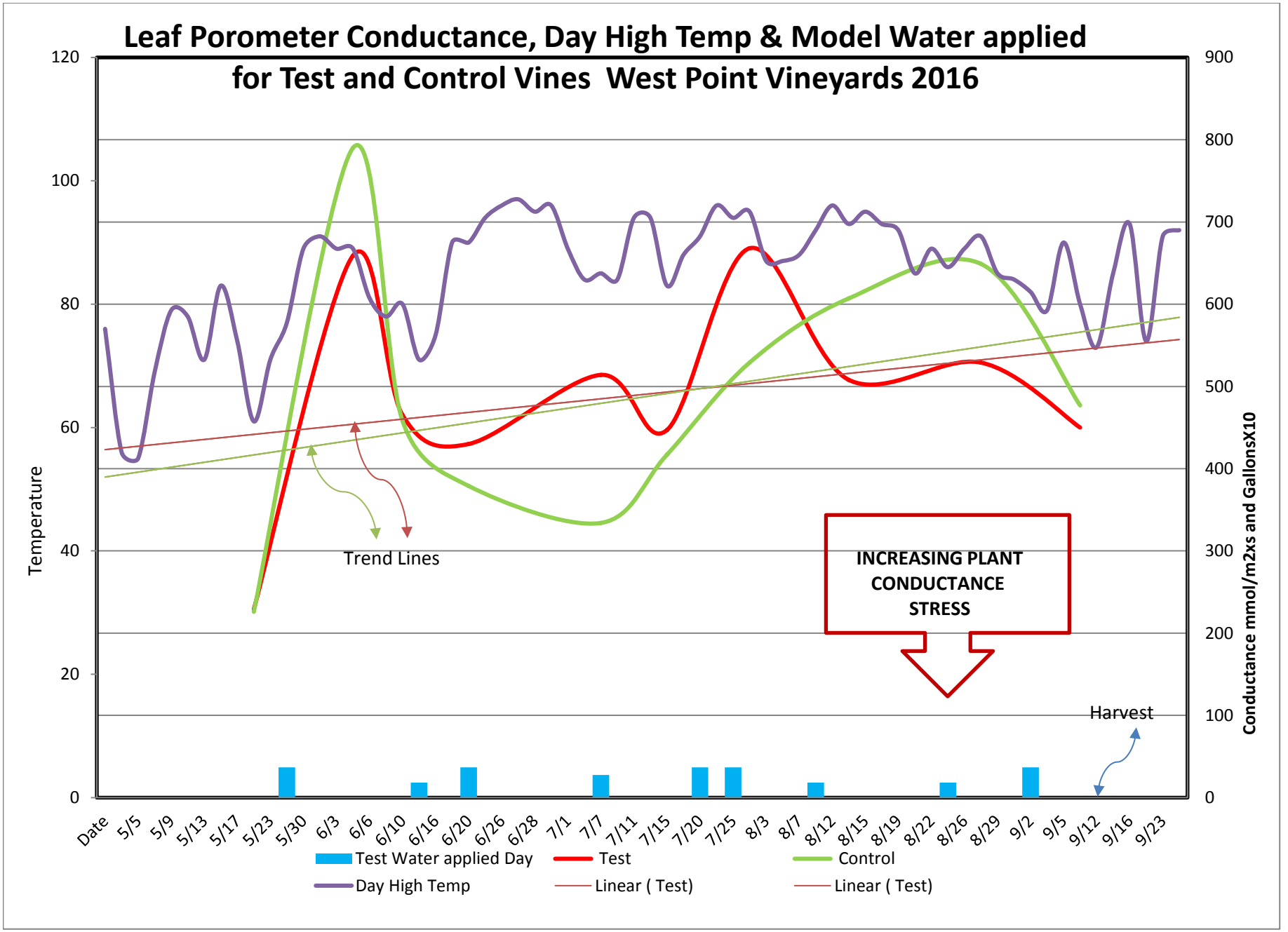

Leaf Porometer Conductance, Day High Temp & Water per Model
San Andreas Vineyard 2016 Season
Conductance mmol/m2xs
Temperature and Gallons
900
800
700
600
500
400
300
200
100
0
120
100
80
60
40
20
0
INCREASING PLANT CONDUCTANCE STRESS
Trend Lines
Harvest
Date
5/5
5/9
5/13
5/17
5/30
6/1
6/3
6/6
6/10
6/16
6/20
6/26
6/28
7/1
7/7
7/11
7/15
7/20
7/25
8/3
8/7
8/12
8/15
8/19
8/22
8/26
8/29
9/2
9/5
9/12
9/16
9/23
Test Water applied Day
Day High Temp
San Andreas Test
San Andreas Control
Linear (San Andreas Test)
Linear (San Andreas Control)

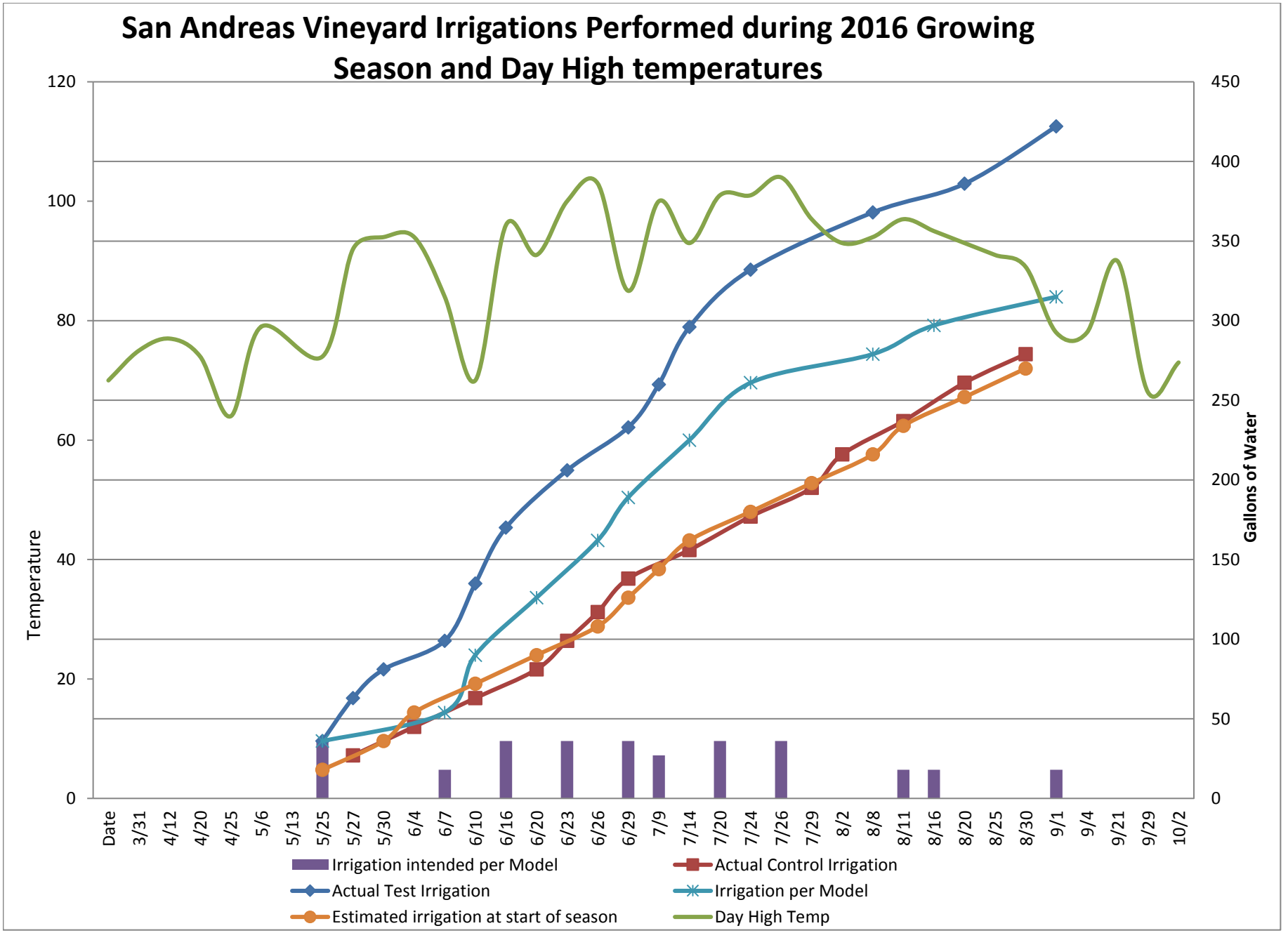

2016 West Point Plant Moisture Pressure (PMS)
Test Compared to Control and water applied per Model
PMS (Bars) and Gals of water applied
Day Max Temperature
Trend Lines
INCREASING PLANT
PMS STRESS
Harvest
Date
Test
Water applied
Test PMS
Control PMS
Temperature
25
20
15
10
5
0
120
100
80
60
40
20
0
5/3
5/10
5/17
5/24
5/31
6/7
6/14
6/21
6/28
7/5
7/12
7/19
7/26
8/2
8/9
8/16
8/23
8/30
9/6
9/13
9/20
9/27
10/4

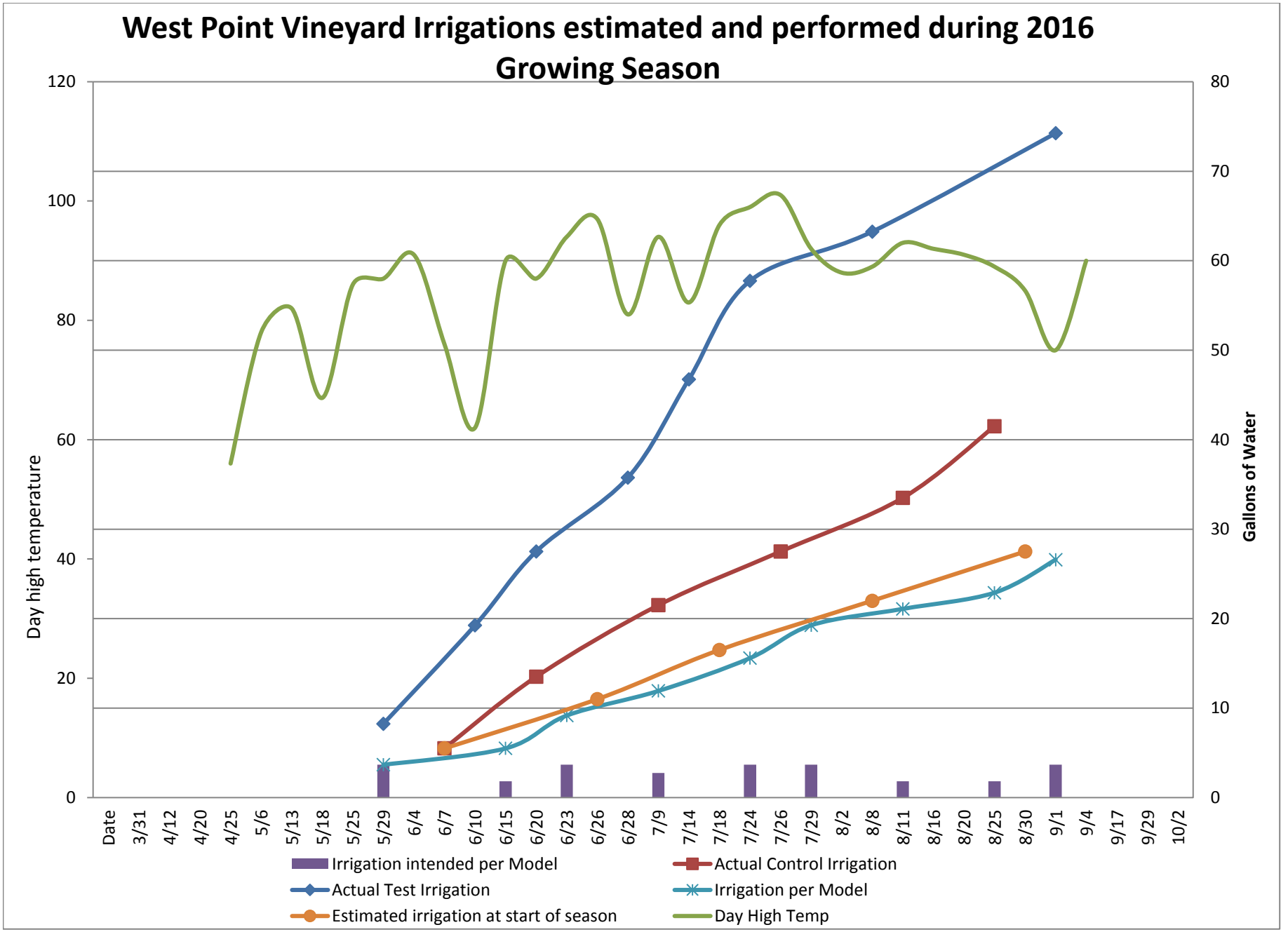

2016 West Point Plant Growth Cane Length readings,Day Temp and Water applied per Model
Temperature
Cane Length Inches & GallonsX1/3
120
100
80
60
40
20
0
100
90
80
70
60
50
40
30
20
10
0
Date
3/31
4/12
4/20
4/25
5/6
5/13
5/18
5/30
6/1
6/4
6/7
6/12
6/14
6/24
6/27
7/2
7/7
7/13
7/16
7/20
7/24
7/26
7/29
8/2
8/5
8/11
8/16
8/20
8/25
8/30
9/4
9/10
9/21
9/29
10/2
Water applied Day
Control Cane 2
Control Cane 1
Test Cane 1
Test Cane 2
Day High Temp

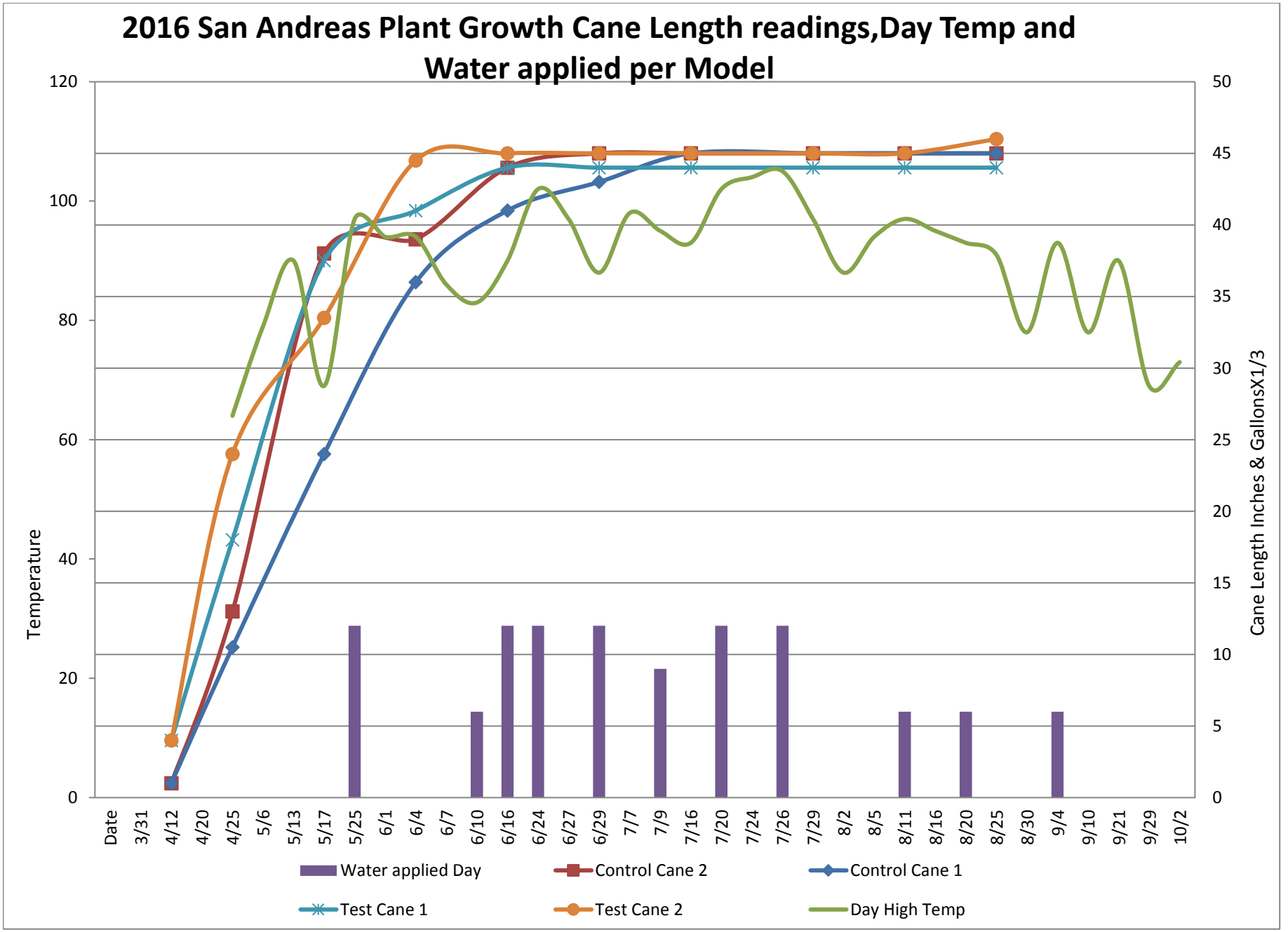

2016 San Andreas Vineyard Moisture Sensor readings,Day Temp and Water applied per Model
Temperature
Sensor pressure (Bars) & Gallons of water
120
100
80
60
40
20
0
250
200
150
100
50
0
36 inches Deep
16 inches Deep
Date
3/31
4/12
4/20
4/25
5/6
5/13
5/18
5/24
6/1
6/4
6/7
6/12
6/17
6/24
6/27
7/2
7/7
7/13
7/16
7/20
7/24
7/26
7/29
8/2
8/5
8/11
8/16
8/20
8/25
8/30
9/4
9/10
9/21
9/29
10/2
Model Water applied
Deep Test
Shallow Test
Shallow Control
Deep Control
Day High Temp

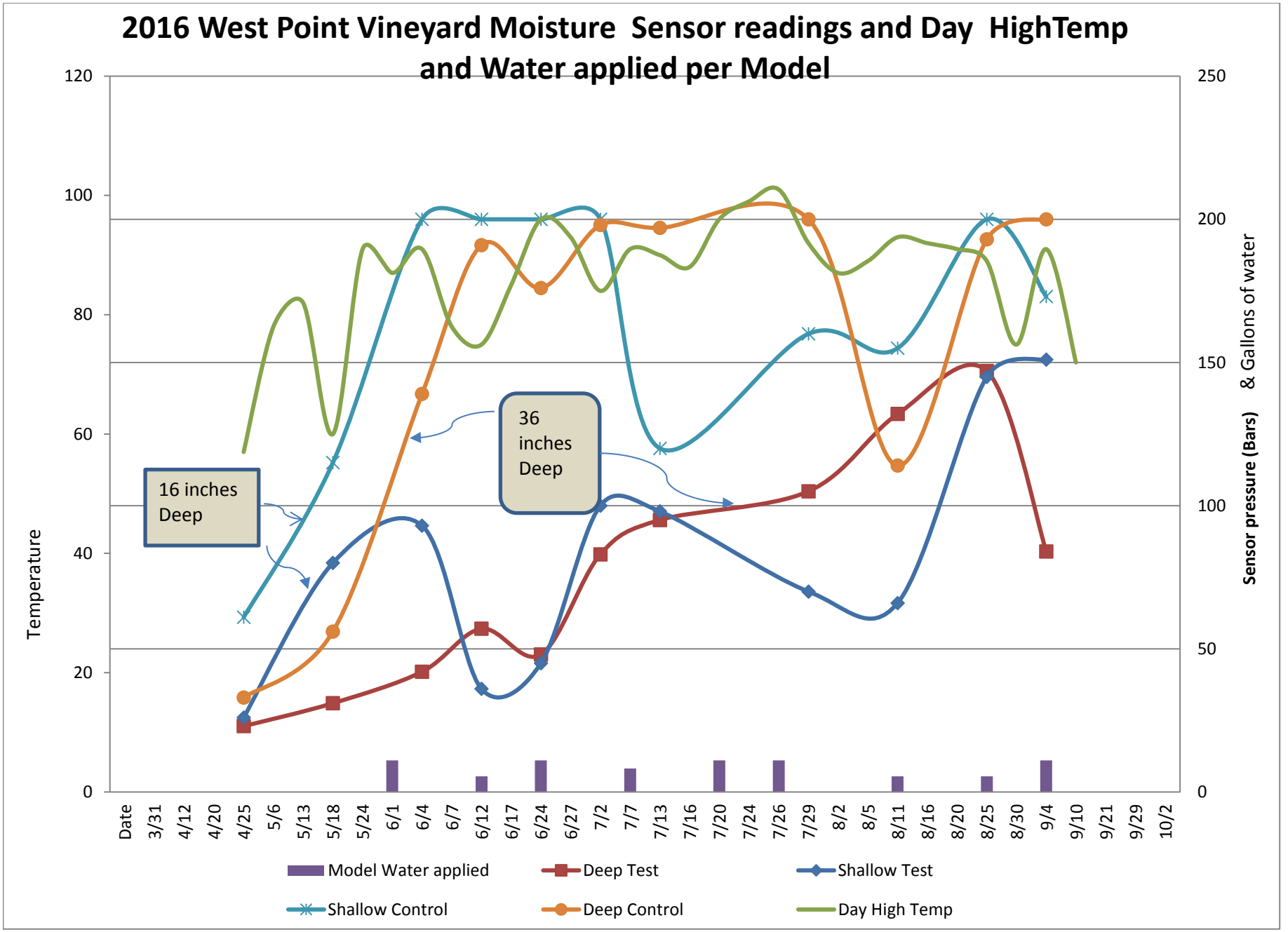

2016 Season San Andreas Plant Moisture Stress
Test per Model Compared to Control and Day High Temperature
PMS (Bars) and 1/3 Gals of water applied
Day Max Temperature
Trend Lines
INCREASING PMS PLANT STRESS
HARVEST
Date
Water applied per Model
test
control
Temperature


Leaf Porometer Conductance, Day High Temp & Model Water applied
for Test and Control Vines West Point Vineyards 2016
Temperature
Conductance mmol/m2xs and GallonsX10
120
100
80
60
40
20
0
900
800
700
600
500
400
300
200
100
0
Trend Lines
INCREASING PLANT
CONDUCTANCE
STRESS
Harvest
Date
5/5
5/9
5/13
5/17
5/23
5/30
6/3
6/6
6/10
6/16
6/20
6/26
6/28
7/1
7/7
7/11
7/15
7/20
7/25
8/3
8/7
8/12
8/15
8/19
8/22
8/26
8/29
9/2
9/5
9/12
9/16
9/23
Test Water applied Day
Test
Control
Day High Temp
Linear (Test)
Linear (Test)


San Andreas Vineyard Irrigations Performed during 2016 Growing Season and Day High temperatures
Temperature
Gallons of Water
120
100
80
60
40
20
0
450
400
350
300
250
200
150
100
50
0
Date
3/31
4/12
4/20
4/25
5/6
5/13
5/25
5/27
5/30
6/4
6/7
6/10
6/16
6/20
6/23
6/26
6/29
7/9
7/14
7/20
7/24
7/26
7/29
8/2
8/8
8/11
8/16
8/20
8/25
8/30
9/1
9/4
9/21
9/29
10/2
Irrigation intended per Model
Actual Control Irrigation
Actual Test Irrigation
Irrigation per Model
Estimated irrigation at start of season
Day High Temp


West Point Vineyard Irrigations estimated and performed during 2016 Growing Season
Day high temperature
Gallons of Water
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Date
3/31
4/12
4/20
4/25
5/6
5/13
5/18
5/25
5/29
6/4
6/7
6/10
6/15
6/20
6/23
6/26
6/28
7/9
7/14
7/18
7/24
7/26
7/29
8/2
8/8
8/11
8/16
8/20
8/25
8/30
9/1
9/4
9/17
9/29
10/2
Irrigation intended per Model
Actual Control Irrigation
Actual Test Irrigation
Irrigation per Model
Estimated irrigation at start of season
Day High Temp

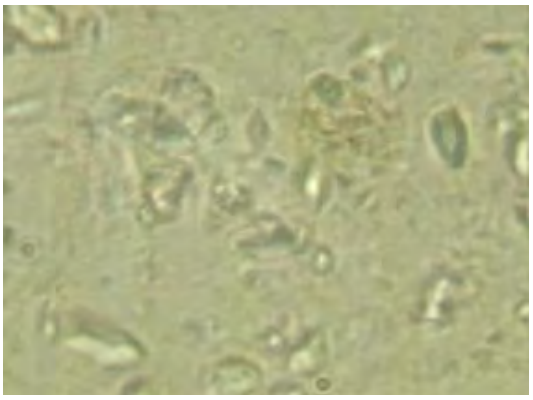

2016 San Andreas Plant Growth Cane Length readings,Day Temp and Water applied per Model
Temperature
Cane Length Inches & GallonsX1/3
120
100
80
60
40
20
0
50
45
40
35
30
25
20
15
10
5
0
Date
3/31
4/12
4/20
4/25
5/6
5/13
5/17
5/25
6/1
6/4
6/7
6/10
6/16
6/24
6/27
6/29
7/7
7/9
7/16
7/20
7/24
7/26
7/29
8/2
8/5
8/11
8/16
8/20
8/25
8/30
9/4
9/10
9/21
9/29
10/2
Water applied Day
Control Cane 2
Control Cane 1
Test Cane 1
Test Cane 2
Day High Temp


2016 West Point Vineyard Moisture Sensor readings and Day HighTemp and Water applied per Model
Temperature
Sensor pressure (Bars) & Gallons of water
120
100
80
60
40
20
0
250
200
150
100
50
0
16 inches Deep
36 inches Deep
Date
3/31
4/12
4/20
4/25
5/6
5/13
5/18
5/24
6/1
6/4
6/7
6/12
6/17
6/24
6/27
7/2
7/7
7/13
7/16
7/20
7/24
7/26
7/29
8/2
8/5
8/11
8/16
8/20
8/25
8/30
9/4
9/10
9/21
9/29
10/2
Model Water applied
Deep Test
Shallow Test
Shallow Control
Deep Control
Day High Temp

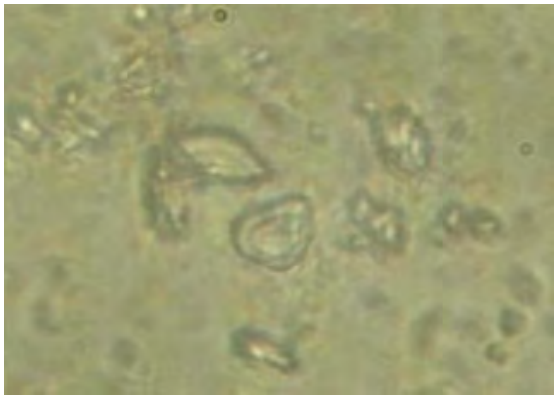
Zinfandel

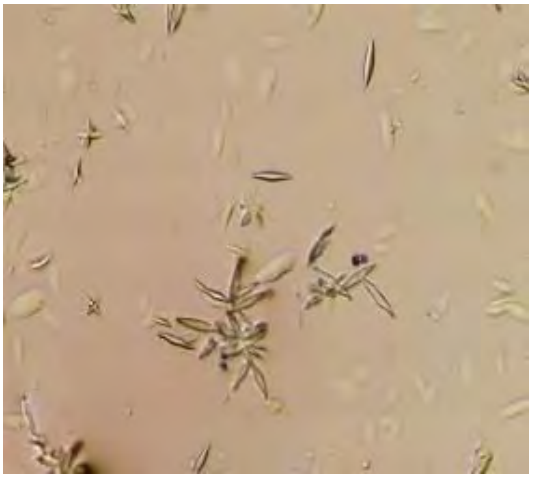
Control block

Test block

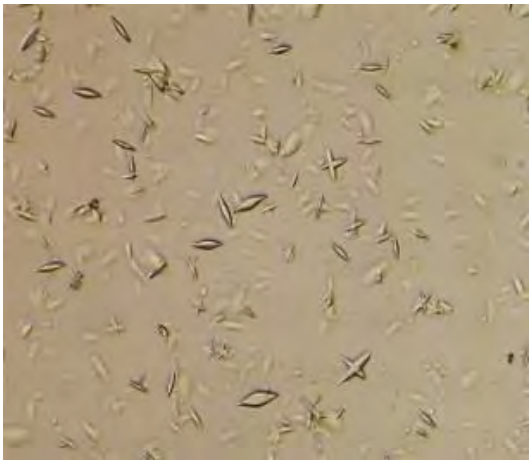


Before fermentation



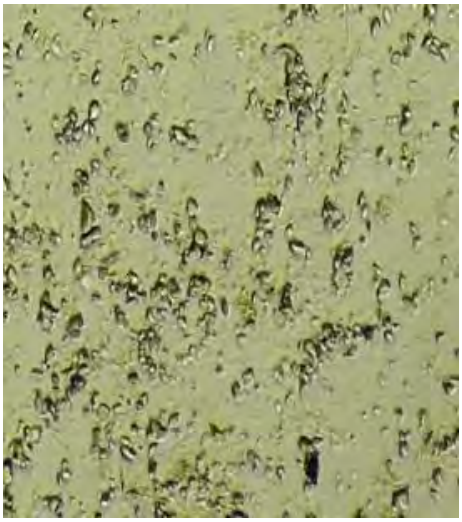


After Fermentation



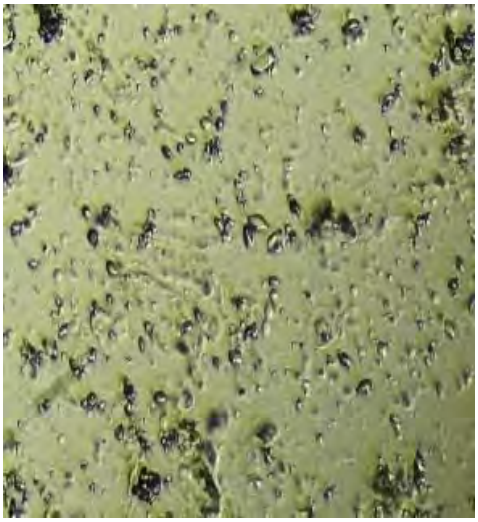
Syrah

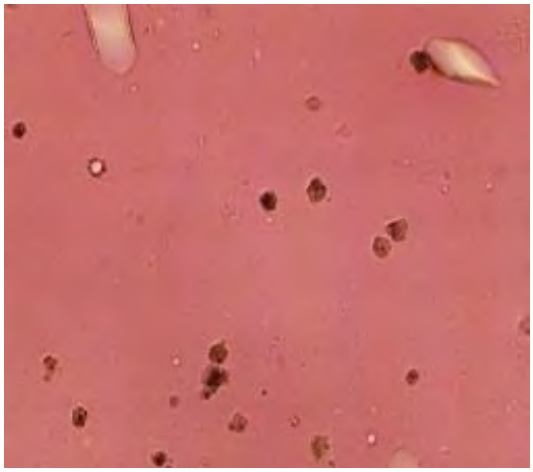
Control block



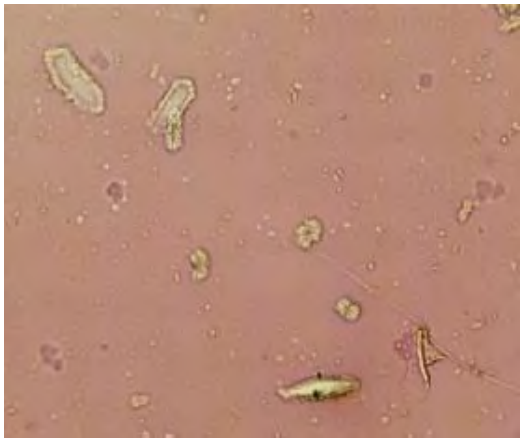
Before fermentation

Test block





After Fermentation



USDA Project No.: 61	Project Title: Evaluation of Sanitizing Treatments for Sizer Carriers in Stone Fruit Packinghouses	
Grant Recipient: The Center for Produce Safety	**Grant Agreement No.:** SCB15061	**Date Submitted:** December 2017
Recipient Contact: Bonnie Fernandez-Fenaroli	**Telephone:** (530) 554-9761	**Email:** bonnie@centerforproducesafety.org

Project Summary

The purpose of the project was to evaluate and improve sanitizing treatments for fruit sizer carriers in stone fruit packinghouses. In modern stone fruit packinghouses, fruit sizer carriers are small rollers/holders (often made of rubber and supported by plastic frames) for conveying washed and waxed fruit individually through optical sorters and automatic labelers for sizing, labeling, and packing. This section of the packing line typically is kept dry to protect electrical components and is not compatible to hosing with a large amount of water. The sanitation operation for carriers varies among packing facilities, with some cleaning (and possibly also some sanitizing) in place every shift. Field fruit surfaces often retain 10^3–10^5 microbes/cm^2 when arriving at packing facilities (Narsaiah et al., 2012; Pao and Brown, 1998). These natural microorganisms are common in the fruit production environment and their presence on fresh fruit does not normally represent a public health issue. Prior studies by the Principal Investigator's (PI's) research group have revealed that fruit packing operations, such as washing and waxing, can help to reduce fruit surface microbial load (Pao and Davis, 1999; Pao et al. 1999, 2000). However, a portion of the natural microflora will unavoidably enter and deposit, along with detached fruit waxes, over the subsequent fruit sizing and/or packing lines. Microbes can transfer between processing equipment and, in some cases, they develop biofilms and other food safety concerns (Allen et al. 2005; Kang et al., 2007; Pao and Davis, 2001). However, baseline microbial load data and information on the influence of packing operations on the microbial loads on sizer carriers in stone fruit packinghouses are lacking.

The objectives of this (one fruit season) study included: 1) surveying the levels of naturally occurring microflora on the fruit-contact surfaces of sizer carriers in commercial stone fruit packinghouses in California; 2) determining the growth potential of *Salmonella enterica* and *Listeria monocytogenes* on sizer carriers; and 3) investigating the potential of using humidity and temperature conditions to minimize pathogens on sizer carriers. The data obtained will be used to identify effective approaches on practical non-chemical sanitizing treatments for sizer carriers, which would be applicable to diverse fresh fruit packinghouses.

In 2014 the California tree fruit industry experienced two food safety events that were both associated with *Listeria monocytogenes* contamination. In an effort to help the California industry proactively review and, where needed, strengthen food safety programs, the research team collaborated with a major stone fruit grower and packer in California to carry out this project to evaluate sanitizing treatments for fruit sizer carriers in stone fruit packinghouses. This study evaluated the levels of naturally occurring microflora on sizer carriers of eight commercial stone fruit packinghouses in the Central Valley of California, and also investigated the influence of environmental conditions on the survival of *Salmonella enterica* and *Listeria monocytogenes* on the sizer carriers. Most of the packinghouse and laboratory work was completed in the summer of 2016. The research team performed an inoculation study on two types of carriers to observe the growth potential of *Salmonella enterica* and *Listeria monocytogenes* on clean and used carriers under 16

different environmental (four temperature and four humidity) conditions. Pathogen-resembling colonies isolated were identified to species level for confirmation. The study results suggested that both sizer carrier sanitation and environmental conditions (e.g., humidity and temperature combinations) can be beneficial in minimizing microbial contamination of packing lines and food-contact surfaces. The general practice used in California stone fruit packinghouses for cleaning sizer carriers was shown to be capable of significantly reducing potential bacterial contamination introduced from stone fruit and/or handling operations. Furthermore, this study demonstrated that some environmental conditions, such as the treatment combination of 75% humidity and 40°Celsius, can be beneficial in minimizing microbial contamination of packing lines.

This project did not build upon a previously funded Specialty Crop Block Grant Program project.

Project Approach

Key activities and tasks associated with Objective 1 included environmental sampling and documenting sizer carrier sanitation in the packinghouses. Environmental swabs with phosphate buffer were used individually to sample 192 sizer carriers in eight stone fruit packinghouses in the Central Valley of California during packing operations in the fruit season (June to August 2016). In each packinghouse, 12 randomly selected carriers were swabbed on the fruit-contact surfaces (approximately 30 cm^2) before and after routine equipment cleaning. The swabs were then transported on ice with neutralizing broth before plating within eight hours using three meter Petri film plates according to manufacturer instructions.

Key activities and tasks associated with Objective 2 included laboratory inoculation studies and determining pathogen growth potential on sizer carriers. To prepare inoculums, four serotypes of H2S positive *Salmonella enterica* (*S*. Enteritidis ATCC 13076, *S*. Montevideo ATCC 8387, *S*. Newport ATCC 6962, and *S*. Typhimurium ATCC 14028) and four strains of *Listeria monocytogenes* (ATCC7644, ATCC19115, ATCC43256, and ATCC51772) were maintained at 4°Celsius on tryptic soy agar (TSA). The cultures were transferred to tryptic soy broth and incubated for 22 to 24 hours at 35°Celsius. The cultures were then centrifuged, re-suspended, and pooled in sterilized, deionized tap water to obtain approximately 8.0 and 6.5 log CFU/milliliter inoculums for spot and immersion inoculations, respectively. Two brands of new sizer carriers were obtained from local equipment suppliers (Compac, Visalia, California; Aweta Americas Inc., Fresno, California), and two brands of used sizer carriers were supplied by stone fruit packinghouses (Gerawan Farming, Kerman, California; Abundant Harvest, Kingsburg, California). To determine pathogen growth potential, carriers were immersed in inoculum for 15 minutes before being air dried at room temperature (22 ± 2°C) for two hours, to achieve a surface contamination level at approximately 2.0 log CFU/cm^2 as determined by subsequent swab tests.

Key activities and tasks associated with Objective 3 included performing inoculation studies and evaluating environmental treatments for pathogen growth and survival. For the pathogen growth study, inoculated carriers were held at 22, 28, 34 or 40°Celsius under 65, 75, 85 or 95% humidity in environmental chambers (model 7000-10; Caron, Marietta, OH) for one, three, and six days before pathogen enumeration. For the pathogen lethality study, inoculated carriers were air-dried for two hours before held at 34 or 40°Celsius under 65, 75 or 85% humidity for monitoring pathogen reduction up to two days. To determine the potential lethality by environmental conditions, the fruit-contact surfaces (30 cm^2) of the sizer carriers were spot-inoculated with one milliliter of each inoculum in approximately 75 droplets before being air dried at room temperature for two hours, to achieve a surface contamination level at approximately 6.5 log CFU/cm^2.

Key results from the study were as follows:
Environmental swabs of 192 carriers from California commercial packinghouses indicated that routine cleaning significantly reduced total aerobic and coliform counts on carrier surfaces from 3.9±0.3 to 3.2±0.3 (P = 0.002) and 1.5±0.4 to 0.9±0.5 (P = 0.001), respectively, but yeast and mold counts were not significantly reduced ($P \geq 0.05$) (Attachment 1, Figure 1). The survival of inoculated pathogens on clean and used (non-cleaned; with deposited wax, fuzz, etc.) sizer carriers was influenced by incubation humidity (65, 75, 85 or 95%), temperature (22, 28, 34 or 40°Celsius), pathogen types, and carriers. *Salmonella* and *Listeria* declined to ≤0.0 log CFU/cm^2 from ~2 log CFU/cm^2 (initial contamination level) after one day of exposure to 65% humidity at 40°Celsius, 75% humidity at 34°Celsius, or 85% humidity at 40°Celsius, regardless whether the carriers were new or had been used commercially. However, at 95% humidity, *Salmonella* counts persisted over six days at 34°Celsius on used carriers. When new carriers were inoculated with pathogens at approximately 6 log CFU/cm^2, a ≥3-log reduction was reached in four hours under 75 or 85% humidity at 34 or 40°Celsius (Figure 2). A ≥5-log lethal effect was observed in four hours under conditions of 75% humidity and 34°Celsius for *Salmonella*, 65% humidity and 40°Celsius for *Listeria*, and 75% humidity and 40°Celsius for both *Salmonella* and *Listeria* (Figure 2). No significant growth ($P > 0.05$) of either pathogen was observed under all experimental conditions on clean or used sizer carrier surfaces. The results suggest that both sizer carrier sanitation and environmental conditions (e.g., humidity and temperature combinations) can be beneficial in minimizing microbial contamination of packing lines and food-contact surfaces. The research team recommends additional studies to explore the potential of applying moderate, yet lethal, temperature and humidity conditions to combat microbial contamination on produce- and food-contact surfaces.

In June 2016, the PI gave an oral and poster presentation of the interim research results at the Center for Produce Safety (CPS) Research Symposium in Seattle, Washington to 315 attendees.

The project specifically focused on packinghouse operations for stone fruit and did not benefit commodities other than California specialty crops.

The project partners were the CPS and California State University, Fresno, as well as the California Fresh Fruit Association (CFFA). CPS managed the project and the California State University, Fresno, performed the research studies. The CFFA facilitated the communication among project investigators, stone fruit packing companies, and sizer carrier suppliers. The research team appreciated the contributions of sizer carriers by Compac (Visalia, California) and Aweta Americas Inc. (Fresno, California) and two California stone fruit packinghouses (Gerawan Farming and Abundant Harvest).

Goals and Outcomes Achieved

Activities that were completed included (i) evaluating the natural microbial loads on the fruit-contact surfaces of sizer carriers to establish baseline data on the efficacy of existing sanitation approaches; (ii) evaluating the growth potential of selected foodborne pathogens (*Salmonella enterica* and *Listeria monocytogenes*) on fruit sizer carriers; and (iii) evaluating potential clean-in-place sanitizing treatments (through humidity and temperature combinations) for fruit sizer carriers.

The project staff recruited and trained four undergraduate students, one graduate student, and one visiting scholar to support the experimental efforts. Tasks involved in the laboratory procedures include media preparation, microbial inoculation, sample preparation, plate counting, pathogen isolation, waste sterilization,

etc. Initial tests were performed to determine the adequate pathogen inoculum concentration to reach the desired artificial contamination of sizer carriers.

The project staff performed inoculation studies on two types of carriers to observe growth potential of *Salmonella enterica* and *Listeria monocytogenes* clean and used carriers under 16 different environmental (four temperature and four humidity) conditions. Pathogen counts were performed using agar overlay methods. Pathogen resembling colonies isolated from the experiment were identified to species level for confirmation.

The experimental plan for Objective 3 (Evaluating potential clean-in-place sanitizing treatments for fruit sizer carriers) was adjusted based on observations that inoculated foodborne pathogens (*Salmonella* and *Listeria*) were incapable of multiplying on the surface of sizer carriers. The observation prompted the team to identify potential temperature and humidity combinations as treatments for pathogen reduction on sizer carriers. This modification did not change the original goal and budget of the Objective 3.

The team completed all experiments, conducted data analysis and communicated results and conclusion to the industry partners of this study both orally and in writing.

Outcome measures were not long term. In the summer of 2017 the PI submitted a manuscript for publication based on the research findings of this project.

This project set out two goals: (1) to evaluate microbial loads on fruit-contact surfaces of sizer carriers through sampling eight stone fruit packing operations to establish the first baseline information on the efficacy of existing sanitation approaches, and (2) to evaluate potential clean-in-place approaches for sanitizing sizer carriers. Both goals were achieved in this study. First, baseline data on total aerobic bacteria, yeasts and molds, and coliform counts on sizer carriers before and after routine packinghouse cleaning (and sanitizing in some cases) were obtained. Results of this study suggested that the general sanitation practices for sizer carriers in California stone fruit packinghouses are capable of significantly reducing potential bacterial contamination introduced from stone fruit and/or handling operations. Second, a non-chemical approach to reduce pathogens on sizer carriers, through various combinations of humidity (65, 75 and 85%) and temperature (34 and 40°Celsius), was demonstrated to have potential as an effective sanitizing treatment.

The project staff worked closely with industry collaborators and completed all proposed experiments within the project timeframe. Key baseline data gathered include (i) the microbial loads on fruit-contact surfaces of sizer carriers in stone fruit packing operations before and after cleaning, which demonstrated the efficacy of existing sanitation approaches; and (ii) the survival of inoculated foodborne pathogens (*Salmonella* and *Listeria*) on sizer carriers exposed to various humidity and temperature combinations, which determined that a ≥3-log reduction was reached in four hours under 75 or 85% humidity at 34 or 40°Celsius, and a ≥5-log lethal effect was observed in four hours under conditions 75% humidity and 40°Celsius for both *Salmonella* and *Listeria.* These results may help the packinghouse industry with microbial control efforts.

Major successful outcomes for the project include the collection of the first baseline data on microbial loads on fruit-contact surfaces of sizer carriers in stone fruit packinghouses in California. Analysis of the microbial results suggested that the current general sanitation practices used for cleaning sizer carriers are capable of significantly reducing potential bacterial contamination introduced from stone fruit and/or handling

operations. Furthermore, the project demonstrated that treatment of sizer carriers with moderate environmental conditions, such as the combination of 75% humidity and 40°Celsius, can be beneficial in minimizing potential pathogen contamination of packing operations.

Beneficiaries

The specialty crop beneficiaries of this project are packers of fresh stone fruit in California and other growing regions (Pacific Northwest and Northeastern United States) as well as the stone fruit industries in these regions. California produces 95% of the peaches, plums, and nectarines harvested for fresh consumption in the U.S. (source: California Fresh Fruit Association). Also, approximately 25 to 30% of California's annual production of stone fruit is exported to more than 35 countries. The combined farm gate value of this crop is $900 million.

The project's accomplishments will primarily benefit the stone fruit packing industry, including the industry collaborators and equipment suppliers, and members of the CFFA. The California Fresh Fruit Association (formerly the California Grape & Tree Fruit League) is a voluntary, nonprofit agricultural trade association that represents California's fresh fruit industry.

The PI from the California State University, Fresno, presented final research results in June 2017 at the 8th Annual CPS Research Symposium in Denver, Colorado, to 325 symposium attendees. Interim results were presented previously in a poster session at the 2016 CPS Research Symposium in Seattle, Washington to 315 attendees. The symposium participants included California regional and national growers/shippers, retail and food service buyers, scientists, academics, produce industry representatives, and members of regulatory agencies. The annual symposium provides expert panels to critique the research results after presentation by the researcher, which helps participants evaluate how the results can be used in their respective businesses.

Lessons Learned

The positive results of this study suggested that the current general sanitation practices for cleaning sizer carriers in California stone fruit packinghouses are capable of significantly reducing potential bacterial contamination introduced from stone fruit and/or handling operations. One positive experience was the cooperation of the packinghouses to participate in this study.

The original experimental plan for Objective 3 was to test antimicrobial solutions for reducing inoculated pathogens on sizer carriers. However, part way through the Objective 2 experiments the project staff observed that the pathogens (*Salmonella* and *Listeria*) inoculated at a low level did not survive and were incapable of multiplying on the surface of the sizer carriers, and that "natural death" seemed to be promising for reducing pathogen contamination on the sizer carriers. Therefore, the project staff adjusted Objective 3 to identify potential temperature (~22 to 40°Celsius) and relative humidity (~65 to 85% relative humidity) treatments for non-chemical reduction of pathogens inoculated at a high level on sizer carriers. As a result of this change in direction the team then demonstrated that moderate environmental conditions, such as the combination of 75% humidity and 40°Celsius, can be beneficial in minimizing potential pathogen contamination of packing lines.

Additional Information

See Attachment 1 for Figures 1 and 2.

Project results will be disseminated at industry meetings, and streamed through social media sources. Results will also be made available online as follows:

1. A final report submitted to CPS has been posted on the CPS website: http://www.centerforproducesafety.org/grant_opportunities_awards.php.
2. CPS worked with the scientists to publish results in scientific journals. Publication dates occur after the project is completed. Abstracts and awards can be found on the CPS website.
3. The Board of Directors and members of the Technical Committee of CPS distribute a series of information briefs throughout the year on the website and through presentations, meetings and webinars. An example of this would be the "CPS 2016 Research Symposium Key Learnings" on the CPS website at the following link: http://www.centerforproducesafety.org/amass/documents/document/365/CPS%202016%20Key%20Learnings.pdf.

The following websites provide additional resources on the final reports and symposium proceedings:
Center for Produce Safety: http://www.centerforproducesafety.org/resources.php
Produce Marketing Association: http://pma.com
Western Growers Association: http://www.wga.com/

References cited:

Allen, R.L, B.R. Warren, D.L. Archer, K.R. Schneider and S.A. Sargent. 2005. Survival of *Salmonella* spp. on the surfaces of fresh tomatoes and selected packing line materials. HortTechnology, 15:831–836.

Kang, D., J.D. Eifert, R.C. William, and S Pao. 2007. Evaluation of quantitative recovery methods for *Listeria monocytogenes* applied to stainless steel. Journal of AOAC International, 90:810–816.

Narsaiah, K, S.N. Jha, P. Jaiswal, A.K. Singh, M. Gupta, and R. Bhardwaj. 2012. Estimation of total bacteria on mango surface by using ATP bioluminescence. Scientia Horticulturae, 146:159–163.

Pao, S. and G.E. Brown. 1998. Reduction of microorganisms on citrus fruit surfaces during packinghouse processing. Journal of Food Protection, 61:903–906.

Pao, S. and C.L. Davis. 1999. Enhancing microbiological safety of fresh orange juice by fruit immersion in hot water and chemical sanitizers. Journal of Food Protection, 62:756-760.

Pao, S. and C.L. Davis. 2001. Transfer of natural and artificially inoculated microorganisms from orange fruit to fresh juice during extraction. Food Science and Technology (LWT), 34:113–117.

Pao, S., C.L. Davis and D.F. Kelsey. 2000. Efficacy of alkaline washing for the decontamination of orange fruit surfaces inoculated with *Escherichia coli.* Journal of Food Protection, 63:961–964.

Pao, S., C.L. Davis, D.F. Kelsey and P.D. Petracek. 1999. Sanitizing effect of fruit waxes at high pH and temperature on orange surfaces inoculated with *Escherichia coli*. Journal of Food Science, 64:359–362.

Attachment SCB15061

Figures 1 and 2

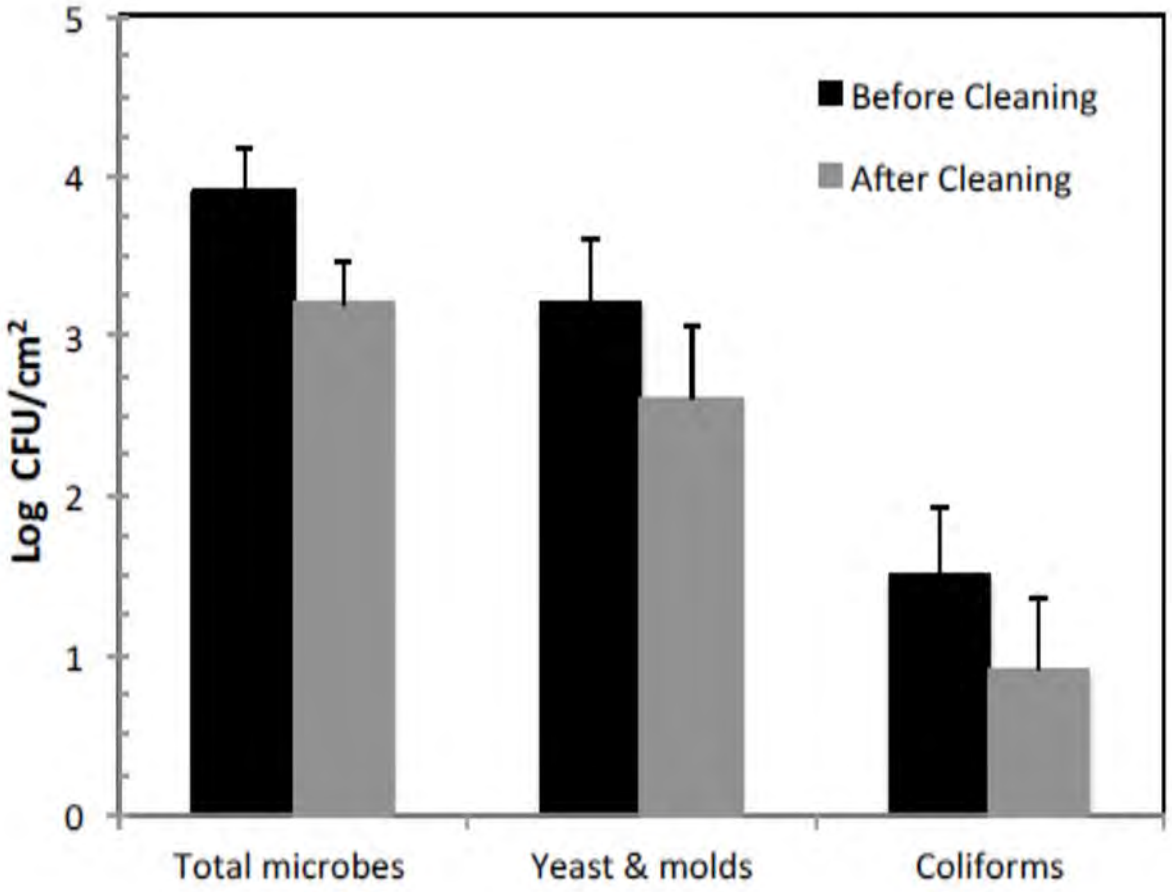


Figure 1. Microbial loads of sizer carriers before and after cleaning at stone fruit packinghouses. (Data represent the means and SE of eight packinghouse evaluations.)

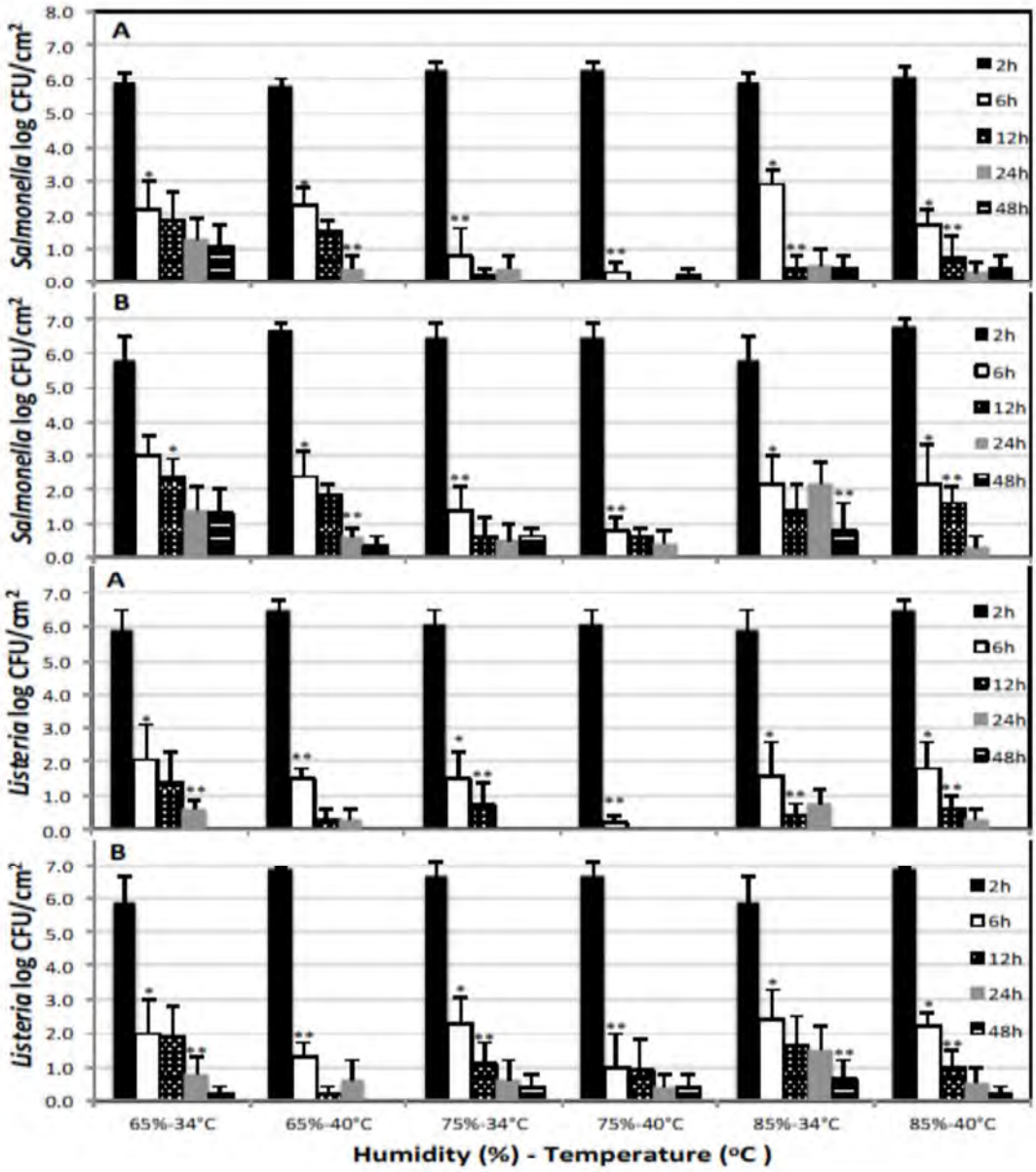


Figure 2. The influence of humidity and temperature conditions on the survival of inoculated foodborne pathogens on two brands (A and B) of sizer carriers. Bars represent the averages of log values ± SE of ≥ 3 replications. Symbols "*" and "**" indicate a 3-log and 5-log reduction, respectively, from the initial contamination measured at hour two.

CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
SPECIALTY CROP BLOCK GRANT PROGRAM
FINAL PERFORMANCE REPORT

USDA Project No.:	Project Title:	
64	Methods for detection of diverse parasites on packaged salads based on (viable) oocysts	
Grant Recipient: The Center for Produce Safety	**Grant Agreement No.:** SCB15064	**Date Submitted:** December 2017
Recipient Contact: Bonnie Fernandez-Fenaroli	**Telephone:** (530) 554-9761	**Email:** bonnie@centerforproducesafety.org

Project Summary

Protozoan contamination of produce is of growing importance due to their current or projected capacity to cause significant illness in consumers of fresh produce. The prevalence of protozoa in developed countries, such as the United States, is likely to rise due to increasing demands for imported produce as well as climate change. However, fresh produce is rarely tested for protozoan pathogens. In addition, current methods used to detect protozoan (oo)cysts (the environmentally robust stage) require time-consuming techniques conducted by specialized laboratories. One critical issue that needs to be addressed for monitoring produce safety of packaged salads is to establish reliable methods for detection of protozoa in this food commodity. With a reliable protozoan detection toolset, future monitoring will become possible to perform risk assessment in the context of food safety. Thus, the motivation for this project stemmed from a lack of commercially available, user-friendly tests for protozoan pathogens in packaged salads.

The purpose of this study was to develop a novel test (multiplex polymerase chain reaction (PCR) assay) that can simultaneously detect and differentiate four protozoan pathogens in a rapid, accurate and affordable manner. The selected parasites—*Cryptosporidium* spp., *Giardia* spp., *Cyclospora cayetanensis* (*C. cayetanesis*) and *Toxoplasma gondii (T. gondii)*—were specifically targeted in this project due to their current and/or projected capacity to contaminate and cause illness in consumers of leafy greens. The detection limits of the newly developed assays were assessed in systematic laboratory spiking experiments by using spinach as a model leafy green vegetable. Additional tests with the capability to determine the viability of these parasites were optimized and applied for detection of viable protozoan parasites in leafy greens. Combined, the novel tool-set developed in the current study—using multiplex PCR for routine screening, followed by viability tests for further quantification of viable parasites—provides a fundamental advance for the produce industry to identify and manage health risks associated with parasite contamination of leafy green commodities.

This project did not build upon a previously funded Specialty Crop Block Grant Program project.

Project Approach

Development of simple one-step procedure for routine detection of the parasites: A new multiplex PCR assay for simultaneous detection of *Cryptosporidium* spp., *Giardia* spp., *T. gondii* and *C. cayetanensis* was developed. Several PCR assay conditions were evaluated for assay optimization. The specificity and sensitivity of the developed multiplex PCR assays were tested with the mixture of four protozoan parasites. The assay limits of detection (ALODs) in the parasite mixture were one (oo)cyst per reaction for *Cryptosporidium*, *Toxoplasma* and *Giardia*, and 10 oocysts per reaction for *Cyclospora*. ALODs appeared to be similar or lower (more sensitive) when each parasite was tested separately (Table 1 – see Attachment). The screening method was applied in subsequent spinach spiking experiments.

Optimization and adaptation of molecular methods for discrimination of live to dead parasites: In addition to developing a rapid and sensitive method for routine screening of protozoa, the performance of optimized and adapted viability tests was evaluated. Propidium monoazide (PMA), a photoreactive deoxyribonucleic acid (DNA)–binding dye, is used to detect viable microorganisms in molecular analysis. PMA treatment was optimized to discriminate live from dead *Giardia* in a molecular testing approach (quantitative polymerase chain reaction, qPCR) measuring DNA inside intact (oo)cysts. PMA treatment did not reliably discriminate live from dead *Cryptosporidium* and *Toxoplasma* due to their robust oocyst walls inhibiting PMA penetration, even after death. Another viability assay—reverse transcriptase quantitative polymerase chain reaction (RT-qPCR), which measures messenger ribonucleic acid (mRNA) expression from live cells—did successfully differentiate live from dead *Cryptosporidium* and *Toxoplasma* parasites. Therefore, selected viability assays were applied for the subsequent validation through systematic spinach spiking experiments and compared with microscopy methods (Table 2).

Spiking experiments for screening assays: The first set of spiking experiments was conducted, using spinach as a model leafy green vegetable, to evaluate the performance of the newly developed assays on salads spiked with the four target protozoan pathogens. To determine the efficiency of different treatment methods in recovering (oo)cysts from spinach, washing of spiked spinach with elution buffer by hand (wash experiment) was compared with the smasher instrument procedure (mash experiment). Serial dilutions of parasite mixtures ranging from 10 to 10,000 individual parasites were spiked onto spinach (10-gram portions) in three to five replicates. After recovery and concentration by centrifugation, protozoa (oo)cysts were analyzed using: 1) the newly developed multiplex PCR; 2) quantitative molecular methods specific for each parasite; and 3) previously established microscopy based techniques (Figure 1). The wash method provided equivalent or better amplifications of (oo)cysts as measured by multiplex PCR compared with the mash method (Table 3). *Cryptosporidium*, *Toxoplasma* and *Cyclospora* could be detected at a low concentration of 10 oocysts per 10 g of spinach by both methods, whereas *Giardia* amplified only as low as at 50 and 10,000 cysts per 10 g of spinach by the wash and mash techniques, respectively. The recovery of (oo)cysts as measured by microscopic and qPCR methods demonstrated lower recovery of *Giardia* with the mash method (Table 4) as compared with other pathogens. Using the presence/absence detection data from the spinach spiking experiments, logistic regression was applied to create a probability curve for estimating the likelihood of parasite detection under a range of theoretical contamination levels expressed as (oo)cysts per 10 g of spinach. Modeling results suggest that washing spinach leaves yielded better recovery and therefore more sensitive detection of parasites as compared with the mash approach. Using *Toxoplasma* as an example, oocysts could be accurately detected 90% of the time at contamination levels of 10 or 100 oocysts per 10 g spinach, using the wash or the mash technique, respectively (Figure 2). When the hand-wash technique was applied, successful detection of parasites would occur at 90% likelihood when contamination levels on 10 g of spinach were 10, 35, 45, and 55 (oo)cysts for *Toxoplasma*, *Cryptosporidium*, *Giardia*, and *Cyclospora*, respectively (Figure 3).

Spiking experiments for viability assays: The second set of spiking experiments was performed to assess the limits of detection of selected viability assays and their ability to discriminate live from dead (oo)cysts on spinach. In the first experiment, serial dilutions of live *Cryptosporidium*, *Giardia*, *Toxoplasma* and *Cyclospora* mixtures were prepared to obtain concentrations ranging from 10 to 1000 (oo)cysts and spiked on spinach in five replicates (Figure 4). RT-qPCR results showed that mRNAs were detected on spinach spiked with as low as 10 *Cryptosporidium* and *Giardia* and 50 *Toxoplasma* (oo)cysts (Figure 5). No targeted mRNA was detected on spinach spiked with phosphate buffered saline (PBS) as a negative control (data not shown).

Logistic regression of RT-qPCR results indicated that the assays would yield positive detection of parasites 90% of the time when 16, 21 and 93 (oo)cysts of *Cryptosporidium, Toxoplasma* and *Giardia* per 10 g of spinach were present, respectively (Figure 6). Molecular tests combined with PMA treatment were also conducted but *Giardia* were only detected in a portion of replicates spiked at the highest concentration of 1,000 cysts (data not shown).

In the second experiment, spinach was spiked with mixtures of live and dead parasites to evaluate the effect of different proportions of live (oo)cysts in protozoan contamination, which simulates more realistic environmental conditions. Live and dead parasites were mixed in defined ratios of 5,000 total (oo)cysts and spiked on spinach in five replicates (Figure 4). The increasing proportions of dead protozoa spiked on spinach may have inhibited the mRNA amplification from live *Cryptosporidium* and *Giardia* but not from *Toxoplasma* (Figure 7). This result suggested that the detection of live *Cryptosporidium* and *Giardia* may be underestimated when dead (oo)cysts are present in large concentrations on contaminated salads. The probability of detecting viable *Giardia* on spinach was calculated using RT-qPCR and PMA-qPCR/PCR (Figure 8). The results suggested that detection with higher sensitivity would occur using PMA-PCR or RT-qPCR analysis (220 and 110 cysts per 10 g of spinach, respectively) compared with PMA-qPCR. The total costs of PMA-PCR and RT-qPCR analyses in this study were estimated at $17 and $25 per sample, respectively (including the cost for DNA/RNA extraction and for analytical duplicate plus nested PCR reaction in PMA-PCR or for analytical duplicate plus two dilutions in RT-qPCR). Although PMA-PCR may provide relatively lower sensitivity than RT-qPCR, the PMA-PCR assay for the detection of live *Giardia* would be useful, especially when a simpler and more affordable method is preferred in viable *Giardia* monitoring. Microscopic-based viability staining results suggested that discriminating dead from live *Giardia* cysts spiked on spinach was not as clearly visualized as when parasites were suspended in phosphate buffered saline (data not shown); thus, this approach may not be as efficient for *Giardia* viability determination on leafy greens as compared with RT-qPCR or PMA-PCR.

In June 2017, the principal investigator (PI) presented final research results at the Center for Produce Safety (CPS) Research Symposium in Denver, Colorado.

This project focused solely on detection of pathogens known to be of concern with fresh produce, and does not enhance the competitiveness of non-specialty crops.

The project partners for this project were the CPS and the University of California, Davis. CPS managed the project and the University of California, Davis performed the research studies.

Goals and Outcomes Achieved

Two key challenges to the produce (and produce-packing) industry were addressed in the current investigation: 1) development of a rapid, accurate, and affordable test (by molecular means) for simultaneous detection of four selected protozoan parasites in leafy greens; and 2) optimization and validation of viability assays that discriminate live from dead parasites on produce. A newly developed qualitative nested multiplex-PCR assay was sensitive (1–10 parasites per reaction) for detection of low levels of parasites and accurately detected 10–50 parasites spiked on 10 grams of spinach as determined in spiking experiments. The ALODs in the parasite mixture were determined to be one (oo)cyst per reaction for *Cryptosporidium*, *Toxoplasma* and *Giardia*, and 10 oocysts per reaction for *Cyclospora*. For viability assays, RT-qPCR was compared with PMA coupled with real-time as well as conventional PCR assays (qPCR/PCR). The RT-qPCR assays could

accurately detect 20 (*Cryptosporidium* and *Toxoplasma*) and 90 (*Giardia*) (oo)cysts spiked on 10 grams of spinach. However, the research team did note that the presence of large numbers of dead parasites on spiked spinach may result in underestimation of live *Cryptosporidium* and *Giardia* (oo)cyst quantification by RT-qPCR. PMA-PCR effectively discriminated live from dead *Giardia* at contamination levels of 220 cysts on 10 grams of spinach using a relatively simple and affordable approach.

Outcome measures for this project were not long term.

Goal 1 was to develop a multiplex PCR assay. This assay was developed within the grant period.

Goal 2 was to optimize viability assays for *Cryptosporidium*, *Giardia, Toxoplasma* and *Cyclospora.* Viability assays were optimized for all parasites with the exception of *Cyclospora.* Although the team had a working collaboration with experts at the U.S. Centers for Disease Control (CDC), adequate samples yielding viable *Cyclospora* oocysts were not submitted within the study duration. Thus, only screening assays (Goal 1) based on parasite DNA (viable or not) were developed for this parasite (*Cyclospora*).

Goal 3 was to validate the use of screening and viability assays on leafy greens. A set of systematic spiking experiments was conducted, demonstrating the feasibility of applying the newly developed assays as well as optimized viability assays on spinach, as a model leafy green vegetable.

Key baseline data that have been gathered include: 1) detection limits for four selected protozoan parasites in leafy greens (e.g., on 10-g spinach samples) using the newly developed multiplex PCR assay; 2) recoveries of protozoan oocysts spiked on spinach samples as measured by qPCR; 3) probability of detecting target protozoa spiked on spinach in spiking experiments (wash and mash techniques); and 4) probability of detecting three viable target protozoan parasites via RT-qPCR assays that discriminate live from dead parasites on produce. The outcomes achieved were discussed in the previous section; additionally, see Attachment for tables and figures.

The project had several successful outcomes, as follows:
A key outcome of this project was the development of a new molecular test that can simultaneously detect and differentiate the presence of four important foodborne parasites on produce. This assay, a multiplexed, nested conventional PCR test, is simple, rapid (<24 h), and inexpensive. Systematic spiking experiments demonstrated the ease of application of this test on leafy greens, using spinach as a model produce salad. The low detection levels of the assay demonstrate applicability of the method for efficient screening of food commodities. The multiplex-PCR assay was sensitive (1–10 parasites per reaction) for detection of low levels of parasites and accurately detected 10–50 parasites spiked on 10 g of spinach as determined in spiking experiments. The ALODs in the parasite mixture were 1 (oo)cyst per reaction for *Cryptosporidium*, *Toxoplasma* and *Giardia*, and 10 oocysts per reaction for *Cyclospora*.

The optimization and validation of several viability assays for discriminating live from dead parasites on produce presents a fundamental advance in the field of produce safety. Detection of parasite DNA alone is not sufficient for making appropriate management and/or policy decisions that affect public health. Insight on whether positive detection via screening tests is due to the presence of infectious pathogens (as opposed to nonviable organisms) is imperative. Project results demonstrate that RT-qPCR can effectively discriminate viable from dead *Toxoplasma, Cryptosporidium* and *Giardia* on spinach; the PMA-PCR assay for the

detection of live *Giardia* would be useful when a simpler and more affordable method is preferred. For viability assays, the RT-qPCR assays could accurately detect 20 (*Cryptosporidium* and *Toxoplasma*) and 90 (*Giardia*) (oo)cysts spiked on 10 g of spinach. However, the research team did note that the presence of large numbers of dead parasites on spiked spinach may result in underestimation of live *Cryptosporidium* and *Giardia* (oo)cyst quantification by RT-qPCR. PMA-PCR effectively discriminated live from dead Giardia at contamination levels of 220 cysts on 10 g of spinach using a relatively simple and affordable approach.

Currently available commercial methods for protozoan pathogen detection on environmental matrices are laborious, expensive, and require specific personnel training in microscopy (as per Environmental Protection Agency method 1623 for *Cryptosporidium* and *Giardia*) or are completely lacking (for *Toxoplasma* and *Cyclospora*). In comparison, both the screening multiplex PCR and RT-qPCR as well as PMA-PCR methods used for viability discrimination can be adopted for immediate use by any laboratory with molecular testing capacity.

The application of user-friendly and cost effective tests for routine monitoring of produce for parasite contamination will yield field surveillance data essential for investigations aimed at predicting risks of illness to consumers via quantitative microbial risk assessment.

Beneficiaries

The user-friendly multiplex PCR test developed in the project can be readily used for routine screening of protozoan (oo)cysts on produce. This project's accomplishments will provide a toolset to recognize protozoan pathogen contamination on produce allowing the implementation of prevention strategies. Improved detection of these parasites by molecular methods that are fast, specific, and have acceptably low detection limits fills a big gap to improve monitoring strategies and provides data to develop quantitative microbial risk assessment scenarios. The beneficiaries are the relevant growers, harvesters and processors of leafy greens. The ability to certify the absence of certain pathogens will guide more specific and effective risk management practices for the industry and provide new insights into optimization of processes.

This project will, at minimum, benefit the more than 90 member companies of the California Leafy Green Products Handler Marketing Agreement that work with hundreds of farmers in the state to produce and handle lettuce, spinach and other leafy greens products. According to the California Agricultural Statistics Review 2015–2016, the lettuce production alone is valued at $2.2 billion annually. Additionally, since the toolset is not limited to leafy greens and can be optimized for other produce types, it is reasonable to expect that the total number of potential beneficiaries could extend to growers, harvesters and processors of other specialty crops, such as berries and cilantro, which can suffer from common protozoan contamination. According to the 2012 Census of Agriculture there are 1,985 berry growers farming over 52,000 acres in California.

The PI at the University of California, Davis presented final research results in June 2017 at the 8th annual CPS Research Symposium in Denver, CO, to 325 symposium attendees. Interim results were presented previously in an oral presentation at the 2016 CPS Research Symposium in Seattle, WA (315 attendees), and in a poster session at the 2015 CPS Research Symposium in Atlanta, GA (245 attendees). The symposium participants included California regional and national growers/shippers, retail and food service buyers, scientists, academics, produce industry representatives, and members of regulatory agencies. The annual symposium provides expert panels to comment on the research results after presentation by the researcher, which helps participants evaluate how the results can be used in their respective businesses.

Project results will be disseminated at industry meetings, and streamed through social media sources. Results also will be made available online as follows:

1. Final reports submitted to CPS (after the June 2017 symposium) are posted on the CPS website: http://www.centerforproducesafety.org/grant_opportunities_awards.php.
2. CPS works with the scientists to publish results in scientific journals. Publication dates occur after the project is completed. Abstracts and awards can be found on the CPS website.
3. The Board of Directors and members of the Technical Committee of CPS distribute a series of information briefs throughout the year on the website and through presentations, meetings and webinars. An example of this would be the "CPS 2016 Research Symposium Key Learnings" on the CPS website at the following link: http://www.centerforproducesafety.org/amass/documents/document/365/CPS%202016%20Key%20Learnings.pdf.

The following websites provide additional resources on the final reports and symposium proceedings:
Center for Produce Safety: http://www.centerforproducesafety.org/resources.php
Produce Marketing Association: http://pma.com
Western Growers Association: http://www.wga.com/

Lessons Learned

Positive results are that the novel multiplex PCR test can be immediately adopted for long-term use by the produce industry for screening leafy greens for the presence of parasites. Also, the multiplex PCR test can be optimized for application to other produce commodities, such as berries, that are at risk for contamination with parasites. The team's results indicate that applying viability assays in field surveillance investigations would be the key to minimizing contamination due to live versus dead parasites, and will aid accurate modeling efforts to predict the risk of illness to consumers.

There were no unexpected outcomes or results for this project.

Addressing food safety concerns due to viable *Cyclospora cayetanensis* contamination is especially challenging due to the difficulty in obtaining oocysts for research purposes. Unlike the other three protozoan parasites targeted in this study, *Cyclospora* is a human-specific pathogen and its oocysts can only be obtained from diarrheic stool samples of patients. While the research team succeeded in procuring oocysts for development of a screening assay, the viability state of the parasites could not be verified by the project collaborator at the CDC. A collaborative framework among produce industry partners, academic institutions, state-level public health laboratories, and the CDC is strongly recommended for strategizing surveillance and sample collection approaches that would maximize resources for advancing research on this important emerging infectious disease agent.

Additional Information

See Attachment for Tables 1–4 and Figures 1–8.

Tables 1-4 and Figures 1–8

Table 1. Multiplex PCR assay limits of detection (ALODs) tested with individual parasites or a mixture of four target protozoan parasites in phosphate buffered saline.

(Oo)cyst /extract	(Oo)cysts /reaction	Successful amplification / Replicates tested							
		Cryptosporidium		*Toxoplasma*		*Cyclospora*		*Giardia*	
		Single	Mix	Single	Mix	Single	Mix	Single	Mix
1000	100	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3
100	10	3/3	3/3	2/3	3/3	3/3	**3/3**	2/3	3/3
10	1	3/3	**1/3**	3/3	**1/3**	**3/3**	0/3	**2/3**	**3/3**
1	0.1	**1/3**	0/3	**3/3**	0/3	0/3	1/3	0/3	0/3
0	0	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3

Table 2. Viability assays tested in viability spiking experiments.

Parasite	Viability assays used in spinach spiking experiments (Yes/No)		
	RT-qPCR	PMA-(q)PCR	Viability staining
Cryptosporidium	Yes	No	Yes
Giardia	Yes	Yes	Yes
Toxoplasma	Yes	No	No
Cyclospora	NA[a]	NA	NA

[a] Not applicable

Table 3. Spiking experiment 1: screening assay. Qualitative detection of pathogens using a multiplex PCR assay in two spinach spiking experiments (wash vs. mash). Ten grams of spinach was used per sample.

(Oo)cyst dilution	(Oo)cysts /extract	Successful amplification / replicates tested							
		Cryptosporidium		*Toxoplasma*		*Cyclospora*		*Giardia*	
		Mash	Wash	Mash	Wash	Mash	Wash	Mash	Wash
10000	3333	3/3	NA[a]	3/3	NA	NA	NA	**3/3**	NA
1000	333	3/3	5/5	3/3	5/5	3/3	5/5	0/3	4/5
100	33	3/3	4/5	2/3	5/5	2/3	2/5	0/3	1/5
50	17	3/3	2/5	1/3	4/5	0/3	1/5	0/3	**1/5**
10	3	**1/3**	**1/5**	**3/3**	**3/5**	**1/3**	**1/5**	0/3	0/5
0	0	0/3	0/1	0/3	0/1	0/3	0/1	0/3	0/1

[a] Not applicable. In the wash treatment, 10,000 (oo)cyst dilution was not used. In both spiking tests, the highest oocyst concentration of *Cyclospora* was 1,000 oocysts due to limited oocyst quantity available.

Table 4. Recoveries of 1,000 (oo)cysts spiked on 10 g spinach measured by qPCR and microscopy (IMS-DFA and membrane filtration) in spiking experiments using hand-wash (wash) or Smasher (mash) recovery approaches.

	Recovery % ± standard deviation			
	Mash (N = 3)		Wash (N = 5)	
	qPCR	IMS-DFA	qPCR	IMS-DFA
Cryptosporidium	96 ± 11	26 ± 4	79 ± 15	48 ± 4
Giardia	not detected	10 ± 9	39 ± 6	40 ± 6
Toxoplasma	33 ± 31	26 ± 4	34 ± 16	48 ± 7
Cyclospora	22 ± 23	2 ± 2	47 ± 8	30 ± 19

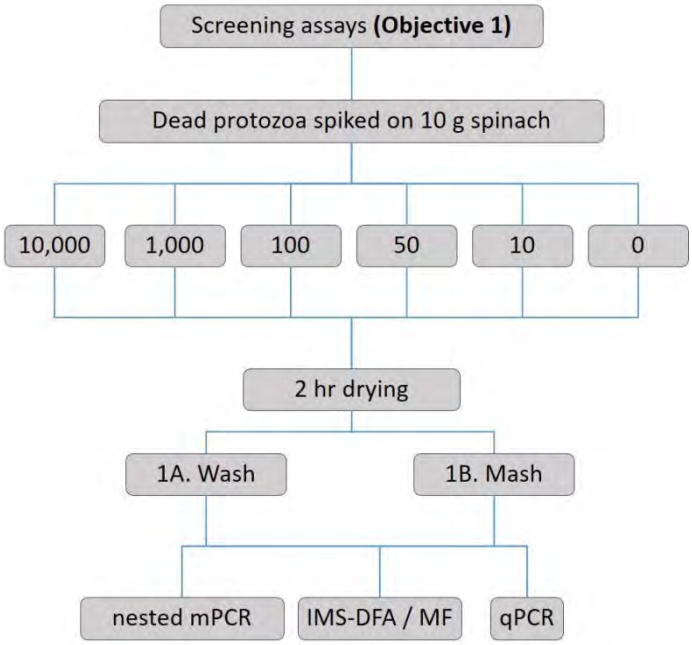


Figure 1. Flow diagram depicting experimental study design for screening assays, in which spinach samples were spiked with target parasite mixture with different concentrations.

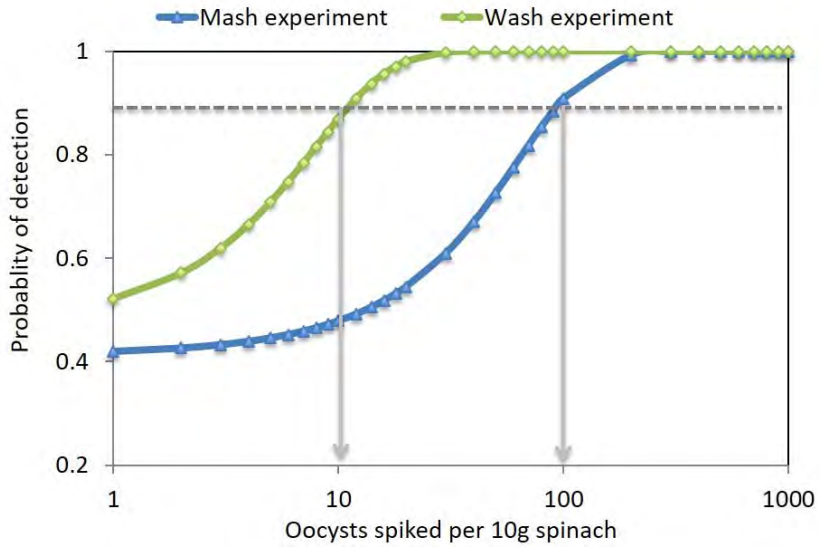


Figure 2. Probability of detecting *T. gondii* oocysts spiked on 10 g of spinach in two screening spiking experiments (wash vs. mash). Probability curves were estimated using logistic regression. The arrows depict the estimated parasite concentration detected with 90% likelihood for each target protozoan.

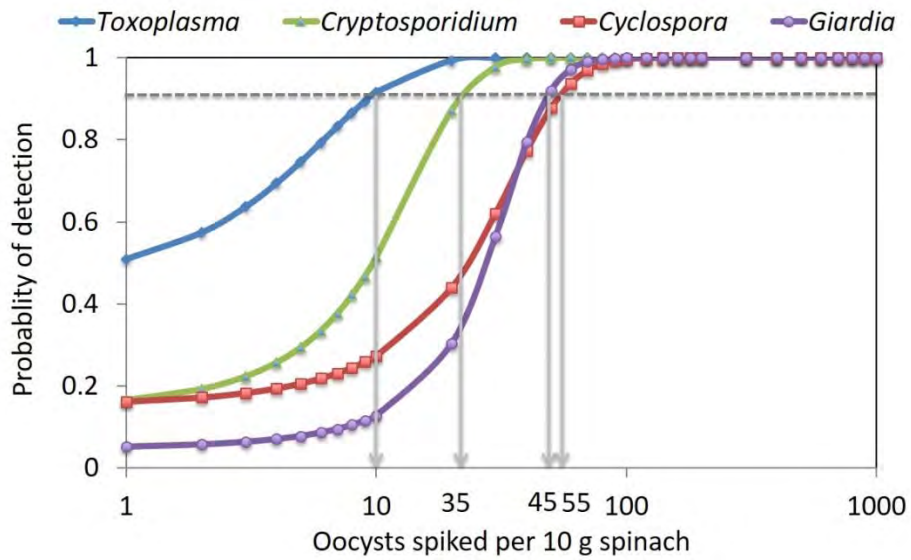


Figure 3. Probability of detecting four target protozoa when recovery of spiked parasites was performed using the hand-wash technique. Probability curves were estimated using logistic regression. The arrows depict the estimated parasite concentrations detected with 90% likelihood for each target protozoan.

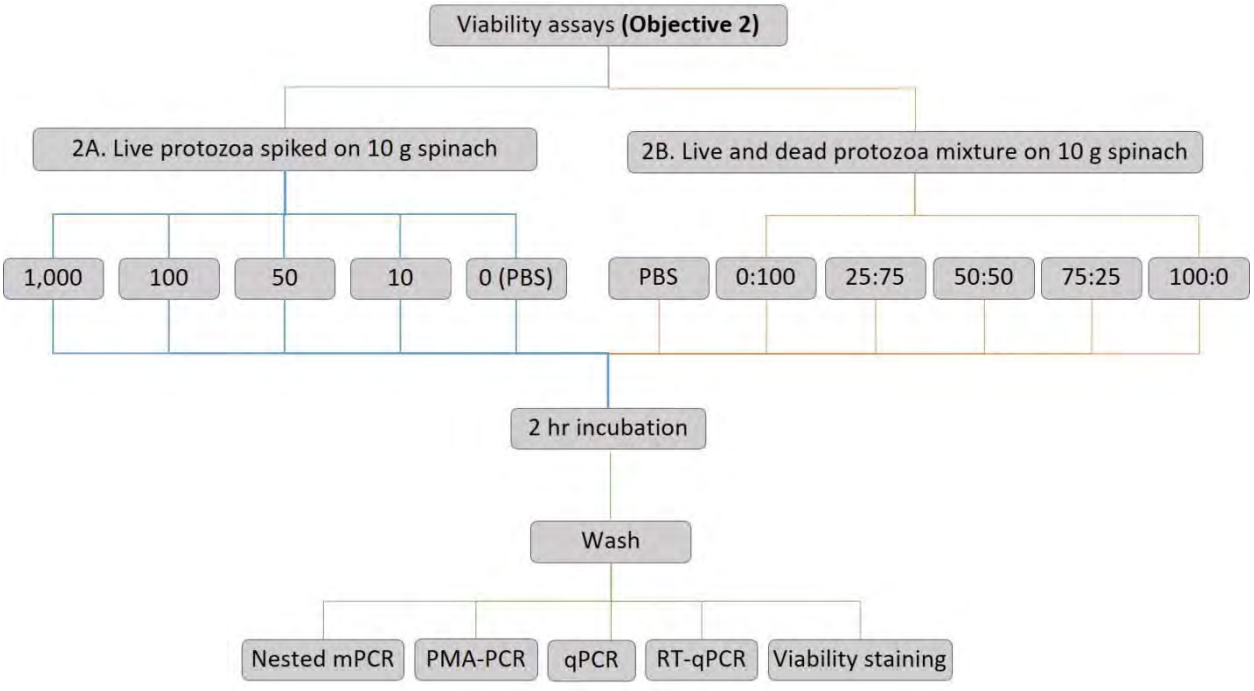


Figure 4. Flow diagram depicting experimental study design for viability assays, in which spinach samples (N = 5) were spiked with serial dilutions of live (oo)cysts or mixtures of different live to dead (oo)cyst ratios.

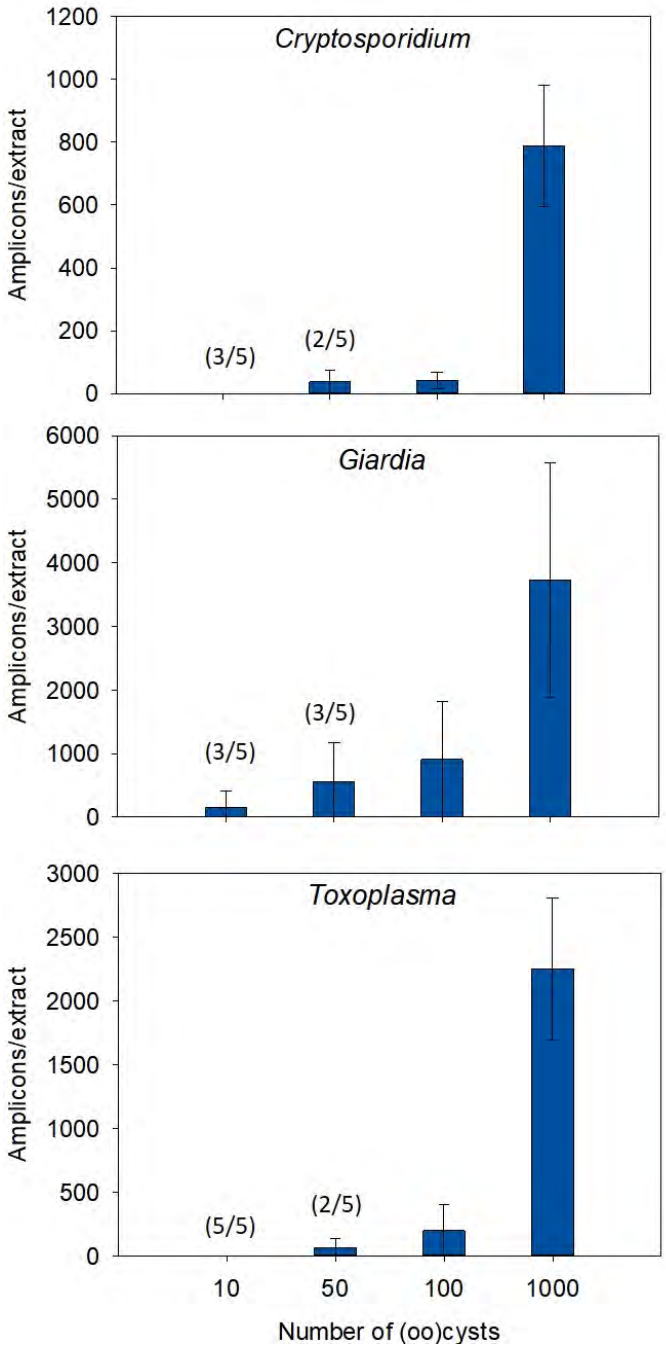


Figure 5. Quantification of mRNA amplicons from serial dilutions of live *Cryptosporidium, Giardia* and *Toxoplasma* spiked on 10 g of spinach. The number of non-detects out of five replicates tested is shown in parentheses above each bar, if applicable.

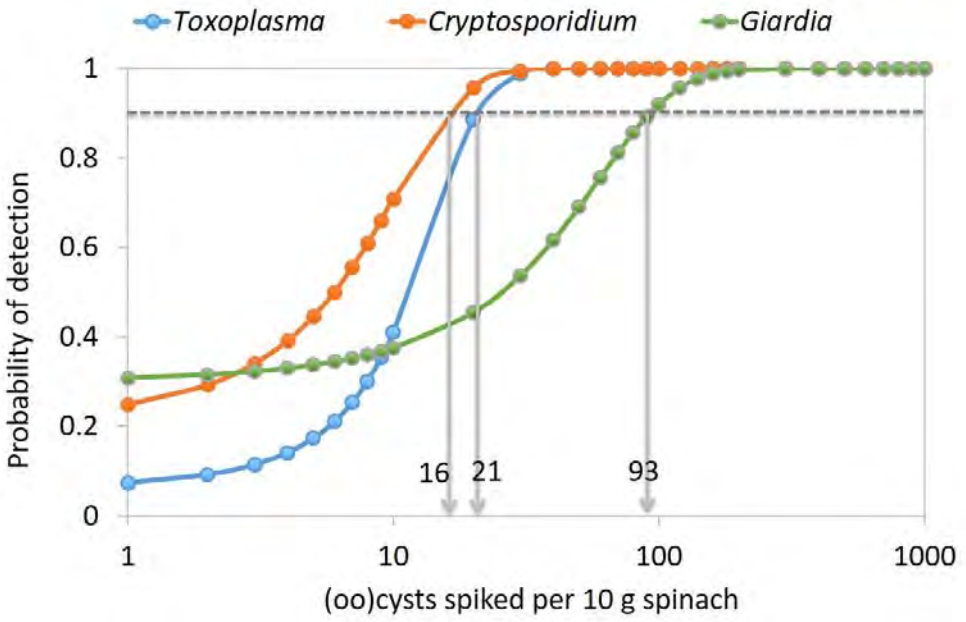


Figure 6. Probability of detecting three viable target protozoan parasites via RT-qPCR assays that discriminate live from dead parasites. Parasites were recovered using the hand-wash technique, and probability curves were estimated using logistic regression. The arrows depict the estimated viable parasite concentrations detected with 90% likelihood for each target protozoan. (Note that *Cyclospora* was not included in viability experiments because the infectivity status of the stocks obtained from CDC could not be verified.)

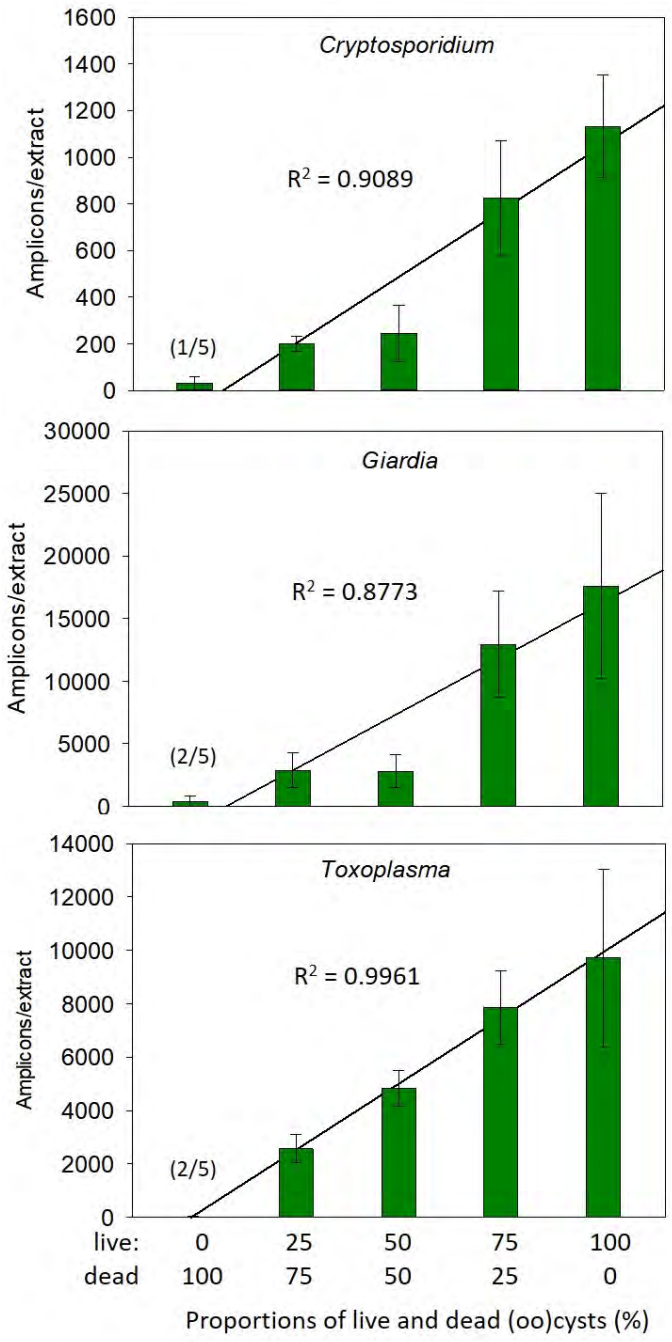


Figure 7. Effect of the proportions of live (oo)cysts on mRNA amplification of protozoa spiked on spinach using RT qPCR. Each mixture contained 5,000 (oo)cysts of *Cryptosporidium*, *Giardia* and *Toxoplasma* with defined ratios of live to dead (oo)cysts of 0:100, 25:75, 50:50, 75:25 and 100:0. Error bars represent the standard deviation of five replicates. Non-detect data were assumed to be one-half of the respective sample limits of detection. The number of non-detects out of five replicates is shown in parentheses, if applicable. Black trend line and R^2 indicate a linear relationship between the proportion of live (oo)cysts and mRNA amplicons obtained via RT-qPCR.

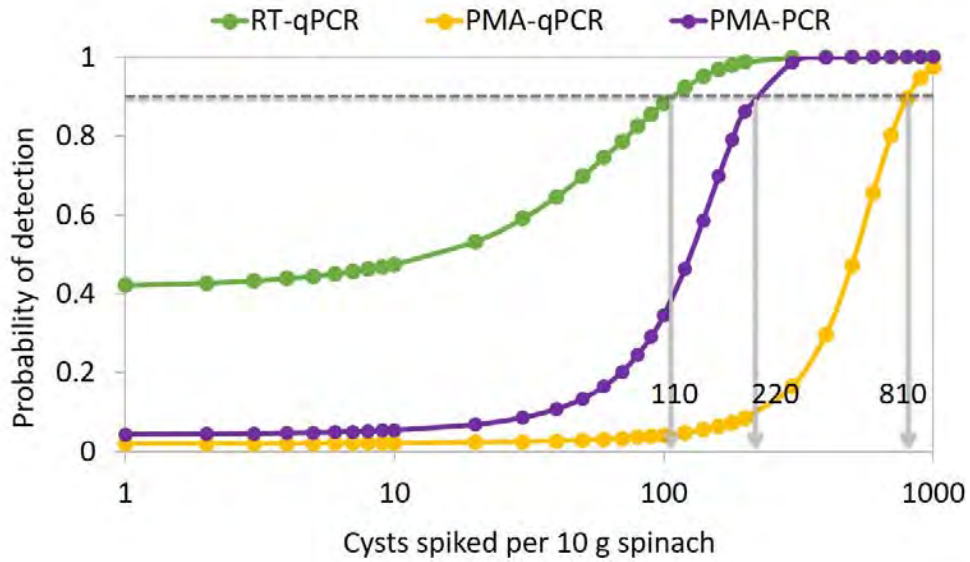


Figure 8. Comparison of probability curves for detection of viable *Giardia* by RT-qPCR, PMA-PCR and PMA-qPCR on spinach in viability spiking experiments. Data from serial dilutions of live (oo)cysts and different ratios of live/dead mixture were combined for the regression. The arrows depict the estimated viable *Giardia* cyst concentrations detected with 90% likelihood using each assay.