

# **12-25-B-1683**

## *Final Report*

Revised 5/17/17

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# 12-25-B-1683 Specialty Crop Block Grant/ Nevada Final Report

Plant Industry Division



## Project Title

### NV Vines & Wines

The NDA has submitted a request to terminate this project and reallocate the remaining funds to the University of Nevada Reno. A final report has been provided below.

## Final Report

### Project Title:

[Main Station Farm Vineyard Project](#)

### Project Summary

This is the final report on efforts to establish a self-sustaining commercial scale vineyard in Northern Nevada. The vineyard suffered a series of setbacks and failed to grow as expected. Funding needed to operate the vineyard far exceeded donors ability to respond to production problems caused by vermin, deer and vineyard infrastructure. Starting in 2016 the vines should have produced grapes and income capable of funding ongoing expenses and vineyard expansion.

The project goals were to establish the marketability of grapes and wine produced locally. These goals are not possible because there are no grapes to test. The University of Nevada will continue the project and use the facility for a new undergraduate degree program. They will be correcting the major vermin problems, replanting the vines, expanding the vineyard size, and conducting related research. Nevada Vines and Wines LLC members will support vineyard planting and wine making through events, promote Nevada wine, and work on further changes in the restrictive Nevada winery licensing laws.

Part of the funding, roughly \$17,706 was reallocated to the University of Nevada Reno (UNR), College of Agriculture Biotechnology and Natural Resources and Conservation (CABNR) to perform the wine grape research and education. After many project setbacks it was determined that UNR, CABNR was more equipped to implement the production and education components of the project.

### Background

Compared to other western states, Nevada lacks a viable vineyard or winery industry. In 2012 about 40 acres of vineyards were known to exist in all of Nevada. These vineyards are located in Fallon, Tonopah, and Pahrump. Fewer than 5 licensed wineries were in operation in the state. In contrast, the *2007 Economic Impact of New Mexico Wineries on the State's Economy*, reported 27 licensed wineries with sales of \$19,986,000. Additional revenue from winery tourism, festivals, and other indirect income produced an estimated total of \$32,000,000 impact on the economy of New Mexico. Washington State reported 30,000 jobs and an \$8 Billion economy based on sales of vines, grapes, and wines (Puget Sound Business Journal, April 24, 2012).

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Colorado, Idaho, Arizona, and Oregon have reported similar economic impacts. All have similar weather, water availability and growing conditions compared to Nevada.

Nevada's lack of a viable industry is thought to be related to 1) the lack of knowledge on the quality of grape and wine possible in Nevada, 2) reluctance of potential investors based on questions of wine industry viability, 3) restrictive license requirements in counties with populations greater than 100,000 (Washoe and Clark), and 4) the lack of any organized effort to address these issues.

## Project Approach

Nevada Vines and Wines LLC (NVW) is a membership and donor supported not for profit 501c3 organization. NVW was founded to promote education, research, and community involvement with all aspects of viticulture and enology in Northern Nevada. NVW has grown to over 200 members that are actively involved with grape growing, wine making, and exposing the public to Nevada wines. About 10,000 vines have been planted by NVW members currently used primarily for personal consumption. Vineyards range in size of 75 to more than 1,000 plants and are scattered around Washoe County. Building on these experiences, the intent of this project was to establish a commercial scale self-sustaining operation. The estimated size would be 10 acres at a cost of \$400,000 to \$500,000 to establish. Ten acres of vines could produce 40 tons of grapes grossing \$40,000 to \$60,000 annually once the vines matured.

The University of Nevada, Reno (UNR) College of Agriculture, Biotechnology and Natural Resources (CABNR) operates an existing two acre vineyard located at their Valley Road facility. Plants have grown there for more than 15 years. The vines are used for numerous research and educational activities but the small plots are not of sufficient size to demonstrate commercial production viability. Many NVW members learned about grape growing and wine making via the CABNR Valley Road project.

NVW and CABNR entered into an agreement to establish a vineyard of sufficient size to demonstrate commercial viability in Nevada. CABNR operates the Main Station Farm (MSF) on a large block of land in western Reno. Ten acres were made available for this project. Initially two acres were to be planted. Funding was to come from NVW fund raising activities, Kick-Start like event profits, donors, and this Specialty Crop grant. Labor to plant and maintain the vineyard was to be provided by NVW members assisted by UNR staff. After the third year, grape production was to begin providing income. Profits from grape and wine production were to be used to support and expand the MSF vineyard at a sustainable size.

## Goals and Outcomes Achieved

Goals of this project were to:

1. Demonstrate that wine grapes can be successfully grown in Nevada of sufficient quality to be commercially viable

2. Develop horticulture standards for grape production that can be adopted by growers in Nevada
3. Determine the marketability of Nevada grown grapes based on comparative California grape prices
4. Determine the marketability of Nevada produced wine based on relative market prices in local outlets
5. Educational outreach to interested parties on aspects of viticulture, enology and Ag Economics developed through the activities of this project.

**Goal 1.** *Demonstrate that wine grapes can be successfully grown in Nevada of sufficient quality to be commercially viable.*

UNR Main Station Farm Vineyard (MSF)

Goal: Raise to maturity a two acre vineyard of Riesling and Limberger grape vines. Future phases of the project were to include diversification of grape varieties and expand to 10 acres.

Outcome: MSF vineyard failed to demonstrate that vines can be successfully grown in Northern Nevada. As of September 2015 only 648 of the 2900 plants are surviving. However, they have not reached a size capable of producing income from a crop.

**Project Details and Findings Related to Goal 1:**

**Year 2013-14**

1. Planted 1800 Riesling vines at McCarran Ave site with drip irrigation
  - a. Vines were planted on one acre
  - b. High density planting of 5 ft spacing between plants and 5 ft rows compared to the standard of 6'X6' or greater planting.
  - c. Five foot rows complicated weed control. The width did not match any available mower so multiple passes were needed
  - d. Estimated 306 failed after the first winter for a 83 percent survival rate
  - e. Loss was related to heavy winter cold damage and plants not in protective sleeves.

2013-14

1. UNR changed land use plans for the McCarran road frontage which forced vineyard relocation
2. Relocated 800 Riesling vines from the McCarran Site to the Clear Water Rd. location
3. Planted 600 additional Riesling and 1500 Limberger vines all with drip irrigation
4. Total plantings, 2900 plants all with protective sleeves. Spacing for plants at 5 ft on center with 6 foot rows.

2014-15

1. Survival rate Riesling 248 of 1400 plants or 17 percent, Limberger 645 of 1500 or 43 percent
2. None of the plants had produced sufficient growth to reach a fruit wire 36 inches above the ground line
3. No vines reached sufficient size to support grape production by 2015-16  
The vineyard suffered major damage from rabbits, ground squirrels, marmots, and deer. In one year the marmot population more than doubled. NVW consulted with Washoe county vector control agents and were advised that the vineyard was located in an area with the highest density of marmots in the county and control would be an ongoing battle. Solutions offered were fencing, applications of gas by licensed pest control contractors, and flooding. NVW lacked the funds to control the pests and build the required fencing.

**Goal 2** *Develop horticulture standards for grape production that can be adopted by growers in Nevada*

- A. Pruning techniques to protect against variable spring frost patterns
  1. MSF No data collected as plants did not reach sufficient size to require pruning
- B. Use of ABA (abscisic acid) plant hormones to enhance cold resistance
  1. No observed benefits at Valley Road
  2. Initial findings on ABA could not be replaced by other researchers
- C. High density planting to test yield variation of high quality grapes
  1. MSF - No data collected as three year old plants failed to produce fruit
  2. Experiences from other growers indicates yields do meet or exceed projected yields and quality equal to or better than from standard density plantings
- D. Measurement of water usage comparisons
  1. Valley Road established a use rate of 12 gallons of water per week during growing seasons for plant establishment that appeared to be proper for this region
  2. NVW members are using as low as 6 gallons per week for established vines with good growth
  3. Six gallons per week for newly planted vines produced stress and restricted growth compared to 12 gallons per week
- E. Testing market viability of Nevada grown grape crops
  1. MSF – No data collected as no grapes were produced
  2. NVW members are not selling their grapes as they are grown for personal use
- F. Business based economic modeling
  1. Insufficient data for optimizing or economic modeling

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- G. Wine making to test and demonstrate Nevada fruit viability for quality wines
  - 1. MSF - failed to produce fruit
  - 2. Valley Road produced wines, from grape vines that were in production prior to the start of the award, that were awarded medals in regional competitions
  - 3. NVW produced wines are winning in regional and national competitions. Unfortunately, new grapes were not produced by the new vines that were planted during the project.

## Project Details and Findings Related to Goal 2 at MSF Vineyard:

- 1. Increased cold weather tolerance related to applications of abscisic acid (ABA) had been reported in the literature. Test using ABA was conducted. Outcomes were not conclusive as no difference was observed. Subsequently it was reported that the original ABA research was flawed and no longer recommended as a treatment.
- 2. Winter die back due to the cold may be related to desiccation caused by very low moistures at low temperatures and wind exposure. Anti desiccation agents such as ‘Wilt Proof’ and ‘Moisturin’ were applied at the MSF, Valley Road, Spanish Springs, and Lakeridge vineyards. Due to above average winter temperatures in 2014/15 no severe winter damage was observed so it is not known if commercial antidesiccants are effective or not.
- 3. Water Use Rate.
  - a. The MSF vineyard was watered via a drip irrigation system at a rate of 10 to 12 gallons per week per plant. This compared with other growers who reported using as little as 6 gallons per week per plant for established plants to as high as 12 gallons per week per plant for newly planted vines.
  - b. For vineyards using clean culture (no cover crop or weeds) this amount appears to be adequate depending on the exposure, soil type, or location.
  - c. The MSF Clear Water Rd vineyard was planted in an existing alfalfa field. The alfalfa was left as a cover crop. The general sense is that irrigation rates were more problematic with water used by the vines v. water consumed by the alfalfa. Competition for water between the alfalfa cover crop and vines may have contributed to the higher die back rate.

## 4. One Acre Vineyard Maintenance Time to Task Data:

a. Task	Time	Season Total
Weekly Walk-Through – 1 PERSON	Ave. 0 .75 hours/week	18 hrs for 24 weeks
Weed Control labor (Urban Roots) 2 sessions	30 person Hrs/session	60 hrs
Weed Mowing: 3 sessions	3 hrs with mower	9 hrs

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Irrigation repair sessions as needed	15 hours
b. Total Labor Hours	102 Person
Estimated cost: Supervisor @ \$24 per hr, labor @ \$17.50 per hr	\$1902
Tractor @ \$15 per hr	\$135
Chemicals and supplies	\$450
<b><u>Estimated Total Maintenance Costs per Acre</u></b>	<b><u>\$2487</u></b>

- c. Other growers in area the report a proportional amount of person hours to maintain a vineyard. It was pointed out that vineyards with mature vines require additional time for pruning, mildew and white fly control, as well as pre-harvest bird netting, and harvest time.
- d. Projected annual maintenance costs with netting, pruning, and disease control are estimated at \$4,500 per acre
- e. Commercial pest control operators bid \$10,000 for initial control of ground hogs/marmots. Annual vermin management costs could not be estimated.
- f. Deer fencing solutions were not pursued but several options discussed range from \$3 to \$10 a lineal foot.

**Goal 3** *Determine the marketability of Nevada grown grapes based on comparative California grape prices.*

To achieve sustainability the MSF vineyard needs to be expanded and obtain mature grapes. By 2016, income produced from the initial 2900 plants was to be used to fund the ongoing operations plus vineyard expansion. Projections called for 1 ton of grapes by the third year and 3 to 4 tons/acre by the end of the fifth year. However by 2015, the MSF location failed to grow vines large enough to produce grapes and will not for several years. Without grapes NVW could not do a comparative analysis of grape quality or Nevada produced wine marketability using these intended grapes.

**Goal 4** *Determine the marketability of Nevada produced wine based on relative market prices in local outlets*

1. Due to Nevada's law restricting the production of wine for sale in counties with populations greater than 100,000 no data could be collected
2. Potential investors interviewed identified Nevada's restrictive law as the greatest obstacle to their developing a winery in the State.
3. By 2016, income from the initial 2900 MSF plants was to fund the ongoing operations plus additional planting. In order to have income from wine sales, a licensed winery would be needed.

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4. Projections for the initial two acre planting called for 90 cases of wine in the third year and 270 cases (\$27,000 at \$100 per case) by the end of the fifth year. However by 2015, the MSF location failed to grow vines capable of producing grapes. Without grapes, NVW could not do a comparative analysis of wine quality or wine marketability.

5. As grapes mature, the quality of the wine improves significantly. Marketing of ‘Old Vine’ wines is common in many regions. Some people were of the opinion that comparisons of wine produced from 3 year old vines with more mature wines from other regions would not communicate the potential quality of Nevada wines.

**Goal 5** *Educational outreach to interested parties on aspects of viticulture, enology and Ag Economics developed through the activities of this project.*

NVW has engaged with multiple events designed to expose the public to grape growing and wine production potential in Nevada. These activities continue to generate considerable media attention and public awareness.

## 1. Conducted two vineyard tours in 2014 and 2015

- a. Combined 17 vineyards were opened to the public
  - 1.) Vineyards ranged in size from 75 to 400 plants with both European and hybrid varieties
  - 2.) More than 500 people attended
- b. The tours received print, radio, and television media exposure
- c. Comments received from the public were generally positive
  - 1.) Most common: “I had no idea that grapes like this could be grown here”
  - 2.) From the least experienced: ‘How can I get started?’ ‘How much work and water does a vineyard take’?
  - 3.) From the more experienced: most were process related about varieties planted, pruning, disease and pest control, and cold protection.
  - 4.) From potential investors: ‘With the current restrictive winery license laws, what do you expect to do with all of the grapes when they come into full production’?
  - 5.) Each event was followed by a wine tasting and fund raising event

## 2. Monthly NVW member educational events

- a. Presented by UNR then moved to NVW locations
- b. Began with a discussion of grape growing or wine making followed by wine evaluation of regional wines with wine ratings and informational discussions.
- c. Attendance ranged from 15 to 50 at each event

## 3. NVW annual membership meetings and celebrations

- a. Membership has grown to more than 200 participants

- b. Presented an annual award each year recognizing individuals for contribution to the wine culture of Nevada

#### **4. Educational Seminars**

- a. UNR, Extension Service Master Gardeners, and NVW members joined forces to present four short courses on developing a vineyard. Attendance exceeded space and more are planned in the future
- b. NVW members are assisting other members with planning, planting and maintaining vineyards. The number of vines planted has increased by 38 percent (see table in the additional information discussion) as a direct result of this activity.

#### **5. NVW members participated in annual wine making activities.**

- a. Until 2015 members volunteered to maintain grapes and produce wine in the UNR Valley Road vineyard and winery. Participants received hands-on experiences in all aspects from pruning to wine making. More people applied to participate than could be accommodated
- b. NVW vintage production: NVW Co Op was formed to provide access, instruction, exposure, and a process for individuals to get involved with wine making. Co Op participants provide the resources to obtain grapes, supplies, and labor to produce an annual vintage. This has proved to be very successful as a ‘hands on’ experience allowing individuals to participate at any level. Experienced members assist “newbies” with various tasks through the wine making process from harvest to bottling. Participants are able to take home the wine they helped create. Co Op participants are excited by this opportunity and are actively spreading the word and recruiting new members.
  - a. 50 Co Op members participated in the production of wine for personal consumption consistent within TTB/IRS 200 gallon guidelines.
  - b. Co Op members have obtained oak barrels and flex tanks adding tank capacity for NVW Co Op use.

#### **6. Time on Task Data to be used in future seminars:**

- a. The following represents data collected on the person hours per ton of grapes and the activities involved in wine making. Wine making crews consisted of Lead NVW members assisted by NVW Co Op members and other volunteers in the 2013 vintage.
  - a. The grapes were purchased in El Dorado or Amador County from commercial vineyards that picked the grapes into their bins and loaded them onto NVW transportation tanks.

- b. b. Estimate of time: 1 day for 1 to 2 lead members to organize transportation, tanks, go to the vineyard. 1 day to load the grapes, and drive home, and clean the tanks.
- c. Total time: 2 people X 10 hours = 20 person hours
- b. Crush & Fermentation:
  - a. 2 Lead members assisted by 5 to 8 volunteers, 4 to 5 hours per person total to remove stems and crush, place juice in fermenters
  - b. Punch red wine 2 hours per day for 10 days
  - c. 2 lead members and 5 to 8 volunteers, 8 hours for pressing and place juice in maturation tanks
  - d. Total time: 111 person hours
- c. Maturation Racking and Bottling
  - a. 2 Lead members, monitor wine progress and transfer the wine of sediment (Racking) 3 times totaling 16 hours from October to August.
  - b. Bottling, 2 lead members and 10 volunteers 8 to 10 hours to bottle and cork.
  - c. Total time: 64 person hours

Estimate of total time per ton: Average 3 to 5 people crew size for 195 to 210 person hours per ton of grapes

- 7. NVW members participated in two annual home wine maker competitions that featured wines from grapes grown in NV, CA, and a hybrid blend of both.**
- a. More NV produced wine was entered in the second year and the event continues to attract new people to the wine possibilities in Nevada. The event was judged by independent tasters, from Washoe County and California.
  - b. Annually 80 wines were entered by 60 participants. Classifications for the wine were Nevada grown, California, and a blend; all vintages were made in Nevada.
  - c. Winners include a California wine produced by a Reno resident. A French hybrid (Frontenac) locally grown and produced
  - d. NV wines continue to be scored very high and draw favorable comments. Overall the judges were impressed by the NV wine compared to the California and blended wines. They were surprised by the high quality and commented on continued improvement of NV wines.
  - e. This activity continues to attract an increased numbers of both residents and visitors exposing them to the quality that is possible.

## **Beneficiaries**

*Groups and operations benefitted from completion of project*

Direct Beneficiaries:

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405 South 21st St.  
Sparks, NV 89431

2300 East St. Louis Ave.  
Las Vegas, NV 89104

4780 East Idaho St.  
Elko, NV 89801

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Because the MSF vineyard failed to reach viticulture and enology targets it appears as if nobody benefitted from the production activities of this project. However, education activities performed to increase awareness and participation in Nevada grape production was extensive throughout the project which included current and interested wine grape growers. Alternative sites were utilized for performing education activities. The production failure may be the result of vineyard location, organizational problems, under funding, and the dependence on volunteers for a commercial scale project.

Others benefiting from the preliminary work of this project are UNR and NVW. The University is implementing plans to expand on the MSF vineyard, develop an undergraduate viticulture program, and expand research and outreach statewide. Other western states with advanced wine industries have all had very active land-grant college involvement. NVW alone lacks the size and scale to impact the entire state. UNR's expanded role is a positive thing for the entire state.

## Lessons Learned

### *Positive and negative insights*

Because the MSF vineyard failed to reach viticulture and enology targets it would appear commercial grape production is not practical in Northern Nevada. However, the production failure is the result of vineyard location, organizational problems, under funding, and the dependence on volunteers for a commercial scale project and not overall vineyards per-say. UNR Valley Road vineyard has existed for more than 15 years and has produced good grapes. Growers in other microclimates around Washoe County have been very successful as well.

The following data sets show an alternate picture of the potential for Nevada wines. The vineyards are successful; many are expanding because of their success, and demonstrate that different micro environments can produce different results. NVW past President Bill Coplin started tracking and collecting data on these vineyards. Of the known vineyards, small scale plantings continue to increase year over year while larger blocks remained constant or decreased (see table below).

## Nevada Vines and Wine Member Vineyards in 2014

Vineyard	# Vines	2014	2015	Note
UNR Valley Road Viticulture program		1,970	1970	To be used by UNR students for new
ClearWater MSF 2016		3,600	895	To be replanted and expanded by UNR in
NVW Members				
Buffalo Creek	2,500	2,500		

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Dyer	500	500		
Bernardo		360	500	300 additional plants in 2016
Bernardo Churchill		0	2500	Vineyard being rebuilt, not in production in 2014
Scattered in Red Rocks	Red Rocks	4,000	4,000	4,000+ vines to be planted by 2016, 40 acres
Pebble Creek Grape Grower		300	475	125 Additional vines to be added in 2016
Twin Mustang		250	550	All French hybrids, winery license application in progress
Other		1,260	1600	La Casa Casatana, Lakeside, Canepa Ranch, Smith Vineyards, D.Clark
<b>Total NVW vines</b>		<b>9170</b>	<b>12,625</b>	For 2016 NVW members have ordered 450 + vines
<b>Increase</b>			<b>3455</b>	38% increase by NVW members in one year

## Potential Economic Impact

- Wine production potential at maturity 1270 cases at maturity
- Third year wine market potential if 380 cases at \$80/case = \$30,400
- Fifth year wine market potential 1270 cases at \$100/case = \$127,000
- Several licensed wineries would be needed to process and market 1270 cases

A number of non NVW vineyards are known to exist. Several have offered to be part of the 2016 vineyard tour. Attempts to expand the vineyard data base map to include non NVW members were not successful due to the lack of a systematic method of mapping. Alternative mapping methods need to be developed. NVW vineyard manager Joe Bernardo has been putting on short courses on vineyard establishment via UNR Extension. He has now identified 22 growers in Washoe County.

In December of 2015 the MSF vine failure rate was of concern because it was contradictory to what was thought. An expanded case review began. Interviews were conducted with growers that had increased plantings in 2014/15. The intent was to compare their experiences with the MSF survival rate. The following are the findings of this review:

Vineyard	New Plantings	Die Back	Rate	Note
MSF Vineyard	1500 Limberger	855	57%	Rates are for the Clear Water Road Vineyard
	*1400 Riesling vines = 41% survived.	1152	83%	800 transplants = 0% survived, 600 new

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\*Compared to the 2013 the survival rate for new vines at the McCarran Ave vineyard was 83%

Bernardo	360	13	4%		
Spanish Springs	200	Limberger 9	4.5%	Grapes were harvested at the predicted volume for 3 year old vines	
	100	Tempranillo	4	4%	Grapes were harvested at the predicted volume for 3 year old vines
Twin Mustangs	250	15	6%	Early plantings lacked protective sleeves and die back was higher due to rabbit damage. Die back rate has dropped with the use of protective sleeves.	

## Summary

- 1.) The MSF vineyard die back appears to be at odds with other Washoe County sites.
- 2.) All growers have vermin problems ranging from rabbits to deer but are able to manage the problem through vigorous action. However NVW did not anticipate such a significant issue and did not have the resources to implement such a significant pest vertebrate issue
- 3.) All of the growers used clean cover methods but several reported weed control a continual problem
- 4.) None of the growers questioned knew why MSF failed but speculated on vermin, cover crop completion, frost prone location, lack of continual attention, or high water table from proximity to river

## Identify lessons learned to help others:

This project may have been more successful if it had been organized and structured differently. Overall there was a rush to get the project going due to the lead time it takes to produce a crop. This may have contributed to a number of problems. First, a more comprehensive funding effort should have been employed. The estimated cost of the project totaled over \$400,000. Initial fund raising should have reached a target level of several hundred thousand before the vineyard started. Lacking a line of credit or sufficient funding, NVW was unable to respond when project needs were identified. Examples include expensive farm equipment (mowers and sprayers), \$10,000 for ground hog control by a licensed contractor, and a double wall deer fence surrounding the site. The project should not have started until adequate financial reserves existed.

Second, site location is critical. Land at the MSF existed so it was expedient to locate the vineyard there. The first vineyard location at McCarran frontage was perhaps the best possible site. However, UNR sold this site to a commercial developer forcing the vineyard relocation.

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The alternative sites had problems including poor soil, vermin problems, frost collection point because of low elevation/topography, to close to the Truckee river with a shallow water table, and lack of public exposure proved to be problematic for fund raising purposes. Perhaps a non UNR site should have been sought.

Third, reliance on volunteers appears to be inadequate for ongoing needs of a commercial scale operation. It was easier to get participants to perform one time functions such as site prep, planting, pruning, etc when a direct result/benefit can be seen. It is much more difficult to depend on them for ongoing daily maintenance when there does not appear to be the same direct benefits.

Finally, it is important to maintain focus on the project objective. In this case ongoing donations were needed for the demonstration commercial scale vineyard. It became apparent that a separate PAC was needed to resolve winery license issue the donors focus became divided. Funding was needed to hire lobbyists (non-federal funds) in order to continue making progress on the project. There are only some many activists and donors and the license laws became a higher priority. Funding for one activity came at the expense of the other project. To promote a commercial wine industry the law changes should have been completed prior to planting the vineyard. No federal funds were used in hiring a lobbyist or in activities related to this priority, however the focus became overcoming this significant project hurdle.

## Contact Person

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## Additional Information

2014-2015 Winery related activities took a major set-back during this period. Tobacco Taxation Bureau (TTB formerly known as ATF) issued a ruling that the UNR wine making program was in violation of federal alcohol regulations lacking the appropriate licenses for making, tasting, or offering wine samples to the public. As a result of negotiations with TTB, UNR legal staff has informed the program that a clear separation of facility use was needed. Wine could be made in the lab for research purposes only by UNR related personnel (faculty, staff, and matriculated students). The volunteers from NVW and the Adopt a Vine program could no longer share the lab (winery and vineyard) and alternative facilities would be needed.

This set back creates issues on the goals of the project. In order to demonstrate that commercial wines can be made in Nevada tastings will need to be conducted. NVW members have been working to address this significant project constraint.. As a 501c3, NVW cannot legally be involved with legislative/political activities. Members acting as individuals can and did so outside of grant activities. A separate Political Action Committee (PAC) was formed and

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successfully lobbied to allow wine production and sales legal State wide. Thanks to this action one of the major obstacles in the development of commercial wine related activities in the State has been removed. **The activities performed by the PAC were not performed utilizing federal funds.**

Other Washoe County Vineyards:

1. NVW has started to track other vineyards located in Washoe County Nevada Vines and Wine Member Vineyards

Vineyard #	Vines	2014	2015	Note
UNR Valley Road Viticulture program		1,970	1970	To be used by UNR students for new
ClearWater MSF		3,600	895	To be replanted and expanded by UNR in 2016
<b>NVW Members</b>				
Buffalo Creek		2,500	2,500	
Dyer		500	500	
Bernardo		360	500	300 additional plants in 2016
Bernardo Churchill		0	2500	Vineyard being rebuilt, not in production in 2014
Scattered in Red Rocks	Red Rocks	4,000	4,000	4,000+ vines to be planted by 2016, 40 acres
Pebble Creek Grape Grower		300	475	125 Additional vines to be added in 2016
Twin Mustang		250	550	All French hybrids, winery license application in progress
Other		1,260	1600	La Casa Casatana, Lakeside, Canepa Ranch, Smith Vineyards, D.Clark
<b>Total NVW vines</b>		<b>9170</b>	<b>12,625</b>	Additional members to be identified in 2016, order in for 300 + vines
<b>Increase</b>			<b>3455</b>	37% in NVW Member planting

Wine production potential at maturity = 1270 cases, market potential if ave \$80/case = \$101,600 if more licensed wineries are created

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Summary: Attempts to expand the vineyard data base map to include non NVW members were not successful. No systematic method of mapping exists and alternative methods need to be developed. Of the known vineyards, small scale plantings continue to increase year over year while larger blocks remained constant or decreased.

The size of the MSF vineyard planting decreased due to high amount of vine failure. In December of 2015 the vine failure rate was looked into in more detail. Interviews were conducted with growers that increased plantings in 2014/15 to compare experiences with survival rate of their new plantings. The following presents the findings of this review:

Vineyard	New 2013/14 Plantings	2014/15 Die Back	Survival Rate	Note
MSF Vineyard	1500 Lemberger	855	57%	Rates are for the Clear Water Road Vineyard
1400	1400 Riesling	1152	83%	800 transplants = 0% survived, 600 new vines = 41% survived.

Compared to the 2013 the survival rate for new vines at the McCarran Ave vineyard was 83%

## Bernardo

Spanish Springs	200 Lemberger	14	99%	Grapes were harvested at the predicted volume for 3 year old vines
	100 Tempranillo	4	99%	Grapes were harvested at the predicted volume for 3 year old vines

## Twin Mustangs

## Remaining funds reallocated to High Altitude Vineyards in Nevada

### Project Title

[High Altitude Vineyards in Nevada](#)

### Project Summary

In the spring of 2015, the Nevada State Legislature passed a bill that allows wineries to operate and sell in the largest counties in Nevada. Previously, only rural counties with limited populations were allowed to open and operate wineries. The new law has opened a flood gate of interested parties who would like to establish wineries and tasting rooms in both Reno and Las Vegas to take advantage of the main population and tourist centers.

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Entrepreneurs and established businesses wanting to open wineries are not just coming from Nevada, but also from wine regions along the west coast. Established California, Washington, and Oregon wineries view the new wine laws as a way to take advantage of a growing economy and to be pioneers of large-scale winemaking in Nevada.

With these new potential agricultural business opportunities on the horizon, little information exists on what grapes grow well in Nevada's climate and soils. The purpose of the new vineyard installation would be to support the installation of new vineyards across the state for commercial operations; supporting a viable specialty crop for Nevada's farmers.

## Project Approach

May-July 2016

The project manager hired a student intern to prepare for the vineyard planting. This intern prepped the field, took soil samples, planned an irrigation layout and provided information on trellising options. The project manager also spent time talking to researchers, hobbyists, and professional winemakers to determine the varieties of grapes grown as part of the project. These professionals included: Dr. Grant Cramer, UNR; Dr. Felipe Barrios, UNR (formerly University of California, Davis), Joaquin Fraga, Vineyard Manager and Researcher, Napa Valley Kate Boyle McDonald, and Boyle McDonald Wines.

During the conversations, Merlot was chosen as a successful grape variety for this area. However, it was discovered that there was no consensus on the rootstock that is best for Nevada soils and water. Rather than planting multiple varieties of grapes, the project manager decided to plant merlot grapes on two different kinds of rootstocks. This will provide more information for growers looking to plant wine varieties in Nevada.

August 2016-September 2016

The project manager worked with Sunridge Nurseries to select the best rootstocks to trial as part of this project. The rootstocks chosen were: Merlot 1103-P and Merlot GRN-5. These rootstocks are best for high Boron and salt soils. They are also considered to be drought tolerant. The vines were delivered in early September and planted on September 22 and September 29. The vines were protected from early frost and pests with plastic sleeves. The vineyard is planted on the Main Station Field Lab-Nevada Agricultural Experiment Station property with full cooperation with project partners.

## Goals and Outcomes Achieved

All of the project goals and outcomes were achieved. Meetings between the project manager, grape growers, and vineyard professionals took place to discuss how production information will be shared in the future. A grape variety and rootstock were selected and planted as a result of the meetings.

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The only item not achieved as laid out in the work plan was the trellising installation, since time was a constraint with the reallocation of funding from Nevada Vines and Wines to the University of Nevada, Reno (UNR) towards the end of the project. The reallocation of funding was due to unanticipated struggles in managing the project experienced by NV Vines and Wines which led to the determination that UNR would be able to better manage and implement the project. UNR received a 2016 grant to continue project activities in order to ensure that the appropriate beneficiaries are reached with production data. Since time was an issue, the project manager decided to forego the installation of the trellising in order to plant the grapes as early as possible, with the goal of avoiding any damage due to frost or early cold weather. The trellising materials were ordered and delivered. The trellising will be installed as soon as the ground is workable in the spring.

Two varieties of white wine grapes and two varieties of red wine grapes were identified as good contenders for Nevada's climate.

- White wine: Riesling and Gewurztraminer
- Red wine: Merlot and Malbec

## Beneficiaries

Although there are no direct beneficiaries due to the time it requires for grape vines to reach maturity and the short term of this grant, we have submitted and received a second Specialty Crop Block Grant to continue the industry participation and research started in this grant.

## Lessons Learned

The project staff learned two lessons during this grant. The first is that very few if any growers in Nevada have addressed rootstock options for grape vines. Much of the discussion is around grape varieties, however hardly anyone knew what rootstocks their vines were grafted to. The second is that the project staff should reserve vines and rootstock a year in advance. We were lucky to have planned a fairly small area so availability of the chosen vines and rootstocks were not a problem. It would have been an issue, however if a larger area were planned. More focus on the topic of rootstocks and ordering vines early will be employed during the next Specialty Crop Block Grant.

## Contact Person

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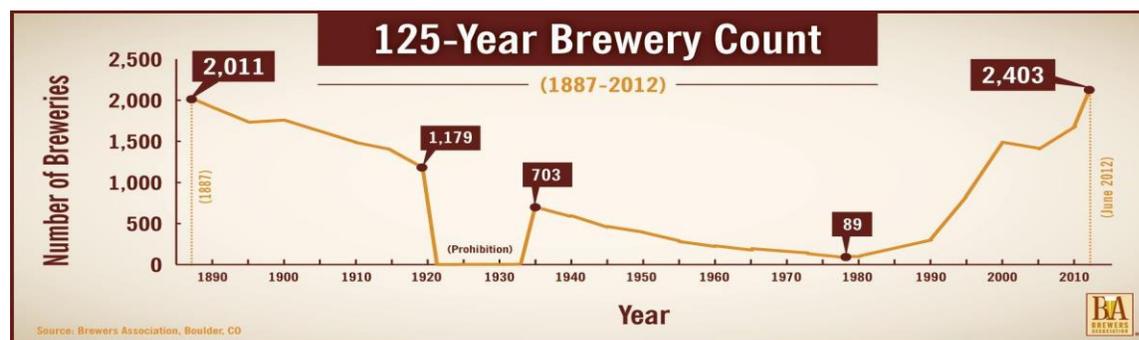
## Project Title

High Desert Hops Project, Phase I

### Project Summary

The purpose of this study is to identify hop varieties that will thrive in Nevada's high desert ecology and yield highly desirable qualities for Nevada brewers. Furthermore, the results of this study will provide Nevada farmers with reliable data (production, maintenance, harvesting, selling, etc.) that will encourage and guide producers to grow hops successfully, thereby advancing the economic impact of specialty crops in Nevada. Also, throughout the study, farmers and brewers will connect through focus groups to enhance the economic impact of this specialty crop in Nevada.

Over the last three decades, the U.S. craft beer industry has experienced tremendous growth. Prior to 1980, there were less than 100 breweries in the United States compared to 2,403 in 2012. Additionally, the craft beer industry accounts for 2,347 (97%) of total breweries and grew an astounding 17% in 2012 alone with 419 new breweries opening.<sup>1</sup> One consistent trait of the craft beer industry is the heavy use of hops, for both high-alpha content (bitterness) and aroma. As a result of demand for heavily hopped beers (e.g. American India Pale Ale), the recent growth of the craft beer industry has impacted the availability of desired high alpha hops, most recently notable in the hop shortage of 2012<sup>2</sup> where many varieties, such as Centennial, Amarillo, Chinook, Simcoe, and Citra, could not meet consumer demands.



The craft brew industry was estimated at \$10.2 billion in 2012 (+/- 10% of total U.S. beer industry), up from \$8.7 billion in 2011. This trend is also present throughout Nevada. As of 2012, there were 18 breweries in Nevada<sup>3</sup> with several new breweries set to open in 2013. Additionally, according to the Governors Office of Economic Development's (GOED) 2013 Agricultural Report, a 2011 survey showed that 80% of Nevada breweries experienced problems with the supply of hops and 100% of Nevada breweries would prefer to grow locally sourced hops. Finally, according to the GOED 2013 Agricultural Report, hops were identified as a future economic opportunity for the agricultural industry in Nevada as a result of demand and growth in the craft beer industry. Currently, only 3 states in the U.S. have a substantial hop industry and are accounted for in the National Agriculture Statistics Service: Washington, Oregon, and Idaho.

<sup>1</sup> Brewers Association

<sup>2</sup> Craft Brewing Business

<sup>3</sup> Nevada Brewers Association

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Referencing GOED's 2013 Agricultural Report, Nevada has the ability to become the 4<sup>th</sup> state to develop a substantial hop industry through collaborative efforts such as the High Desert Hops Project.

## Project Approach

The High Desert Hops Project is a five-year study<sup>4</sup>, consisting of three phases, conducted on an acre of farmland at the University of Nevada's Main Station Field Laboratory. *Phase I of the study focused on infrastructure installation, planting and developing a support network within the craft beer industry.* Below is a summary of the activities performed during Phase I of the project.

Phase 1: Variety Identification, installation & planting at MSFL, early development of brewer/farmer network.

In December of 2013 a brief survey was distributed to Nevada craft breweries requesting input regarding desired hop varieties, willingness to work with local farmers, and price points. Based on the results of the survey, ten hops varieties (100 plants each) were selected for consistently being used by Nevada craft brewers that also represented a range of alpha beta acid content (bittering agents) and oil content (aroma). The ten varieties selected are:

1. Cascade
2. Centennial
3. Chinook
4. Crystal
5. Fuggle H
6. Galena
7. Northern Brewer
8. Nugget
9. Vanguard
10. Willamette

Once varieties were identified, a contract with Great Lakes Hops (Michigan) was executed to propagate the plants from cuttings, rather the rhizomes, to ensure the varieties being introduced to Nevada were disease/virus free organisms.

In February of 2014, during the Nevada Small Farms Conference, a meeting with Dr. Ron Godin of Colorado State University Extension was arranged. Dr. Godin is considered an expert in the field of hops production in various climates and offered advice in regards to soil preparation, field layout and design, and pest management in arid climates. Additionally, during the

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<sup>4</sup> In order to carry out the High Desert Hops Project to term, additional funding has been secured for Phase II and Phase III of the five-year project from the Specialty Crop Block Grant program and Nevada Department of Agriculture.

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conference, discussions with area farmers regarding hops production were instigated to raise awareness of the opportunities associated with the crop.

In February, March and April of 2014, preparation of the acre plot at the University of Nevada's Main Station Field Lab (MSFL) began. A new water line, spliced from the mainline at MSFL), was installed to bring irrigation to the site approximately 600 linear feet away. Trenches for irrigation pipes were dug utilizing University of Nevada equipment. Based on the design of the trellising system for the hop yard, and taking water pressure into account, the drip irrigation system was installed.

The final design of the one acre hop yard consisted of:

- 1000 hop plants (ten varieties x 100 plants each);
- 20 rows (two rows per variety) spaced ten feet on center;
- 50 plants per row, spaced four feet apart;
- Two watering zones (every other row);
- 60 Lodgepole Pine poles for trellising, 20 feet tall, spaced 20 feet apart on grid.



The propagated hop plants arrived in mid-May of 2014 and were planted immediately. A Saturday was set-aside for members of the community to come out and assist with the initial planting. Local brewers from IMBIB Custom Beverages, Great Basin Brewing Company and Under the Rose Brewing Company all participated. Additionally, community volunteers, University of Nevada students, and AmeriCorps members all assisted project staff planting the hop plants, which took about six hours. An aggressive watering regimen was scheduled to allow the plants to establish their root system before summer.

During the 2014 season, the High Desert Hops Project attracted attention throughout the local food, beer and farming communities. News coverage included Edible Reno-Tahoe, Reno Gazette Journal, and made national news in the USA Today. The media attention to the project amplified efforts to connect with the brewing industry. An important partnership that was made was with IMBIB Custom Beverages. The owners agreed to test batches of beer with their equipment and analyze the varying qualities that each variety provides to a given batch of beer. This process will be replicated annually with each variety.

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Harvesting began in mid-August and continued through mid-September. The four varieties that produced enough hop cones to harvest in year one (it takes 3-5 years for plant maturity) were Cascade, Chinook, Galena and Nugget. We had a 99% plant survival rate through the summer into the fall, despite every single Vanguard looking quite unhealthy when we received the shipment. With continuous monitoring, we did not notice any pest or disease issues.

Two dry ounces of each of the four varieties were sent to Alpha Analytics for lab testing of the alpha and beta acid percentages contained within the lupulin glands in the cones. These percentages came out to be right in the average across the U.S. for these varieties.

In October and November 2014, once the plants had gone dormant, installation the sixteen-foot tall trellising system began in order to prepare for the maturing plants of next growing season.

Variety	Weight (oz.)	Alpha Acids	Beta Acids
Cascade	104.5	7.7%	5.4%
Chinook	71.5	9.6%	3.0%
Galena	98	9.7%	7.1%
Nugget	116.5	8.9%	6.0%

This entailed 60, twenty-foot long Lodgepole Pine poles and anchoring them four feet in the ground in a grid pattern. In January 2015, completion of the trellis system was accomplished. Airplane cable was strung through the entire yard in a grid pattern with the use of a rented scissor lift. As each run of cable was strung over the top of each row and column of poles, it was

anchored on each side into the ground using earth anchors. Once the cable was secured and the trellis system was tied together, the whole acre lot effectively became a single standing unit upon which the plants would climb.



In February 2015, project staff attended the Nevada Small Farms Conference and participated in a discussion with Nevada producers and brewers/distillers. This discussion led to a better understanding mainly of what kind of market price these two groups are looking for in a local product, which seemed to differ quite drastically. Being able to collect contact info of participants was very beneficial for beginning to develop a network for hops in

Nevada. This will lead to similar forums in the future to break down each group's needs and resources.

In April and May 2015, as each variety emerged from its dormancy and began to grow vertically, one twenty-five foot length of coir twine per plant was tied to the wire grid and anchored at the base of each plant. As each plant tends to send out multiple shoots, it is necessary to cut back unwanted shoots and focus all of the plant's energy on two or three specific vines to send up to the top of the trellis. Through research, we found that these first shoots that emerge in the spring are sometimes used in other hop markets as an edible food item similar to asparagus or nettles. Due to the very short time that this shoot is available and the labor involved in harvesting them, it creates a valuable product, sometimes fetching up to \$500 per pound. We explored the potential of this product as a secondary specialty crop by working with a few chefs in town to try it out as a sellable dish. The results were very mixed.

From April 2015 until the end of July 2015, a crew of volunteers and project staff spent at least eight hours per week maintaining the weed population, trimming back the excess growth from around the base of each plant and ensuring proper vertical plant training. In June 2015, a population of aphids (*Aphididae*) was observed to increase within the hop yard. Luckily, there was a sufficient population of ladybugs (*Coccinella*) that preyed upon the aphids at such a rate that was enough to keep the aphids under control and stop it from damaging the crop. A similar instance occurred in late July, just before harvest, except with an emerging population of spider mites (*Tetranychidae*). At this time, the ladybug population was not as high so we introduced store-bought ladybugs to the yard, which worked again to control the pest population. This success can be attributed to the practice of Integrated Pest Management, where *Kochia* was left in between rows of hops to serve as a habitat for beneficial insects.

Once the cones were ready to harvest, volunteers and project staff of five spent at least thirty hours per week at the hop yard to hand pick cones. Since each variety became ready for harvest at slightly different times, it was possible to get the cones harvested at the correct moisture content. If harvested too wet or too dry, the quality of the cone can be compromised and become less valuable to brewers. Target harvest moisture is between 70 and 83 percent moisture, and we were able to achieve an average of 72 percent.

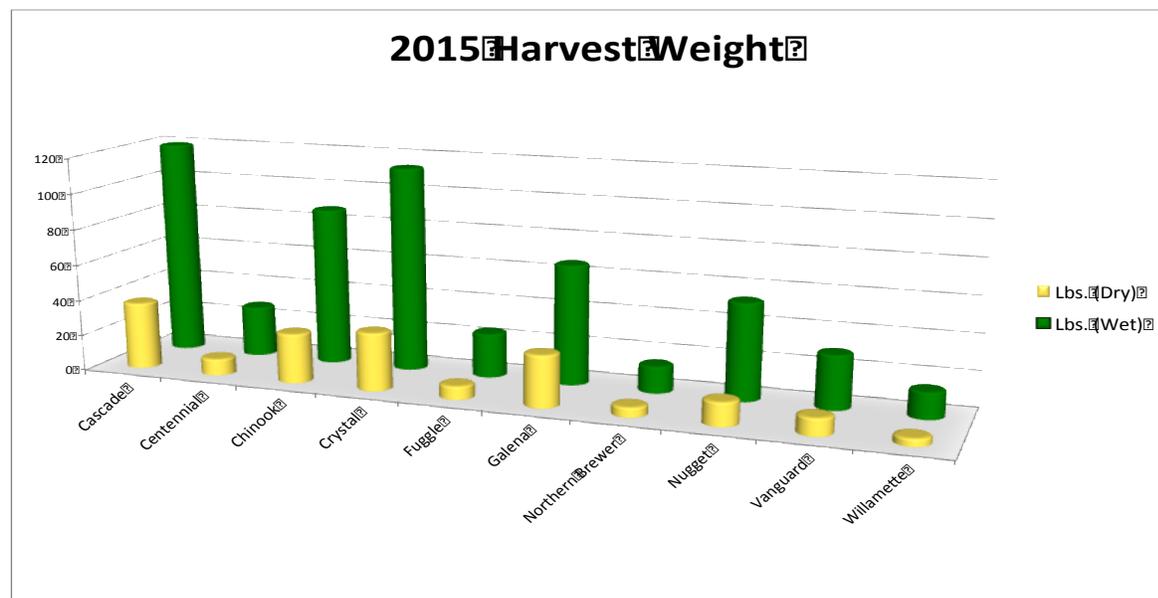
After cones were harvested, they were delivered directly to drying racks built out of lumber and stainless steel mesh. The Depot Craft Brewery/Distillery offered the warehouse space for about thirty days to dry, package and weigh the cones. The process of drying the cones to the proper moisture content involved comparing the harvest weight and moisture level to the weight desired to arrive at ten percent moisture. The dry air in the High Desert made drying the hops quite simple. Typically drying in more humid climates requires forced, heated air through the hops. The only requirement here is moving the dry ambient air underneath each drying rack and waiting an average of twenty hours per daily harvest.

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The total harvest weight came out to be about half of what is typically expected from a fully mature third year crop. It is important to consider that a typical hop yard would be planted with a single variety. An acre with ten different varieties leaves a lot of variables open that could potentially affect yield. However, we were able to see quite definitively which varieties were most successful. Below is a chart showing total wet harvest weight and dried weight by variety.

Two-ounce (dried) samples of each variety were sent to a testing lab to analyze aspects of the



hops that

measure the quality and ability of the hops to be stored before use. Alpha and Beta Acids measure ability to provide bitterness and aroma to beer, and Hop Storage Index (H.S.I.) measure how well the hops will store. (Lab results attached at end of report).

Eight ounces of each variety were used by IMBIB Custom Beverages to produce a beer recipe to feature the specific hop as the only variable to be tested for quality and difference. These beers were provided for tasting at a 'Meet and Greet' event in November 2015 that brought together producers and brewers to collaborate about planning for a new specialty crop market in Nevada. Five local brewing companies and four potential hop producers attended.

Once the 2015 harvest was dried and packaged, The Deport Craft Brewery and Distillery, Great Basin Brewing Company, IMBIB Custom Beverages, and Under the Rose Brewing Company all used hops from the project for a commercially made beer.

Finally, through funds provided by the Specialty Crop Block Grant Program, a pellet mill was purchased. In large scale brewing, pellets are the preferred form that brewers prefer to use due to the even dispersion through the wort and ease of cleaning afterwards. The pellet mill will be made available to other hop growers in the region.

### Goals and Outcomes achieved

Outcome #1: *Identify hop varieties that produce high yields and possess desirable qualities, grown in our bioregion.* The main objective of the High Desert Hops project is to identify which hops can be economically produced in Nevada and meet the standards of the local craft-beer industry. By conducting a survey of Nevada brewers, ten varieties of desirable hops were identified and successfully planted at the University of Nevada's Main Station Field Laboratory. Through two growing seasons, hop varieties to note (in regards to local brewery demand) are: Chinook, Crystal, Galena and Vanguard. However, these are dried, whole-cone hops. Once the harvest is able to be processed (pelletized), brewery demand is expected to grow.

Outcome #2: *Develop a network that connects Nevada hop producers to Nevada brewers that will drive the economic impact of this specialty crop in Nevada.* Throughout the project, researchers (University of Nevada and Desert Research Institute), producers, and consumers have been contacted to develop a Nevada network to support and grow a local hop industry. Project staff has attended multiple events in order to promote developing a hops industry in Nevada and build relationships with industry professionals. Events during Phase I of the project include: Nevada Small Farms Conference (2014, 2015), University of Nevada's Agricultural Field Day (2014, 2015), Governors Conference on Agriculture (2014), and multiple craft beer events in northern Nevada. Furthermore, in fall of 2015 project staff organized a 'Meet and Greet' event at IMBIB Custom Beverages that brought together producers and brewers to collaborate about planning for a new specialty crop market in Nevada. Five local brewing companies and four potential hop producers attended.

Outcome #3: *Create an established, locally adapted source of hops for rhizome harvesting that will spur new plantings in the bioregion.* In spring 2014, 1,000 hop plants (ten varieties) were planted at the University of Nevada's Main Station Field Laboratory. Once a hop plant reaches maturity, a single plant can produce over 25 viable rhizomes without endangering the plant. Rhizomes from the High Desert Hops Project will be made available to local producers beginning in spring of 2017.

### Goals and Outcomes Achieved

- GOAL: Provide a service-learning initiative for new generation of potential farmers, agricultural scientists, and consumers who will be exposed to hop production and hop markets in Nevada
  - TARGET: We anticipate that 80 percent of respondents will indicate that their knowledge has increased as a result of their participation in the project.

The project lead indicated that Phase 1 workshops and events demonstrated that all participants increased their knowledge of hop production and markets in Nevada.

- GOAL: Increase the number of hop producers in the state of Nevada
  - TARGET: 15-20 new hop producers in Nevada

At the end of Phase I, 3 commercial hop producers were active in Nevada.

- GOAL: Increase the number of Nevada consumers for Nevada produced hops
  - TARGET: 5-7 business purchasing hops produced in Nevada At the end of Phase I, 6 businesses (breweries and home-brew shops) purchased hops produced in Nevada. Crop yields through Phase I were not enough to meet industry demands, or this number had the potential to be significantly higher. Additional outcomes involving variety yields and market potential will be discussed under a hops project under 14-SCBGP-NV-0032 since the project will have 3 years of production in place.

### **Beneficiaries**

During Phase I of the High Desert Hops Project, project staff established relationships with most of the craft breweries in the northern Nevada region (28 as of this report) as well as the Nevada Craft Brewers Association. The majority of those breweries are highly interested in sourcing hops from local growers. Furthermore, project staff has been working with other growers to establish new hop yards. In 2015, Bentley Ranch (Gardnerville, NV) established a ¼ acre hop yard with plans to grow and Hops ENVY (Gardnerville, NV) established a .5 acre hop yard. The owner of Hops ENVY was a University of Nevada intern on the High Desert Hops Project in 2014.

It is anticipated that beneficiaries will increase throughout Phase II and Phase III of the High Desert Hops Project.

### **Lessons Learned**

Through Phase I of the High Desert Hops Project, the ability for growers to deliver pelletized hops was a common theme amongst local craft brewers. While most breweries will brew a seasonal whole cone (wet or dry) beer, it is typically only once a year. Whole cones are more difficult for brewers to work with as they create additional labor expenses related to cleaning their brewing equipment. Whole cones also take up a significant amount of storage space and have a much shorter shelf life than pelletized hops, which affects brewers when hops are not in season.

Additionally, breweries in northern Nevada have not had previous experience working with farmers to source their ingredients. There has been a small learning curve for participating

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brewers to understand the seasonality of hops as a crop, especially when working with small farms.

## Contact Person

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## Project Title

Garden Based Education Focused on Nevada Grown Crops

## Project Summary

The Main Street Gardnerville worked to establish a garden education program in Douglas County through the Heritage Park Gardens program. Children, youth, and young parents in the Douglas County community have limited access to healthy foods. Education programs to promote health benefits of fresh produce is an approach employed to overcome such challenges and to encourage the consumption of more vegetables and fruits in addition to the production. The project focused on teaching youth and parents in Douglas County about the health benefits of consuming fresh, locally grown produce. The educational program concentrated on hands-on learning activities to promote a positive agricultural learning experience for children (ages from 3-12) and their parents. The overarching goal of the program was to increase participant's knowledge on the various benefits associated with growing and consuming specialty crops. Program participants would increase their knowledge on growing techniques such as seed starting, garden planning, and growing a variety of vegetables, fruits, and flowers in raised beds. These hands-on experiences exposed and educated Nevada youth and parents to local agricultural food production practices.

## Project Approach

### 2014

During the first year of the project, supplies were purchased and the alphabet garden was started. A draft children's garden curriculum was established, and the season extension demo garden was completed. By year two project participants were recruited through newspaper, social media, website, e-blasts, flyers, word of mouth and distribution at local elementary schools. Half the planter beds were prepared for early planting with row covers. Volunteers completed the alphabet garden and flyers/rack cards outlining workshop opportunities were created. Weekend classes were not held as planned in March-May of 2015 due to conflicts with sport schedules so the monthly workshops were held instead; earlier than originally intended. An open house event was coordinated to showcase the garden and promote monthly workshops.

## 2015

By November of 2015, two student field trips were hosted. Each student received a kit with a pot, soil, iris rhizomes and instructions for planting. While at the gardens they planted daffodils. To further education efforts, volunteers visited a couple class rooms to provide presentations and invite students and their families to the gardens.

During the annual Fall Festival, there was a scavenger hunt that included the Children's Garden area to try and encourage further participation at future educational events.

## 2016

February thru August 2016 activities included holding a planning meeting to determine children garden activities for the season. Season participant recruitment was performed once again through newspaper, social media, the website, e-blasts, flyers, word of mouth and distribution of information at a local elementary school. Recruitment, bed planning, and an open house were held to kick-off the 2016 project year. An educational workshop was held at the garden opener event which demonstrated how to build row covers, plant potatoes, and plant sprout jars for children to take home. Six children were in attendance which was better than expected due to inclement weather.

An education workshop was held at the open house event where children planted circle gardens in the raised beds. Wiggly worms were discussed which included a hands-on project. Participants planted lettuce seeds and sprout jars to take home. Approximately 25 children were in attendance.

In May of 2016, two science classes from Carson Valley Middle School toured the gardens. They designed and created a sundial and placed plants brought by each student. The ownership created through this activity is anticipated to encourage future visits from students with their families.

In June of 2016, two first grade classes from Gardnerville Elementary School came to the gardens for a tour. They planted seeds in newspaper pots to take home and searched for and identified insects in the gardens (beneficials vs. non-beneficials). Further, a teen group from Partnership of Community Resources arrived for a tour to plant donated tomato plants in the Children's Garden.

Education workshops were held at the Fall Harvest event on October 1, 2016. A bee/honey demonstration was provided by Hall's Honey. Further a scavenger hunt was incorporated to increase awareness of garden opportunities. Approximately 60 children were in attendance.

## Goals and Outcomes Achieved

**Goal 1:** *Conduct two workshops each month from March-May to at least 15 individuals for each workshop.*

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- April 18, 2015: “Ready, Set, Grow!”
- May 16, 2015: “Wonderful Worms”
- June 20, 2015: “Plant Your Roots”
- July 18, 2015: “Pollination Power”
- August 8, 2015: “Field Trip to Jacobs Berry Farm”
- September 19, 2015: “Dig it Up”

It was noted that because of overlapping events in the area throughout the summer and family vacation/sport schedules, that one workshop a month would be more feasible.

Individual class size averaged from 0 – 14 children per class, plus their parent/guardian.

**Performance Measure:** *Registration records, attendance records, and/or pre- and post-workshop self-assessment evaluations will be performed.*

## Workshops in 2015:

Classes were held on the 3<sup>rd</sup> Saturday of every month from April through September, with the exception of August the class was held at Jacobs Family Berry Farm in Gardnerville.

Kindergarten to 2<sup>nd</sup> grade classes were held 10am-11:30am; 3<sup>rd</sup> to 5<sup>th</sup> grade class were held noon to 1:30pm. *Adults are required to stay on site while their child is in class.*

Class Attendance:

- April 18<sup>th</sup> 11 in the Kindergarten-2<sup>nd</sup> grade class. 7 in the Grades 3<sup>rd</sup>-5<sup>th</sup> class.
- May 16<sup>th</sup> 14 in the Kindergarten-2<sup>nd</sup> grade class. 10 in the Grades 3<sup>rd</sup>-5<sup>th</sup> class.
- June 20<sup>th</sup> 14 in the Kindergarten-2<sup>nd</sup> grade class. 8 in the Grades 3<sup>rd</sup>-5<sup>th</sup> class.
- July 18<sup>th</sup> 8 in the Kindergarten-2<sup>nd</sup> grade class. 0 in the Grades 3<sup>rd</sup>-5<sup>th</sup> class.
- Aug. 8<sup>th</sup> 20 attendees total for the Berry Farm Workshop
- Sept. 19<sup>th</sup> 0 in the Kindergarten-2<sup>nd</sup> grade class. 2 in the Grades 3<sup>rd</sup>-5<sup>th</sup> class.

## Workshops in 2016:

This year, the workshops were held in conjunction with the three special events already scheduled for the gardens to see if this would increase attendance. The events included: The Gardens Spring Opener, April 9<sup>th</sup>; the Open House, May 21<sup>st</sup> and the Fall Harvest, October 1<sup>st</sup>.

Attendance was as follows:

April 9<sup>th</sup>: 6 children. (The event was almost rained out.)

May 21<sup>st</sup>: 25 children.

October 1<sup>st</sup>: 60 children.

**Benchmark:** *Determined by pre-class evaluations.*

Pre-class questionnaires determined the children's favorite and least favorite fruits and vegetables. Trying to determine what they eat and what they know nothing about. Through follow up discussions, many of the children ended up enjoying most of what they grew... even though they initially did not like that type of fruit or vegetable.

**Target:** *The mean increase in specialty crop growth/nutrition is anticipated to increase by 30% as a result of workshops.*

Through the use of exit surveys, the following results/comments were collected:

- Loved the "Garden to Plate" concept
- Enjoyed watching kids eat off the plants and herbs
- Making new friends
- Kids being outside
- Planting
- Nutrition
- Tasting/eating the food they grew
- How bees and worms help us grow successful gardens

Completed:

- Surveyed the students at the first meeting about which vegetables and fruits they liked, disliked, or were unfamiliar with. Increased their knowledge of vegetable varieties by having them plant the gardens with 50% unfamiliar vegetables (like beets, turnips, rutabaga, butternut squash, mizuna, cucumber), along with 50% vegetable favorites (like peas, carrots, lettuce, potatoes, tomatoes, radishes). This strategy created a guarantee that participants would increase their knowledge about growth and nutrition of specialty crops not typically consumed by an estimated 50%. 100% of workshop participants expressed newfound knowledge pertaining to the growth and nutrition of specialty crops, particularly the 50% of new crops produced.
- Expanded their experience with vegetables and fruits by having two (2) tasting sessions designed to (1) introduce them to unfamiliar vegetables and fruits, and (2) expose them to the idea that just because they didn't like a vegetable once, they might like it in a different preparation. They tasted unfamiliar or unfavored vegetables and fruits in a minimum of two different ways that altered the taste and texture: raw, cooked, pickled, dried, or with a seasoned dip. (The collective favorite was oven roasted rutabaga, not only among the kids, but the parents and volunteers too.)
- Expanded the students' knowledge of growing, harvesting, and tasting by touring Jacobsen Family Berry Farm in Gardnerville. As part of the experience they learned how and when to pick, and then ate the blackberries they picked. Some were reluctant to eat fresh berries because of the shape/texture. Many had never had fresh blackberries, only blackberry jam. 100% expressed enjoyment in consuming local blackberries and increased their knowledge on the production of local berries.

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**Goal 2:** *Hold two separate two day workshops in June-August (weather permitting). Workshops will be developed based on feedback from Goal 1 to at least 15 individuals for each workshop.*

N/A- These referenced additional workshops were not held. Interest was low from the potential attendee pool.

**Performance measure:** *Registration records, attendance records and/or pre- and post-workshop self-assessment knowledge evaluations.*

N/A-These referenced additional workshops were not held. Interest was low from the potential attendee pool.

**Benchmark:** *Determined by pre-class evaluations.*

N/A-These referenced additional workshops were not held. Interest was low from the potential attendee pool.

**Target:** *Approximately 50% of participants will use knowledge gained to improve or enhance their food consumption choices.*

N/A: These referenced additional workshops were not held. Interest was low from the potential attendee pool.

## Goal 3:

*Host garden tours for schools, gardening groups, and residents (weather permitting) through out the months of September-November.*

Through the course of this grant we had several class field trips to our Children's Garden... some were hosted by our volunteers. Two other classes were brought over by their teachers at times that our volunteers were not at the gardens.

In September of 2015:

- Two Class Field Trips were scheduled for the Children's Garden area. The Students planted daffodils. Each student received a plant kit to take home: a pot, the soil, the iris rhizome and instructions for planting.
- Volunteers visited classes at Carson Valley Middle School and at Gardnerville Elementary School.

In May of 2016:

- Two Science Classes from Carson Valley Middle School toured the gardens during class field trips. These students are the ones that designed and planted a sundial in the Children's Garden.

In June of 2016:

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- Two first grade classes from Gardnerville Elementary School came to the gardens for a tour. They planted seeds in newspaper pots to take home. They also searched for and identified bugs in the garden.
- A teen group from Partnership of Community Resources arrived for a tour and helped to plant donated tomato plants in the Children's Garden. (Approximately 12 teens participated.)

**Performance Measure:** *Registration records, attendance records and/or pre-tour and/or post-tour surveys.*

The size/number of students from each class averaged between 25-30 students. Unfortunately no surveys were completed however; a great relationship has begun now between the teachers of these two schools and the volunteers working on this project. We will be hosting more of their classes in the gardens in the future.

**Benchmark:** *Determined by pre-tour and/or post-tour surveys*

Unfortunately, no surveys were completed however; a great relationship has begun now between the teachers of these two schools and the volunteers working on this project.

**Target:** *At least 100 participants introduced and increase their knowledge regarding Nevada grown specialty crops.*

At least 210 students were introduced to the gardens in 2016 during the hosted tours/field trips with at least another 185 since this project began. Most of these children were able to take home special plant projects.

These students contributed something to the gardens, whether it was a special project, weeding, identifying bugs, planting/growing/harvesting or simply sharing their excitement with their family, friends and classmates.

We look forward to continuing the following:

- Holding specialized workshops for children at our special events.
- Scheduling additional special children workshops that will create a complete experience in one day.
- Class room visitations and hosting student field trips to the gardens.

The hopes are to create an afterschool "Kids Gardening Club" with Middle School Students who attend school within a block from the gardens. There was great interest in this by parents, teachers and the students themselves.

## Beneficiaries

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The children from Douglas County and Carson City that participated in the project are the primary beneficiaries of this project. They increased their knowledge on how plants grow and gained skills on growing crops at home. Further the parents that participated in the workshops also benefited through gaining production skills that can be applied at home. The participating schools benefitted through having access to an outdoor learning environment, exposing students and teachers to new learning opportunities.

## Lessons Learned

In a small community, other organizational events and sport scheduled often overlap so it can be a struggle to get high attendance at every event. The conflicts of children sport events and other family activities with weekend educational programs were not anticipated so project staff re-strategized to encourage participation through monthly workshops, field trips, in-class workshops and events. Although monthly workshops were not ideal, since project coordinators felt this was too long for children involved in the project to go between garden involvement. They felt that the participants were not getting the full experience of watching and learning as the growing process progressed, however did not know better strategies to increase weekly participation.

Post award objectives are to continue providing workshops to children. The goal is to make each workshop a complete experience in one day where they can learn, plant, and take home a garden related item (Ex. Plant a bulb in the Children's Garden and then take one home to plant). In additional project staff intend to continue developing the school classroom visits to the gardens and to provide classroom instruction. An additional goal is to create an afterschool kids gardening club with middle school students, which is only a block away from the garden site.

## Contact Information

Paula Lochridge

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## Project Title

**Urban Farming Promotion of Specialty Crop Consumption**

### *Final Report*

## Project Summary

Many people who live in urban areas of Washoe County do not have land sufficient to grow their own crops. Many of these individuals, if given the opportunity would grow their own crops for personal consumption, and to sell at local markets or via Community Supported Agriculture collaboratives. The lack of property available for growing specialty crops has resulted in a reduction in consumption of specialty crops.

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This project demonstrated the viability of small-scale, year-round sustainable gardening methods of specialty crops in an urban setting. The production setup allowed us to show how growers can expand their growth season to year round. This program educated producers and provided a model to encourage individuals in urban areas to create their own Urban Organic Farm. Long term, this knowledge is expected to increase knowledge, sales, and consumption of Nevada specialty crops.

## Project Approach

The project was executed in four separate phases over the course of two years. The first three phases took approximately one year to complete. The final project phase encompassed the second year.

During the first phase of the project, the system was designed and assembled at the initial test location. During this period, the layout and tuning of the system changed several times to accommodate increasing levels of fish and bacteria in the system. No plants were grown during the first phase while the nutrient levels of the water grew to acceptable levels.

This phase of the project was the most difficult to successfully complete. Our major breakthrough occurred when we determined the absolute quantity of waste that could be processed through the system over a 24-hour period and its relationship with the quantity of food given to the fish.

After successfully cycling the tank, we started the second phase where we grew leafy lettuce in both growth beds under Fluorescent and Metal Halide lamps. We measured the effectiveness of the lamps as well as the speed that the lettuce grew. Once the lettuce reached an acceptable level of growth, we harvested. Both growth beds were used and we produced approximately 25 square feet of crops.

During the third phase of the project we added flowering plants in the form of small tomatoes. The tomato plants grew rapidly as expected under the Metal Halide lamp. At the end of the phase, we changed our light source to High Pressure Sodium and initiated the flowering of the plants. During this phase we experienced a catastrophic failure when the weight of the tomato plants caused them to sink into the growth medium where the tomato plants were destroyed. Because of this experience we modified the system design to include a “raft” which will prevent the failure we experienced in the future. Despite the loss of the tomato plants, both growth beds were used and we produced approximately 25 square feet of crops.

Throughout the first three phases, we entertained regular guests to tour the system. These guests included church groups, Scouting troops, The Narcotics Street Enforcement Team, various other law enforcement officials, interested citizens, and children from local schools (91 total visitors).

For the fourth and final phase of the project, we relocated the system to Churchill County High School in Fallon, Nevada. The system was modified to accommodate the new environment, and we trained the school representatives on how to operate the system. During this final phase, the

school incorporated the system into its learning curriculum. Students in Science, math and technology gained exposure to the project and learned how it functioned while studying their individual subjects.

The school has used the system for a year, and the instructors are continually finding new applications for learning that are possible through utilization of the system. The project has hosted several community leaders, school board members, and representatives of the Nevada Department of Agriculture. During each of the presentations, students are encouraged to explain the project and its function. We are pleased to recognize that the students are excited and have obtained the knowledge we set out to teach through this project.

### **Goals and Outcomes Achieved**

The overriding goal of this project was to provide an increase in knowledge for project observers and participants with regard to urban farming Aquaponics methods of growing Nevada Specialty crops. This transfer of knowledge was to occur through utilization of project site and website visits.

During the first three phases, 91 total visitors were hosted. This was well above our projected number of 50. During the first three phases, 91 total visitors were hosted. The breakdown of those visitors is as follows: 42 specialty and website based crop growers, 30 Urban Growers, and 19 others.

During the fourth phase, the project was shared with an estimated 1,500 students, parents, and faculty at Churchill County High School. Each of these visitors increased their knowledge of Nevada Specialty crops, and the viability of alternative methods of production. The initial goals were far exceeded by the end of the project. The urban growers were shown how the methods could allow for four growth periods in a given year. This was well received by the target audience. As a result of this knowledge one grower/producer placed a similar system in their business. They have been able to replicate the growth cycle. All participants were given this knowledge as a part of the project presentation.

A survey was utilized during the beginning of the project to assess an increase in knowledge gained via the content provided on the website. This was not received well by the participants and led to its discontinuation. Subsequent participants were informally asked questions to gauge their understanding of the material presented. On average the participants increased their knowledge 80% - 100%. The effectiveness of the website was determined by repeat visits and number of pages viewed per individual that accessed the site. The site is no longer active. Its former URL was <http://uofarming.com>.

Short-Term Outcomes:

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Every project visitor and participant learned about Nevada Specialty Crops, and the ability to grow them in a self-contained system that could be used in limited space. This increase of knowledge motivated several participants to find new applications for the system.

After the initial presentation and discussion of the project and system, participants were informally asked questions to gauge their understanding of the material presented. On average the participants increased their knowledge 80% - 100%. This increase is supported by the responses of participants who claimed no prior knowledge or experience with Aquaponics.

Long-Term Outcomes:

Continued modification and experimentation with the system will educate an estimated 2,000 students each year. It is expected that a percentage of those educated would seek to create their own system and grow crops on their own in the future.

Beyond the learning goal for Specialty crops, the science departments at the school are incorporating lessons for Biology, Chemistry, Physics, Calculus, and several other subjects into the project. Long term, this project will enhance STEM education at Churchill County High School. This Outcome is exciting and immeasurable in its future impact.

Of the nearly 1600 individuals that learned about the system including students and others, only a handful (12-15) were capable of implementing a program of similar design. Those participants were shown how the system functioned, and they were provided with support to set up their own system. Those select growers have since implemented their own solutions and are actively harvesting crops from them.

## Beneficiaries

This project benefitted specialty crop consumers by providing a model that will make organic specialty crops available to small urban growers for consumption and sales. Project participants became more familiar with specialty crops that can be grown in Nevada utilizing Aquaponics production methods and are able to experiment with various crops. Producers benefitted from the recognition of various specialty crops that can be grown in Nevada, particularly during the colder seasons and utilizing an Aquaponics production model. Students benefitted from the integration of the system into their STEM based learning.

During the first three phases, the project hosted seven tours of the facility including visits from: Boy Scout troop five, Churchill County High School, The Reno Street Enforcement Team, Reno Business's, The LDS Church, and Several community members. Total site visitors benefitted: 91

The fourth phase has resulted in an estimated 1,500 students, parents, and faculty at Churchill County High School benefitting from the project.

Nearly 1,600 individuals have benefitted by increasing their knowledge of Specialty Crop Growth in an urban setting using Aquaponics as a growth method. This number is expected to grow annually into perpetuity.

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## Lessons Learned

First and foremost, we learned that the Aquaponics system is a viable alternative for growing Nevada Specialty crops. Our project was a success and we were able to exceed the number of people that we originally projected would be educated by the project.

During the project, we quickly identified that the most enthusiastic recipients of this knowledge were students and scouting based organizations. We identified that by focusing our efforts on providing a richer experience for the students through exposure to the project, we were able to generate excitement and a desire to obtain additional knowledge that could be provided by the system. We additionally learned that educators were excited to use the system as a tool for their class curriculum.

We initially thought that our main audience would be hobby farmers. We were pleased to learn that our project had an eager audience with students. We believe that a focused effort to educate students will result in the probability that some of the student recipients will pursue future involvement in agriculture because of this education opportunity.

Of the nearly 1600 individuals that learned about the system including students and others, only a handful (12-15) were capable of implementing a program of similar design. Those participants were shown how the system functioned, and they were provided with support to set up their own system. Those select growers have since implemented their own solutions and are actively harvesting crops from them.

### *Aquaponics system at Churchill High School*



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Sparks, NV 89431

2300 East St. Louis Ave.  
Las Vegas, NV 89104

4780 East Idaho St.  
Elko, NV 89801

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## Contact Person

Jody H. Lammel

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## Project Title

**Growing Cold Crops in Hoop Houses in Northern Nevada**

## Project Summary

Grant funds were awarded to the University of Nevada Cooperative Extension (UNCE) in order to create a research and education project in Northern Nevada on growing specialty crops during the early winter through spring time, also known as cold crops, in a hoop house. Growing produce in desert regions comes with a variety of unique complications, such as significant day-to-day and day-to-night temperature fluctuations and poor soils. One way to mitigate some of these problems is through growing in hoop houses, which create an adjustable micro-climate for plants that can greatly extend the growing season. There were three goals in this project: (1) to conduct a study on cold crop production in a hoop house, (2) educate and demonstrate to the public about how to grow crops during the early winter through springtime using a hoop house, and educate schoolchildren about the nutritional value of these crops. Vegetable and fruit production in Nevada can be difficult, as pest insects, rodents, fluctuating temperatures, and limited water create stress to specialty crop plants. There is little information available within Nevada regarding how to grow cold-season crops using a hoop house in Nevada and the purpose of this study was to provide sound research-backed data as well as education to the public about growing specialty crops. This project builds upon a 2011 Supplemental Nutrition Assistance Program Grant (SNAP), which had a primary focus on educating youth about different vegetables and the nutritional benefits that come from eating a variety of produce such as kale, carrots, cucumbers, squash, and herbs. After the grant ended, funds were not available to continue hoop house production.

## Project Approach

This project has been terminated due to the resignation of the project lead and indication that no staff were designated to take over the project. The UNCE site had an existing hoop house in place with 10-6ft x 3ft raised beds which was funded through a 2011 Supplemental Nutrition Assistance Program Grant (SNAP). The hoop house was utilized in performing initial research. Over the past year the project lead did purchase supplies for the project and performed initial

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data collection on the temperature of the hoop house and harvest analysis per crop. In addition, planting schematics were recorded and temperature management. Educational activities did not occur as the project was still in the research phase. Data recorded during the project can be found under attachment 1 of the report titled *Growing Cold Crops* (page 42)

## Goals and Outcomes Achieved

Since the project came to an end during the early stages, most goals were not accomplished with the exception of cold crop research. Data was recorded on crops grown, planting schematics, temperature readings, and harvest counts per crop. Although the educational component of this project did not come to fruition, the data obtained through the research has been included in the report to assist growers in similar climates.

## Beneficiaries

The beneficiaries of the research performed include UNCE as they continue to use the hoop house for future research and education. Their staff are now more aware of the temperature variation and harvestable weights of specific crops based on the data that was gathered. This will enhance any future efforts they put forth in specialty crop research and education. In addition, individuals that assess the SCBGP final report will benefit by having access to the data that was obtained through the project and how this information could apply to their operations.

## Lessons Learned

Securing staff committed throughout the duration of the grant is crucial in successfully completing the goals of the project. During the project, the UNCE office experienced a loss in staff to oversee the project and did not have arrangements in place for someone to take over. As a result the project was terminated to ensure that the remaining funds were utilized for accomplishing SCBGP goals through an alternative project with committed staff.

Additional lessons learned include the data obtained from the research phase. Identifying specific crops that produce a high yield in the hoop house during the winter months and produce a desirable crop will assist growers in determining where to focus their efforts.

## Contact Person

University of Nevada Reno, Cooperative Extension  
Frank Flavin and Lana Caddel  
(775) 784-3561

## Funding Expended

Based on the brief report submitted, no educational activities took place. \$2,800 were expended on project staff to begin cold crop production and perform data collection. The \$7,200 remaining will be requested to be reallocated to the farmers assistance project in order to perform mock audits (\$2,200) and \$5,000 for GAP Audit reimbursements.

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## Additional Information

See Attachments at the end of the report for project photos and data captured prior to the project being terminated.

## Project Title

**Eastern Nevada Food Bank 4H/FFA Hydroponic Laboratory Program**

## Project Summary:

The 4H/FFA Hydroponic Laboratory project was aimed at evoking interest by school children in growing crops hydroponically and to establish a curriculum that could be duplicated by other schools. Experimental crops produced included parthenocarpic Diva cucumbers, parthenocarpic Legend Tomatoes, and Seedless Millionaire Watermelons. These nightshade crops were utilized to grow interest in specialty crop farming by generating excitement from school children in response to indoor climate controlled hydroponic system development and classroom small scale crop production. Overall the objectives of the grant were to develop a feasible hydroponic system and curriculum that can be used in Nevada schools to encourage crop production and consumption; working to encourage next generation growers using digital systems.

ENFB developed a (5) gallon-two plant hydroponic-self-containing system for schools in Nevada to grow two nightshade plants indoors. This project inspired youth in Nevada to look at specialty crop farming in a new way. ENFB drafted and launched the Nevada 4-H Hydroponic Science Program in four Nevada schools, allowing students to construct a system for indoor classroom use and understand the mechanical, electrical, and chemistry applications behinds hydroponic farming. A nine month curriculum was created and followed by participants to build and operate the system as an educational pilot program.

The objectives were to teach Nevada youth advanced agricultural techniques, increase their interest in agricultural farming, while addressing Child Obesity, Nutrition Awareness and Food Desert issues in the community.

This project was important and timely because food desert districts are not receiving enough attention and new farmers are not being established at the rate needed to replace aging farmers and to create a sustainable local food system. A need is present for healthy food to be grown with conservation in mind regarding water, seed, fertilizer and pesticides. Hydroponics can address these issues with low cost remedies, while addressing food safety concerns. This project was based on indoor farming methods that trade the tractor for a laptop.

The project had many facets to consider as its purpose including the following:

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(A). Allow educational curriculum to be administered in the classroom based on plant science, biochemistry, water quality, plant nutrition, nutrient mixture composites, adequate lighting principles, maintaining proper humidity levels and air temperatures to maintain maximum yields, in addition to their effects on vegetation.

(B). Inspire youth to look at advanced agricultural techniques as a new farming model to encourage their choice of college studies in Agriculture and/or Natural Science fields. Each System will be placed in a designated area within each school.

(C). Produce healthy, local school grown food products to share with students, teachers and staff in the lunchroom as part of the “Lets Move - Salad Bars to Schools” initiative launched in the 2013 – 2014 school fiscal year.

This project enhanced the competitiveness of eligible U.S. specialty crops, not just for agri-tourism purposes, but to feed students and staff in schools. These types of projects encourage the community to grow more fresh vegetables and fruits with indoor systems in cold weather climates where normal outdoor conditions will not allow such crop harvesting. Old abandoned building will be sought after to develop hydroponic facilities to improve economic conditions within the community as well as access to locally grown healthy foods.

## Partner Organization:

Eastern Nevada Food Bank (ENFB) is a Public Charity 501(C)3 Non-Profit Community Development Corporation (CDC) chartered in the State of Nevada. As a CDC, ENFB is developing a solution to assist with healthy food availability within USDA designated Food Desert Districts across the nation while creating a new “American Farm” business model with the revision to the “Food Bank” business model.

ENFB and its staff teamed up with the David E. Norman Elementary School in Ely (2013), the 5<sup>th</sup> grade class at the Ely Learning Bridge Charter School (2014), the High Desert Montessori Junior High School Science Program (2015), and the Carson High School FFA Coordinator (2015), to launch this educational program to inspire students to look at agriculture, specifically Hydroponics, as a professional career choice. The University of Nevada Cooperative Extension Office had teamed up with ENFB to provide expertise when needed. A past ENFB Pilot Program in Ely’s David E. Norman Elementary School (Mrs. Hansen’s third grade class) had shown promising interest from students, staff, and teachers.

## Project Approach:

Students were involved in the building of the systems, production processes, data analyses, and harvesting which provided them with comprehensive training on what is involved in agriculture production. The goal was to establish a curriculum that meets school requirements while also

allowing for an engaging hands-on experience for students to learn the sciences involved in various forms of agriculture; in this case hydroponics. The project was also centered around encouraging next generation growers through exposure to indoor production with a digital system approach; targeting the IT savvy generation.

To initiate the project, the initial system needed to be piloted. Then the development of a basic hydroponic system curriculum to educate students, teachers, staff and volunteers was completed. The single kit systems were assembled for placement and various school boards were met with to identify optimal placement for kits. Students were involved in transplanting seedlings from the incubator to final 10 gallon system. Students and teachers were instructed on how to manage plant growth and chart data collected including air temps, humidity levels, water temps, pH levels, PPM levels, nutrient mixture composites and dates, plant length, product yields, and product testing. Schools then were able to harvest vegetables and consume as fit by their meal program. This process was repeated by the four schools that were able to participate.

### **Detailed breakdown of project approach:**

#### *Initial project approach*

Project coordinators wanted to ensure that they had created a useable and efficient system, so in 2013 ENFB's first 10 gallon tomato growing system was built by ENFB staff and placed into the David E. Norman Elementary School's 3<sup>rd</sup> grade classroom for use with a small propagation station. The plants were germinated by the classroom students and two prime specimens were transplanted into the system. CFL light bulbs were used along with electronic devices that measured room temperature, humidity levels, total dissolved solids, pH, and water temperature. The students were to take turns every morning and complete a log of each sensor reading and monitor plant health. This allowed them to work out any kinks before installing the next systems.

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## Class learns, takes part in hydroponics system

By Lukas Eggen  
Ely Times Staff Writer

The end of school year at David E. Norman also marks the end of a very special project for third grade teacher Rolayne Hanson and her class.

The class was chosen to help grow a tomato and watermelon during the spring. But you won't find any soil here. The class used a hydroponics system.

"It has been an amazing experiment," Hanson said. "The kids have learned how to research and understand structures, functions and stimuli of plants. The students have gained a greater knowledge of how plants grow and the fact that plants can grow without soil with water and nutrients and artificial light."

The Eastern Nevada Food Bank in collaboration with the University of Nevada Cooperative Extension 4-H Program, and the White Pine Farm Bureau Federation donated the system. Once the school year is over, the system will be displayed at the UNCE office, located at Campton Street.

While this school year introduced hydroponics to many of the students for the first time, the students worked together to collect and record data and problem solve. That included working to rem-



Rolayne Hanson's third grade class learned about hydroponics systems during the school year. (Staff photo by Lukas Eggen)

edy a virus affecting the tomato's leaves, something the students researched and found a natural cure for by mixing baking soda and water together and applying it to the leaves with a cue tip.

"We learned a lot about structures, functions

and stimuli of plants," Student Celeste Garza said. "We learned that when you talk to plants, the positive energy helps them grow bigger."

From the first day, the students were excited to learn, Hanson said and the class is involved in the day-to-day growing and maintenance of the plants.

"We data collect every day so not only do we take the water temperature, but the PH balance to make sure the balance of water to nutrients is good," Hanson said. "We have a CEO collect the data and share it with all the students who

are charting and recording it in their science journals."

The goal is to inspire students to look at agriculture in a new light and get more students interested in the field as well as promoting eating healthier foods.

"When we first started the incubator system, the kids were more excited than what I've seen at Disneyland," Jim Garza said. "That was the intent to inspire kids to look at agriculture as a new way of life. And advanced agriculture, not your typical agriculture. Hydroponics conserves energy, water, resources, labor and increases yield."

Garza said they are applying for a grant that will allow a hydroponics system to be placed not only at Norman and McGill Elementary School, but Lund, White Pine Middle School and White Pine High School as well. If they receive the grant, the hydroponics systems will also have pumpkins in addition to tomatoes and watermelons. But the students learn more than just about hydroponics. There's science and math involved as well as learning about the possible advantages to hydroponics on a global scale in countries where soil is scarce. And the hope is they can inspire students to help get involved to ensure the future for everyone.

"If we can energize our students from a young age, they're more likely to put that into practice throughout their lives," Hanson said. "Many of them are growing their own gardens now. We talked about as a world in some places; soil is at a premium and how this can help in the world. We're getting a couple of them to think globally already."

In December 2014, the second prototype was placed in the Ely Learning Bridge Public Charter School for classroom participation along with the first draft of the curriculum. Over a period of 4 months in early 2015, the classroom students built a second system using this model while holding curriculum training classes every Thursday in Mrs. Montgomery's 5<sup>th</sup> Grade classroom in Ely taught by the project lead. The students were hands on in assembling a new prototype with LED lights instead of past halogen applications to conserve power usage in the room with only a shared 20amp circuit with other classrooms. It was a great improvement for the system and program.

The incubators were purchased and issued for use. Classroom temperatures and humidity levels needed to be understood by the students at day and night time hours before planting seedlings into the system. They needed to become familiar with Total Dissolved Solids (TDS) in water quality, pH level balancing, and nutrient absorption by the plant at the seedling stage of growth which are all important components of hydroponic production. ENFB held classroom educational sessions every Thursday during the Spring of 2015 and discussed many topics, educating the students to feel ready to move forward with planting.

Below is a photo of the propagation station the students used.

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## Project Goals:

Start student afterschool educational program with students / volunteers by taking pre-workshop survey to identify all current knowledge of Plant Biology.

The research and development phase and collection of data for piloting of the first system with the Ely Learning Bridge Public Charter School created significant delays and the afterschool education program was not able to be completed. Time was needed to gain student interest first. The focus needed to be directed toward a safe and successful growing system kit before promoting the system in the community. In other words, we needed to be sure we had an efficient system and processes before exposing large assemblies to the project.

Transplant seedlings from Incubator to Final 10-gal system:

Seeding had taken place the first week of January 2015, after the holidays and when the students returned to class. Room temperature dropping over the holiday break is a big concern of ENFB since this is not something they could control.

Manage plant growth and chart data collected (air temperatures, humidity levels, water temperatures, pH levels, ppm levels, nutrient mixture composites and dates, plant length, product yields and weight and product tastes:

The students in Mrs. Montgomery's classroom had charted room temperatures and humidity levels at both the highest and lowest point during each day in session during the Spring 2015. As the system is implemented and growth stages are engaged, other data was collected. The following devices are part of the system kit construction that help collect the data to chart.

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## Growtronix Base System

Nutrient recipes were improved upon based on plant tissue analysis submitted for report generation. The 10gal system was reduced to 5gal plastic tanks and new halogen light fixtures replaced the CFL bulbs used in the small spotlight fixtures. This system was used in the UNCE Cooperative Extension classroom by Seth Urbanowitz while holding classes with tribal youth regarding agricultural practices.

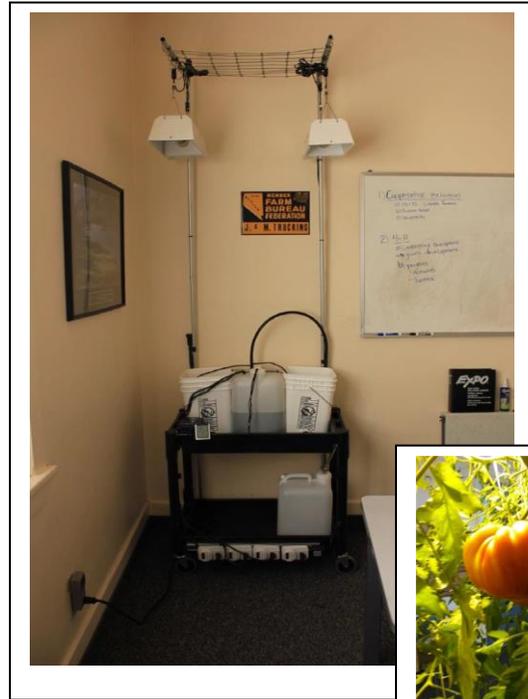
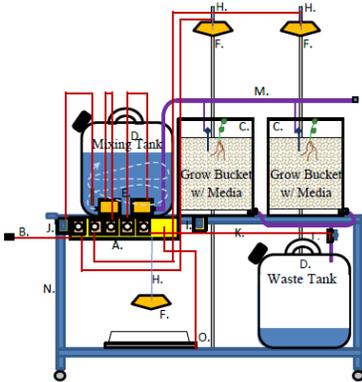
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## Plant Industry Division

### 4-H Two Pod Hydroponic Growing System:

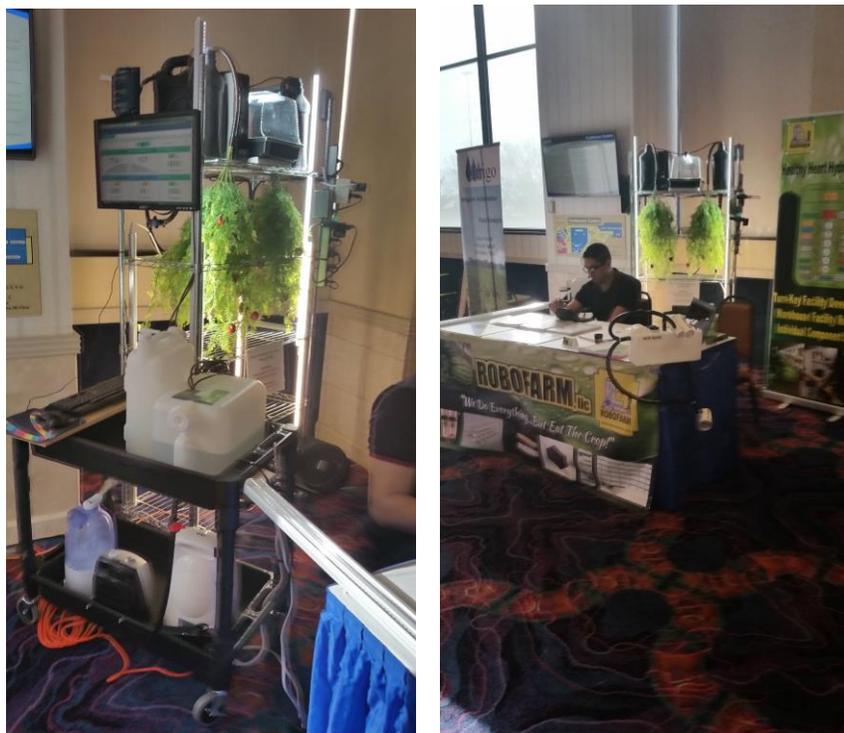
	Cost	Qty	Total
A	15.00	5	64.40
B	33.34	1	33.34
C	5.15	2	10.30
D	12.10	2	24.20
E	18.83	2	37.66
F	59.95	3	179.85
G	14.95	2	29.90
H	11.47	3	34.41
I	4.55	1	4.55
J	157.99	1	157.99
K	22.99	1	22.99
L	10.00	1	10.00
M	10.00	1	10.00
N	5.00	1	5.00
O	68.43	1	68.43
P	31.42	1	31.42
Misc.	60.00	1	85.00

Does not include  
taxes / shipping 786.05





In early 2016, the third and fourth systems were built and delivered to the High Desert Montessori Public Charter School in Reno, Nevada and to Carson High School. per a request from a non-profit organization aware of our program. The curriculum was still under final draft development but a fourth system was delivered to the 7<sup>th</sup> grade science classroom of Marisa Cooper. The facility was on display at the 2016 Nevada Small Farm Conference in Reno prior to delivery. It was fully computerized as well with a desktop provided by the grant with software and sensors provided by the grant. It was still a prototype and needed to be assessed for efficiency.



The funds from the grant were used to purchase components for each system as well as basic nutrient liquids to help establish a first grow session for experimentation. Many of the recipients wanted to experiment with organic teas made by the students in the system provided.

Each recipient of the system had been emailed the final Student and Teacher Training Manual/ curriculum and agreed upon taking the responsibility to consider the use of the curriculum with their systems. Based on the rapid discoveries in the new industry of hydroponics, the curriculum is current and up to date on tomorrow's technology knowledge to take classrooms into the 2020 decade.

**Goals and Outcomes Achieved:**

The goal of this project was to provide an increase in knowledge for project observers and participants with regard to urban farming hydroponic methods of growing Nevada Specialty crops. This transfer of knowledge was to occur through utilization of project site and website visits.

During the first three phases, 91 total visitors were hosted. This was well above our projected number of 50. The breakdown of those visitors is as follows: 42 specialty and website based crop growers, 30 Urban Growers, and 19 others. 26 students were involved in the 3<sup>rd</sup> grade class at

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David E Norman Elementary School and 20 were involved at the Ely Learning Bridge Charter School.

During the fourth phase, the project was shared with an estimated 1,600 students, parents, and faculty at Churchill County High School. Each of these visitors increased their knowledge of Nevada Specialty crops, and the viability of alternative methods of production. The initial goals were far exceeded by the end of the project. The urban growers were shown how the methods could allow for four growth periods in a given year. This was well received by the target audience. As a result of this knowledge one grower/producer placed a similar system in their business. They have been able to replicate the growth cycle. All participants were given this knowledge as a part of the project presentation.

Approximately 23 students were involved at High Desert Montessori Public Charter School and an estimated 6 FFA students managed the system at Carson City High School. The FFA students were targeted since they have a greater potential at pursuing an agriculture focused career in the near future, particularly when resources such as the hydroponic systems provide them with production and business planning skills.

A survey was utilized during the beginning of the project to assess an increase in knowledge gained via the content provided on the website. This was not received well by the participants and led to its discontinuation. Subsequent participants were informally asked questions to gauge their understanding of the material presented. On average the participants increased their knowledge 80% - 100%. The effectiveness of the website was determined by repeat visits and number of pages viewed per individual that accessed the site.

The surveys that were initially intended to measure knowledge and production outcomes were not issued due to the delays that were experienced in research and development of the system and the corresponding curriculum. Project leads prioritized on ensuring the systems were functional and practical for the different class-room ages to allow the curriculum to reflect a comprehensive program that could be duplicated. Further, problems and delays were experienced with schools implementing the program long enough to see crop results since the heat was often reduced by facilities management during holiday breaks and the plants froze or the systems were only used by the biology classes for a month to assess the germination process. As a result, the survey assessments were overlooked as the system and curriculum delays were addressed.

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## Short-Term Outcomes:

Every project visitor and participant learned about Nevada Specialty Crops, and the ability to grow in a self-contained system that could be used in limited space. This increase of knowledge motivated several participants to find new applications for the system. After the initial presentation and discussion of the project and system, participants were informally asked questions to gauge their understanding of the material presented. On average the participants increased their knowledge 80% - 100%. This increase is supported by the responses of participants who claimed no prior knowledge or experience with hydroponics at the start of each system.

## Long-Term Outcomes:

Beyond the learning goal for Specialty crops, the science departments at the school are incorporating lessons for Biology, Chemistry, Physics, Calculus, and several other subjects into the project. Long term, this project will enhance STEM education at Churchill County High School. This Outcome is exciting and immeasurable in its future impact.

Of the nearly 1600 individuals that learned about the system including students and others, only a handful (12-15) were capable of implementing a program of similar design. Those participants were shown how the system functioned, and they were provided with support to set up their own system. Those select growers have since implemented their own solutions and are actively harvesting crops from them.

## Benefits:

This program is driven as an educational tool for awareness to food nutrition, inspiring advanced agricultural practices in the minds of students to become new farmers, allowing everyone to be involved in research and development of a hydroponic system, while increasing innovation to develop sustainable farming practices locally as a community project.

Hands on techniques were executed in mechanical engineering, electrical engineering, electric and water conservation, water quality, nutrient chemistry, plant biology, seed germination processes, and business administration topics of study. The program must be run for multiple years on the same topics of curriculum to allow slow absorption of all areas of knowledge as each year, a deeper dive takes place by the students in their individual areas of interest. This multi-year process will allow the student to select the area of most interest and lead in project management in that area for the organization, opening the door for college preparation into that specific field of study.

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## Lessons learned:

The original design of the kit prototype had produced issues with algae and pathogen development in the perlite medium utilized in the pod around the root zone. This was hard to mitigate with 35% hydrogen peroxide at a 4ml per gallon of water mixture when poured once a month into the pod.

The decision was made during the research and development process of the first prototype to eliminate the medium, go to a more controlled closed water system per NFT samples, and replace the downward directional halogen lights with horizontally installed T8 LED light fixtures that did not have light rays stimulating algae and pathogen growth at the plants root zone. This challenge was accepted by the Chinese Manufacture and (250) LED T5 Tubes.

Crop yields can be increased with removal of isle space in the facility based on modular rolling shelving units that slide against each other and share vertical T5 light fixtures alongside of plants to allow the perfect light absorption without excess power needs.

Nutrient mixtures can play a role in the healthy development of the crop and fruits when monitored and mixed precisely according to the past history of recipes.

The use of hydrogen peroxide – 35% food grade- will help cleanse out build ups of nitrates and sulphates around the root zone, allowing healthy root hairs to be developed to extend the longevity of the plant.

Youth today are tech savvy, we need to move agriculture into the biotechnology field of application without losing the natural process of plant life cycles, just understanding them more deeply and using that knowledge to their advantage financially and holistically to sustain human kind.

## Contact Information

For questions and collaboration on future projects, contact Jim Garza at [www.robofarmusa.com](http://www.robofarmusa.com) (775) 293-5567 or by email [jimgarza999@yahoo.com](mailto:jimgarza999@yahoo.com).

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See attached Student and Teacher Manuals for the 4-H Hydroponic Science Program.

## Contact Information

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See attached Student and Teacher Manuals for the 4-H Hydroponic Science Program available at the end of this report. (Need to attach curriculum to report email)

## Project Title

[Carson City Harvest Hub Development \(Project Terminated\)](#)

## Project Title

[Measuring the Efficiency Study of Salanova Lettuce in High Desert Hoop House Production](#)

## Project Summary

In 2013, the Salanova brand of lettuce became available to the United States seed market as an option for lettuce production. Salanova is a unique variety of lettuce that produces leaf lettuce on a head lettuce core. The claim made by Salanova was that a significant labor savings was seen during harvest due to the formation of the lettuce head. When Salanova became available, the seeds were between 120% and 1,300% more expensive than traditional lettuce seed.

Lettuce is a popular specialty crop in Nevada for a variety of reasons. First, it is a cold tolerant crop which allows farmers an early spring and late fall production option. Second, it is a crop well suited to hoop houses, which have become an increasingly popular tool. Finally, the market demand for locally grown lettuce is very high.

The University of Nevada, Reno Desert Farming Initiative decided to test the claims made by the Salanova brand to determine if the increased seed cost was worth the investment by farmers in our region and if the labor savings were significant.

## Project Approach

Year 1 (2013-2014) The Desert Farming Initiative accomplished four plantings of Salanova and comparative lettuce varieties. Throughout the year, we experienced several issues including pest issues that affected the harvestable quantity of lettuce.

Even though the quantity of lettuce harvested was affected, there was an anecdotal difference between harvesting the Salanova lettuce and the comparable varieties. The Salanova lettuce was easier to cut in one motion versus the other varieties where there was no central lettuce core.

While harvesting each lettuce variety, the farm manager and students recorded the time it took to harvest each bin. The bins, on average weighed 6lbs each. The data was reviewed and shared with farmers.

#### Year 2 (2014-2015)

Six plantings of Salanova and comparable lettuces occurred. It was during this time that the project staff held a lettuce tasting at the University of Nevada, Reno Downunder Café. We fed students, staff and chefs the Salanova brand lettuce and comparable varieties. There was no difference reported. Because of the response, we decided to forgo further taste testing of the lettuce.

On January 22, 2015, the farm manager presented the initial information on this project at the Nevada Small Farm Conference. During the same conference, the project manager gave a tour to 25 participants discussing hoop house production including growing lettuces in hoop houses.

On September 26, 2015, this project was highlighted during the UNR College of Agriculture, Biotechnology and Natural Resources Field Day. A total of 678 farmers and community members visited the site and were given a tour of the lettuce hoop houses.

The Desert Farming Initiative partnered with the Western Nevada Specialty Crop Institute to inform farmers on growing lettuces in hoop houses. On December 5, 2015, the farm manager was the main speaker at the “Growing Greens in Hoop Houses Workshop” held at the Desert Farming Initiative site with 50 farmers in attendance.

#### Year 3

The Desert Farming Initiative compared yields in year 3. We compared the Salanova variety with comparable varieties of lettuce (Green Salad Bowl and Red Salad Bowl). Each harvested area was weighed separately to record yield before being combined for sale. The numbers below show that the comparable varieties provided a higher yield than the Salanova lettuces.

The project partners were involved in all assigned areas of the process.

#### **Goals and Outcomes Achieved**

The project team and partners were able to address all goals in the grant.

#### **Goal 1:** Providing data on high yield, low cost production practices

Results: The Desert Farming Initiative recorded data on labor, yield and revenue to determine whether Salanova lettuces were significantly better than comparable lettuces. Although the Salanova brand did take less labor to harvest (See Chart 1), the yield of comparable lettuces was

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significantly higher than the Salanova varieties. (See Chart 2). The comparable lettuces were able to provide more revenue per square foot over Salanova because of the high yield.

Time to harvest Salanova: 0.28 minutes/sqft

Time to harvest non-Salanova: 2.60minutes/sqft

Yield Salanova: 0.20lb/sqft

Yield non-Salanova: 0.83lb/sqft

**Revenue less Labor Cost Salanova: \$0.62/sqft**

**Revenue less Labor Cost non-Salanova: \$2.33/sqft**

Chart 1:

	Salanova		Non Salanova
sum minutes	765	sum minutes	2758
number of records	90	number of records	147
average time(minutes)	8.5	average time(minutes)	18.8

Chart 2:

### Salanova

<u>section</u>	<u># heads</u>	<u>weight (lb)</u>	<u>Average head wt (lb)</u>	<u>lb/sq ft</u>		
A	18	2.50	0.14	0.17	seeded:	12/21
B	18	3.13	0.17	0.21	transplanted	1/8
C	20	2.88	0.14	0.19	harvested	3/7
D	16	3.38	0.21	0.23	total yield (lb):	11.875
					yield/sq ft	0.20
<b><u>Green/Red Saladbowl</u></b>						
<u>section</u>		<u>weight (lb)</u>		<u>lb/sq ft</u>	<u>seeded:</u>	
E		4.13		0.28	harvested	3/7, 4/4
F		6.75		0.46	1st harvest yield (lb)	21.50
G		6.50		0.44	2nd harvest yield (lb)	27.75
H		4.13		0.28	total yield	49.25

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					yield/sq ft	0.83
E		6.63		0.45		
F		7.38		0.50		
G		8.25		0.56		
H		5.50		0.37		

Notes: The comparable lettuces used in Chart 2 were Red Salad Bowl and Green Salad Bowl. Numerous varieties of lettuces were used to time the harvest in Chart 1. The Salanova was planted at the recommended spacing per the manufacturer. In the future, we would decrease the spacing by half to get better yield in the time that the comparable lettuce reached maturity. The lettuce was sold at \$10.00 per 3lb case.

**Goal 2:** Provide information to farmers on the best methods for growing lettuce in hoop houses.

Results: The information acquired during this project was presented during field days and classes.

January 22, 2015 – NV Small Farm Conference presentation (21 farmer attendees)

September 26, 2015 – UNR Field day presentation and tours (678 attendees)

December 5, 2015 – Class on lettuce and tour (50 attendees)

November 19, 2016 – Class on hoop houses (31 attendees)

The Desert Farming Initiative continues to work with farmers individually on growing lettuces in hoop houses (Assisted individually at least 3 farmers one-on-one. 1 farmer is now growing over 300lbs of lettuce weekly due to this project).

**Goal 3:** Describe consumer differences of Salanova versus non-Salanova varieties

Results: Between feedback from the consumer lettuce tasting in Year 1 and continued feedback from customers, there was no discernable consumer difference between Salanova and non-Salanova varieties. Because of this feedback, it no longer made sense to quantify the differences and instead we focused on the yield and labor differences.

Consumer taste testing: December 3, 2013

## Beneficiaries

There were three groups that benefited from the information in this project.

### Group 1: Local Farmers

Results:

NV Small Farm Conference presentation – 21 attendees

UNR Field day presentation and tours – 678 attendees

Class on lettuce and tour – 50 attendees

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Class on hoop houses – 31 registered

The project manager and partners continue to work with local farmers on hoop house growing and lettuce production. The project staff gives tours of the hoop houses weekly. The focus of the efforts has shifted slightly from “how” to grow lettuces to the nuances of pest management, marketing efforts and food safety. Lessons from this project will be used in future partnerships with the Nevada Department of Agriculture on food safety and post-harvest handling of greens.

## Group 2: Students

Results: Students were involved in all aspects of this project from planting seeds, record keeping and harvesting. Each student was able to articulate the need for hoop houses in Nevada and how lettuce grows in the hoop houses. We hosted 26 student interns and over 150 student volunteers during the project.

## Group 3: Community and Chefs

Results: Because of this project, increased amounts of locally grown greens were supplied to market. The lettuces were sold to the UNR dining facility and local restaurants during the duration of the program. All program income was used on supplies for the program or student efforts.

## Lessons Learned

Throughout the project, new information was learned on growing lettuce in hoop houses. The project staff first learned how much variety impacted results. In the first year, the project staff planted over 20 different varieties of lettuces, including Salanova, to determine the best performing variety. We were surprised on how some lettuces did not do well in our climate even with the help of a hoop house.

We were also surprised on the limited time it took to harvest the Salanova versus comparable lettuces. Initially, the time difference did not seem that great. However, after looking at the results, the harvest time of the Salanova brand did present labor savings.

Because of this project, the Desert Farming Initiative has created a healthy market demand for locally grown greens. We will continue to plant, harvest and sell lettuces to create income for the initiative and pay for student interns.

## Contact Person

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## Nevada Specialty Crops Export Promotion

### Project Summary

The Nevada Specialty Crops Export Promotion Project's purpose was to enhance the competitiveness of specialty crops in Nevada by increasing participation of local businesses in the export market; increased participation created a competitive advantage for those producers who gained market exposure by exporting their products while strengthening Nevada's produce industry by increasing sales. Diversifying into international markets increase exposure of specialty crops and a company's ability to handle any market shifts of economic downturns.

This is accomplished by educating companies on the process of exporting and how to do their own international research. By partnering with the Nevada Industry of Excellence through their ExporTech program, we are able to provide in-depth training to specialty crop companies and prepare them to export within 6 months after finishing the class.

### Project Approach

The project approach was to work with our partners: with local USDA offices, Department of Commerce, Nevada Industry of Excellence, Small Business Administration, and the Nevada Industry of Excellence to spread awareness to specialty crop companies of this training opportunity. Once a company signed up, they would pay the cost of the class up front, and get reimbursed only when they completed an International Business plan.

### Goals

1. Increase export specialty crop business participation in global markets by 50%.
2. Increase export knowledge and awareness of Nevada specialty crop products state-wide.
3. Improve the competitiveness of specialty crop businesses who become an exporter.

### Outcomes Achieved

- Goal number one was a partial success. We had one company register for the class, where available funding would allow for three companies to sign up for the class.
- Goal number two was successful. Even though we weren't able to fill the three class spaces, we talked to about 30 different companies about the training. Ten of the companies were extremely interested in participating and have long term goals of exporting. Unfortunately these companies couldn't make their schedules align with the dates of the classes.
- This was successful for the company that participated in the training.

Briefly summarize the activities and tasks performed during the entire grant period. Discuss the tasks provided in the Work Plan of the approved state plan.

*Expected Measurable Outcomes:*

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Activities consisted of participating in the ExporTech training. During this training the company met with experts 3 different times (1 weekend for 3 months). During these weekends they went through an in-depth explore exporting training, learned about Harmonized Codes and how to properly do international market research, and were given an intern to help with this research. They put together an international business plan and during the final class, present the business plan to a panel of experts. The experts then give their feedback and ensure that the plan is ready to go so that the company can feel confident to begin exporting.

- Though this goal was not completed, please provide the percentage increase (or decrease) to show project actual outcomes.

This project had funding to put 3 companies through the export training. Even though there was a lot of interest, only 1 spot was taken. This company had great success through with this program and reported \$2 million in export sales directly related to the training received from this program in the following year.

## Beneficiaries

- The participating company
- The 30 companies that learned about the training and are now considering having an international component to their current business plan
- The Nevada Department of Agriculture, and partner government agencies for increased collaboration between each other and the private sector.

## Lessons Learned

We learned that specialty crop businesses are very interested in the idea of exporting, but are not currently in the position to take the leap. They are small businesses that are growing and don't have the time/staff at the moment to pursue a new market. It would be important to look at this project again in the future when current businesses are able to get to the point where they are comfortable hiring more staff to pursue international markets.

## Contact Information

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## Additional Information

The Return on Investment (ROI) for this project was a huge success. The \$2,500 that was spent to train the participating company supported them in achieving \$2 million in export sales in the first year. The ROI of taxpayer dollars used for company profit is 80,000% ( $\$2,500/\$2,000,000$ ).

## Project Title

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## Increasing the Awareness & Sales of NevadaGrown Specialty Crops

### Project Summary

The purpose of this project is to increase consumer awareness and to increase sales of Nevada specialty crops. Many businesses and consumers are unaware of the diversity and variety of Nevada agriculture. There is a general lack of knowledge by the Nevada consumer of what specialty crops are grown and available in the state. It is estimated that less than ten percent of the population currently purchases locally grown food on a regular basis. This project focuses efforts to the remaining 90 percent of the population as to the health and economic benefits of purchasing local specialty crops. This project expands upon the national USDA Know Your Farmer, Know Your Food initiative that was designed to create new economic opportunities by better connecting consumers with local producers.

This project is timely and important because demand for locally grown food continues to surge. Industry data indicate that local food sales totaled at least \$12 billion in 2014 and estimate that the market value could hit \$20 billion by 2019. Nevada producers can benefit financially by educating consumers on the benefits and availability of locally grown food.

This project compliments previously funded SCBGP projects as it utilizes the website and social media marketing that were developed in previous awards while not duplicating any of the work.

### Project Approach

Based on the work plan, the following activities were performed:

**Bank of Information** - This included creating a 12-month schedule to feature specialty crops and specialty crop producers through various media outlets. Feature stories were written, and a bank of high quality photos were established for distribution to media outlets.

- Six farm photography sessions were held utilizing three commercial photographers in Northern and Southern Nevada to photograph specialty crops throughout the state. Farms included Custom Gardens, Snyder Family Farms, Hyde's Herbs, Herbs by Diane and several other farms and farmers markets in Northern and Southern Nevada. As the project matured, project staff identified missing specialty crop photos and hired photographers to take pictures accordingly.
- A photo bank was established on the cloud service SmugMug that could easily be accessed by NevadaGrown staff and media. The photo bank is sorted into folders of different specialty crops and specialty crop growers throughout Nevada and is being utilized by media, government organizations, public relations agencies and other organizations that request photos of Nevada agriculture. It has been utilized extensively, including providing more than 50 photos for a NevadaGrown cookbook of seasonal recipes. NevadaGrown continues to update and add photos to the library. The site currently hosts more than 1,500 photos with an additional 500 to be uploaded. Approximately 10 percent of the photos on the site are non-specialty crop. Grant funds were not used for these photos or the cloud service costs to host them.

**Specialty Crop Seasonal Harvest Chart** - A seasonal harvest chart was completed showing the harvest season for specialty crops in Northern and Southern Nevada. It is a two-sided color chart in pdf format and was uploaded to the NevadaGrown website for consumer access in April 2015. The chart has been hugely successful. The first printing of 2,500 was distributed within a few months, and an additional 10,000 copies were printed. Following are some of the venues where the chart has been distributed: farms, farmers markets and special events in Northern and Southern Nevada; food distributors and restaurants; NDA for distribution to Senior Farmers Market Nutrition Program (2,000 copies) and WIC recipients; churches and local schools. NevadaGrown has committed to NDA to provide the chart to the Senior Farmers Market Program in Northern and Southern Nevada for the 2017 season.

**Special Events** - The project committed to attend at least four events per year for two years to promote Nevada specialty crops. This project exceeded the goal. Events were chosen based on the demographics of the event as the project aimed to target consumers and professionals interested in purchasing Nevada specialty crop products. A professional tabletop display board was purchased, and NevadaGrown staff attended the following events to promote specialty crops:

- 2014: Renown Medical Center Spring Farmers Markets (1,000 attendance); Reno Earth Day (5,000 attendance); Washoe County Health District Health Fair (300 attendance); Governor's Conference on Agriculture (300 attendance)
- 2015: Renown Medical Center Spring Farmers Markets (1,000 attendance); Nevada Women's Expo (8,000 attendance); Reno Earth Day (5,000 attendance); 39 North Farmers Market (3,000 attendees); Governor's Conference on Agriculture (100 attendance)
- 2016: Renown Medical Center Spring Farmers Markets (1,000 attendance); 39 North Farmers Market (10 weeks @ 3,000 per week); Farm to Table Trade Meeting and Mixer (150 attendance – industry professionals)
- NevadaGrown staff made presentations at additional events including trade meetings and church and community functions at the request of event organizers. Estimated outreach was approximately 1,000 over three years.

### Marketing Specialty Crops

- The Reno Gazette Journal featured a series of bi-weekly articles from July 2013 through June 2014 featuring seasonal specialty crops and Nevada growers. Producers reported significant sales increases when their farms were featured in the articles.
- Press releases and featured articles were sent to media highlighting Nevada producers and events. These met with limited success due to lack of interest from media.
- Monthly blogs featured stories on specialty crops and growers.
- Social media: NevadaGrown utilizes Facebook, Twitter, Instagram and Pinterest as social media tools to attract and inform consumers. Facebook posts are scheduled daily, and "likes" continue to increase. More efforts are being put into Instagram to reach younger adults.

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**Grower Surveys** – The first grower survey was completed in March 2016, and an additional survey is planned for January 2017 to measure the effectiveness of this project. Those results will be submitted to NDA in a post-grant report. Summary results from the first survey are below:

- An online survey was sent to 147 contacts with 24 responses.
- 15 producers (62%) reported increased sales. Seven (29%) reported sales remained the same, and two (8%) reported decreased sales.
- Of the 15 producers reporting increased sales, 12 answered that NevadaGrown marketing efforts helped increase sales.
- Reasons for decreased sales were poor growing season, lack of distribution, staff challenges, lack of marketing, intentional decision to downsize, internal marketing changes and “just starting out”.
- Marketing efforts that were used most (in order): website listing; NevadaGrown cookbook; logo bags, produce ties or stickers; logo banner; social media; flyers and rack cards; radio, television, press releases; farmers markets.

**Partnerships** were a strong point of this project and strengthened project results:

- **Western Nevada College Specialty Crop Institute** produced a NevadaGrown seasonal cookbook and 12 recipe cards using seasonal recipes. The hard cover books are sold at retailers throughout the state and serve to educate consumers on Nevada agriculture and reintroduce many to cooking and to the kitchen. The recipe cards contain NevadaGrown contact information and will be distributed to producers to give to customers at farmers markets and events. Both WNC projects utilized the NevadaGrown photo library extensively for pictures. NevadaGrown incurred no costs for these projects.
- **Nevada Dept. of Agriculture** – Staff from NDA distributed seasonal harvest charts to recipients of the Senior Farmers Market Nutrition Program and the new WIC program that serves mothers and young children. It was a win-win for both organizations as NevadaGrown provided educational materials, and NDA distributed them to target markets.
- **Reno Gazette-Journal** worked with NevadaGrown and the WNC Specialty Crop Institute to produce a one-year promotion *NevadaGrown Home Means Delicious*. For one year, the RGJ published bi-weekly articles in the Food Section on seasonal specialty crops along with producers and where the crops could be purchased. Recipes were solicited from consumers that were printed in the newspaper and featured in the cookbook.
- **39 North Downtown** is a nonprofit organization in Sparks, NV, with a vision to build community. The organization produces a popular summer farmers market and other events throughout the year. NevadaGrown was invited to be an advisor on how to attract local farmers and promote Nevada agriculture, and now works with 39 North on an ongoing basis. Promotional literature including the seasonal harvest chart are distributed at the events.
- **Renown Health**, associated with Renown Regional Medical Center, approached NevadaGrown in 2014 to host a spring farmers market, and the event has grown to include a holiday market in the winter. Renown is also working with NevadaGrown to

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purchase produce from Nevada producers, and they have produced several videos promoting healthy eating and Nevada agriculture.

## Goals and Outcomes Achieved

Measurable outcomes for the grant were as follows:

- *Complete a database that consists of all Nevada specialty crops, their producers, and what potential specialty crops can be grown in the state.* This was accomplished through the NevadaGrown website which lists 51 vegetable and 26 fruit specialty crops and links to growers who produce them. Additionally, the harvest chart lists the most popular specialty crops and the months they are available. Potential new specialty crops will be developed based on consumer demand and market trends.
- *Attend at least four events per year for two years.* This goal was exceeded with events in one additional year and more than four events per year. Estimated consumer outreach: 6,600 in 2014, 17,000 in 2015 and 32,000 in 2016 for a total outreach of almost 56,000 consumers and businesses.
- *Create a seasonal eating chart.* This was completed in April 2015. It was uploaded to the NevadaGrown website, and more than 12,000 color copies have been printed and are being distributed throughout the state. NevadaGrown will continue to print and distribute this chart which is popular with consumers, chefs and community organizations.
- *Increase the number of NevadaGrown followers on Facebook and Twitter by at least 1,000 per year.* The NevadaGrown Facebook account had approximately 2,500 likes in January 2014, and it has increased to 4,800 in November 2016. The goal of 1,000 likes per year became difficult to obtain due to policy changes in Facebook that restricted the page views unless posts were boosted with financial costs incurred.
- *Survey growers annually to measure increased sales.* A survey was not conducted in the first year since marketing materials and program were still being developed and distributed. A survey was held after the harvest season of Year 2, and an additional survey will be conducted in January 2017. Those results will be submitted to NDA for inclusion in the grant results.

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## Goals for the project were as follows:

- *Increase public awareness and purchasing of NevadaGrown specialty crops.* This goal was met as indicated by the annual survey of growers that indicated increased sales and benefits from marketing efforts.
- *Number of participants in the program.* Target goal was to increase approximately 3 – 5 specialty crop producers market access. This goal was exceeded as 35 producers joined the NevadaGrown marketing program. They ranged in size from micro urban farms to large producers that joined for the marketing benefits. Hops and mushrooms were new specialty crops introduced, along with two new micro-green producers. However, part of this success was negated by new producers who failed during the grant period (7 of the 35).
- 

**Long term outcome** The NevadaGrown team will continue to monitor specialty crops in Nevada and update the databases and seasonal eating chart as changes occur. With several new partners, NevadaGrown will continue to use social media and local media sources to increase awareness of specialty crop producers and help producers increase sales.

## Beneficiaries

The beneficiaries of this project were specialty crop producers and local consumers. Approximately 200 specialty crop growers benefited, along with outreach and education to more than 55,000 consumers. Additional beneficiaries included retailers, restaurants and institutions who sell Nevada specialty crops.

## Lessons Learned

- Drought - While this project was successful, Nevada producers encountered one major challenge that adversely affected specialty crop production: **the ongoing drought in Nevada and the western United States**. Several producers discontinued farming after a few frustrating years of little or no water and no relief in sight. Additionally, many farms reduced crop production due to lack of water, and individuals considering beginning farming backed out due to lack of water.
- Partnerships – Support for local agriculture was evidenced by the new partnerships developed during this project. Most rewarding was the fact that non-agricultural businesses and organizations such as Renown Health and 39 North reached out to NevadaGrown to offer support and resources.
- Press releases and featured articles proved to be difficult to pitch to media for publication due to lack of interest or competing events for news. Due to this unforeseen challenge, NevadaGrown utilized social media as a means for outreach to consumers.
- Farm failures – NevadaGrown actively pursued recruiting additional farms to our program, resulting in 35 additions in a three-year period. Failure of seven of the new farms to remain in business was a stark reminder of how challenging and difficult farming is as a profession.

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## Project Title

Farmers Assistance Program Management

## Project Summary

Much of Nevada's produce comes from small farms which are exempt from the FDA's Food Safety Modernization Act (FSMA), Produce Safety Rule (PSR) regulations. Minimal regulation exists for Nevada grown produce and the primary food safety enforcement pertains to meat, dairy, and public events. There are no regulations in place for small farms to verify that produce was safely grown and handled when it comes to product sold at markets, road-side stands, CSA direct subscription, and through other direct marketing channels. Small farms that grow produce commonly consumed raw and that falls within a designated gross-income range are exempt from having to comply with the Food Safety Modernization Act (FSMA), Produce Safety Rules (PSR). However, if buyers require a food safety program, then growers must obtain a third-party voluntary audit. Since food safety awareness has progressed, more buyers in Nevada are beginning to require audits and consumers want assurance that growers are taking appropriate precautions as food is grown and handled.

The Nevada Department of Agriculture (NDA) sought to enhance the competitiveness of specialty crops state-wide by continuing to offer the Farmer Assistance Program that was offered through a SCBGP award under 12-25-B-1474. This program was continued to further encourage small farms to adopt Good Handling Practices (GHP) and Good Agriculture Practices (GAP) by providing technical assistance, training, and reimbursements for USDA GAP/GHP audit costs. By increasing participation in GAP/GHPs, a competitive advantage for producers is established for growers who adopt industry best practices that decrease the potential of food borne illness outbreaks. This also serves as a means of strengthening Nevada's produce Industry. The project goals complemented the previously funded project through providing assistance and management that will continue to assist small farms with adopting practices that are feasible and affordable to implement. A key mission of the NDA is to develop and support programs that decrease the potential of food borne-illness outbreaks and help farmers gain a competitive advantage in markets by adopting such practices.

To further encourage producers to participate in a GAP audit, the project included funding for reimbursing operation's audit costs. Audit expenses eligible for reimbursement included audit fees, water testing, soil testing, etc. This incentive created opportunity for small operations to receive certification that otherwise may not have been able to justify the costs.

## Project Approach

Throughout the grant six class room trainings were performed impacting the following groups: 100 master gardeners and 65 farmers from southern Nevada, 30 agriculture students from

Washoe County, 6 horticulture students with the University of Nevada Reno, 12 FFA students from Pershing County, and 20 FFA teachers from around the state. The focus of these trainings was to introduce GAP/GHP practices and encourage best practices on their production sites. Participants were also encouraged to assess the feasibility of pursuing GAP certification, which varied for each group. Master gardeners often work in school gardens so were a targeted training group due to their ability to share information with their assigned schools. The objective of targeting FFA students was to set them on the path of safe growing practices as they actively grow on campus and make career choices for their future.

Most FFA students select livestock and forage projects with few pursuing crop production. An added objective was to promote horticulture projects and encourage FFA students to pursue this as a career. An important skill when producing specialty crops is food safety which was emphasized during trainings to prompt program participation. As more FFA students coordinate specialty crop projects and develop the skill and desire to grow high-value crops, they must also apply safe growing practices to protect the integrity of their business. These efforts are anticipated to be long-term impacts of the outreach performed but were also short term successes in that two school farm groups went on to create food safety programs and request mock audits.

Five mock audits were requested during the project and three have successfully obtained GAP certification. In addition, the remaining two that received mock audits were school farms that have since created a farm food safety program. They have expressed that once the students complete a polished food safety program, they will request an official audit to inculcate added farm business skills in students.

At the start of the project there were 4 USDA GAP certified operations in Nevada and by the end of the project there was 8 initial audits performed in addition to 3 unannounced audits, making the total audits performed 11. NDA staff participated on the Small Farms Conference (SFC) planning committee in order to present GAP information at an event that caters to the majority of Nevada's specialty crop growers. Growers were notified of produce safety resources through various communication channels including email, phone, meetings, etc.

### **Goals and Outcomes Achieved**

***Goal 1:** Increase farmer participation in GHP/GAP from 4 to 10 by 2017, in 2015 increase participation by 10% and 20% by December 2016. Performance Measure: number of participants that have requested program services.*

The project began September of 2015 and ended September 2016 since the project under SCBGP 12-25-B-1474 was still ongoing. As a result of the the activities performed in 2016, including the six trainings and five mock audits, an additional 3 operations became GAP certified. All three of these operations participated in the mock audit program and the cost share. A total of 8 operations received initial audits (one farm requested two initial audits in order to separate fields), and 3 unannounced audits were performed. Further, there are 2 school farms that are

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working towards becoming GAP certified and 1 farmer. These operations are implementing practices that will facilitate compliance with the FSMA, PSR.

**Goal 2:** *Increase food safety knowledge and awareness of Nevada Producers statewide.*

*Performance Measure: Number of participants in workshops, roundtables, and symposiums through sign-up sheets.*

Beginning in September of 2015, NDA partnered with the University of Nevada Reno, College of Agriculture, Biotechnology and Natural Resources (CABNR), UNCE, two school farms, the Nevada Small Farms Conference, and Nevada FFA chapters to pilot an educational GAP program. As a result, five GAP trainings have been held since the start of the project. Three were held in Northern Nevada (total of 68 participants) and two were held in Las Vegas (total of 165 individuals attended). The newly trained GAP auditor spoke at all trainings familiarizing potential participants with GAP/GHPs and the Farmers Assistance Program.

A webpage was maintained and updated which included resources and forms for those wishing to participate in the program. A program fact sheet was developed and is handed out to cooperating agencies and other offices for distribution. The brochure that was created under award 12-25-B-1474 was also distributed at various events. An overview of the program and full application were completed and added to the website <http://agri.nv.gov/GAP/>.

In order to encourage more participation, staff will continue to collaborate with UNCE and UNR with the following: coordinating trainings on food safety practices and the GAP certification process, providing GAP mock audits, and in performing outreach at specialty crop stakeholder events.

Eleven Farmers Assistance Cost Share requests were received for operations successful at receiving GAP certification.

## Beneficiaries

The 233 individuals that participated in the trainings throughout the grant are the significant beneficiaries of the project. They were able to increase their knowledge on best practices for minimizing food safety risks on the farm, and on resources available to assist them in creating a farm food safety program. In addition, the farms that became GAP certified and two that created food safety programs benefitted by taking advantage of the services offered through this grant program and will have an increased potential of selling thru markets that require a food safety program. The operations that participated in the cost share benefitted by receiving financial assistance that offsets their GAP certification costs, allowing them to sell to large retailers, distributors, etc. In addition, consumers of Nevada products benefitted by the changes farmers implemented on their farms to minimize food safety risks to the local food system.

## Lessons Learned

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Encouraging operations towards becoming GAP certified is an on-going struggle as many buyers in Nevada still are not requiring certification. Further, some buyers have allowed farmers several years to achieve the certification and most farmers in Nevada are selling directly to consumers, which does not require a food safety program. In addition, most farms in Nevada are very small and may not be able to supply the demand required to sell to a large retailer, wholesaler, or distributor, therefore they don't see the need to invest in a food safety program since it is not required. Although at this point in time GAP certification is not being heavily required, US Foods and Whole Foods presented at the 2015 Small Farms Conference and indicated that if farms wish to collaborate, they would need to become GAP certified. This has at a minimum demonstrated to growers that food safety is increasing in demand from buyers. As food safety requirements become more abundant, it is anticipated that buyers will request evidence of FSMA, PSR compliance; for those that are not required to comply it is anticipated that some produce safety verification will be requested. Further, as consumer awareness on produce safety increases, more growers are anticipated to implemented GAPs/GHPs.

Although many farmers have continued selling via direct marketing, they have developed an increased appreciation on the importance of food safety practices as a result of trainings provided. Growers have a better understanding on how a food safety program can serve as a marketing tool and potentially limit liability. Food safety education and technical assistance has prompted an estimated 15 farms to develop food safety programs, demonstrating project success in minimizing risks to the food system in Nevada.

Project staff have identified that farms are reluctant to receive GAP certification due to (a) the fear of failing the audit, (b) few to no GAP certification requirements from buyers, and (c) the initial time investment they need to dedicate to establishing policies and procedures, training staff, and implementing necessary on-farm changes. To address these issues, project staff will continue to perform outreach, coordinate trainings, and seek out resources that will help farms initiate a foods safety program and comply with the FSMA rules.

## Contact Person

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## Project Title

[Outreach and Education on Specialty Crops to Nevada Youth](#)

## Project Summary

In Nevada a need was present for children to learn about specialty crop growth, nutrition, and producers. Children are often unaware of where specialty crops originate in relation to plant growth and eventual fruit production. Children may assume Nevada is a desert where food crops

are incapable of growing, presenting a disconnect on what crops are present in Nevada and the diversity involved. Further, Nevada youth are often unaware of the nutritional benefits associated with consuming fresh fruits and vegetables. The Nevada Department of Agriculture partnered with Nevada schools, Washoe County Parks, and homeschool groups in providing education to Nevada youth and their families with the objective of increasing sales and consumption of specialty crops. A series of trainings were provided to establish a connection between where local food comes from, local farmers, nutritional benefits of consuming specialty crops, and how crops are grown.

### **Project Approach**

One class-room training and three large events were coordinated over the grant period. Initially the intention was to hold small in-class trainings, however to engage parents and attract larger training audiences, the NDA partnered with Washoe County Parks in hosting three education events where 25 individual sessions were held. This change in strategy modified the original target audience from 180 students to 517 individuals. An added benefit was the participation from parents at events that otherwise would not have been able to be present in a school classroom setting; increasing the potential of improved sales for local producers since they are the direct buyers. This approach also ensured that farmers and local agriculture information was directly provided to parents instead of relying on students to share with parents at home.

### **2014 Activities**

Training was provided in 2014 to a first grade class in order to enhance child knowledge on how fruits and vegetables are grown, the nutritional benefits associated with specific crops, and local specialty crop growers. Approximately 17 students and 2 instructors participated in the class. The initial phase of the lesson was to test participants' beginning knowledge on fruit and vegetable plant identification. Students were able to guess the plant type and discuss their experiences with growing such crops. The project coordinator explained key characteristics of each individual plant to help students differentiate between plants. Characteristics described included leaf shape, smell, color, hair-like projections, etc. By the end of this lesson, each student was able to identify individual plants which included basil, tomato, peppers, squash, strawberries, and spinach (all crops commonly grown in Nevada).

To follow this lesson, nutritional qualities were discussed for select fruits/vegetables, emphasizing vitamins commonly found in crops of a specific color. The lesson allowed students to match the crop selected to a picture highlighting a key nutritional property. By the end of the lesson, all students were able to match the fruit or vegetable to the corresponding picture demonstrating how it aides the body (example: spinach contains vitamin K which helps clot blood; strawberries have vitamin B6 which aids the brain; carrots have vitamin A which contains beta-carotene and builds healthy eyes, etc.) The final lesson was discussing how plants grow, resources that are needed for growth, and local farms they can visit in order to see and buy crops that were discussed in the previous lessons. Each student was given a set of Nevada Farmer

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Trading cards and a nutrition worksheet. At the beginning of the class, approximately 80% of the students indicated they were more interested in eating fruits and vegetables and were going to share their new knowledge with others, particularly at home.

To prompt more farmer involvement in Farm-to-school, the project coordinator participated on the 2015, 2016, and 2017 Nevada Small Farms Conference Planning committee. As a result, one session was incorporated on agritourism specific to farm-to-school and school-to-farm. The speaker discussed how farmers can connect with local schools to coordinate farm field trips, what is required in terms of liability and bussing logistics, how to maintain student engagement, and the best methods for marketing their farm during these events. In addition, the presenter discussed agriculture events held at schools and opportunities for farmers to participate.

Farmers were also provided with farmer trading cards to increase marketing opportunities. Cards were distributed at farmers markets, farm field trips, and among other outreach events. Positive feedback was provided by farmers on the trading cards and several have requested that an additional order be placed. They indicated that the trading cards have been a great way for both children and adults to become familiar with individual specialty crop growers. Cards were purchased through the Nevada Farm to School Grant and the SCBGP award 12-25-B-1241 (program outreach), however they were disseminated during project activities under this award as well.

## 2015 Activities

The content provided during 2015 and 2016 trainings was relatively similar, however the outreach methods shifted from individual classroom trainings to rotating sessions during agriculture events. To target a larger group of Nevada youth, the NDA collaborated with Washoe County Parks Department in coordinating an agriculture day that allowed for multiple training sessions to be held. Park events typically attract various youth groups and schools in relatively close proximity. During the youth event, multiple lessons were provided on specialty crop plant identification, which targeted common vegetables and herbs grown in Nevada. Afterwards, a game was provided on the nutritional benefits commonly found in select specialty crops. Staff discussed vitamins and minerals associated with certain crops and then students were given a group quiz using a poster-sized matching board. An additional presentation and interactive game was provided on biological components farmers need in order to grow specialty crops.

Throughout the day an estimated 10 sessions were coordinated and a total of 100 students and parents were informed about the information aforementioned. In addition, a specialty crop market schedule was created highlighting where local specialty crop products are sold. Approximately 65 growers were invited to attend in order to gain familiarity with the community. Unfortunately, none were able to attend as the event was coordinated at the start of planting season. However, meet your farmer trading cards were made available, creating opportunity for participants to become more familiar with local growers.

Throughout the training, participants were surveyed on their knowledge of fruit/vegetable identification and nutrition, prior to and after each session. The majority of participants present were from the home schooling community. An estimated 30% were able to identify strawberry and spinach plants, with 0-10% of children participants being able to identify the remaining plants (onions, kale, cabbage, leeks, artichoke, broccoli, mint, and rosemary). After students received training on crop identification and nutrition, an estimated 90-100% of participants were able to identify the crops and list nutrients associated with individual crops. A second education event coordinated at Washoe County Parks in April of 2015. Approximately 200 were present and multiple sessions were coordinated throughout the day. Participants received the same instruction as highlighted in the March 2015 training series.

### **2016 Activities**

Due to 2015 event success and word-of-mouth promotion, an increase in attendance was experienced at 2016 events. In addition, the NDA outreach team promoted the education event through Facebook and other social media outlets and the project coordinator provided event information on a Northern Nevada news channel. Farmers were notified of the outreach opportunity and one farmer attended and discussed their farm products. Approximately 200-250 people attended and participated in the interactive presentations. The event included the following sessions: a plant ID and nutrition education session; plant pathology, insect identification, and horticultural plant systems. Approximately 200-250 people were in attendance.

Youth education resources on specialty crops were presented at the 2016 School Garden Conference with approximately 50 people in attendance. Participants consisted of school garden coordinators, agriculture teachers, volunteers, and educators. School garden curriculum resources were shared at the event in order to further the objectives of this project.

Specialty crop farmers market schedules were also created and disseminated at the events in addition to the farmer trading cards to help youth become excited about local farmers; encouraging them to visit individual farms

### **Goals and Outcomes Achieved**

Initially the objective was to reach approximately 180 children and increase their knowledge on where to obtain specialty crops. However, due to our change in strategy over 617 individuals received training.

Verbal assessments were captured prior to sessions involving how many participants had gardens at their school or home, how many eat their fruits and vegetables, and how many students had been on a farm. On average an estimated 25% of the students had experience working in a garden; 50% liked eating fruits and vegetables, and 20% had been on a farm. Based on the questions asked involving the identification of fruit and vegetable plants, staff were able to gauge beginning and post session knowledge of participants. On average an estimated 10-15% were

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able to identify the plants prior to sessions and by the end 90-100% were able to tell key differences between plants. Nutrition education provided indicated that on average 15% of the participants were aware of vitamins commonly linked to specific produce (mainly apples and vitamin C) and by the end of the training an estimated 95% were aware.

Unfortunately, only one farmer participated in the trainings over the life of the grant despite multiple efforts to increase participation. However, the trainings were used as an opportunity to highlight specialty crop related events including pumpkin patches, the cantaloupe festival, and other agritourism events. Although it is difficult to capture a precise number specific to how many families/students increased their consumption and visits to local farms there was an estimated 50 participants that verbally indicated their intent to attend markets and agritourism events. Further, the one producer that did attend the 2016 agriculture day was able to sell products at the event and promote their upcoming agritourism events demonstrating a direct increase in sales as a result of the project. Based on the comparative feedback provided from participants in 2014, 2015, and 2016 events it is estimated that over 25% of the project participants increased their purchasing and consuming of local specialty crops.

## Beneficiaries

Nevada youth, families, agriculture teachers, and farmers were the primary beneficiaries of the project. Nevada youth and participating families benefited through the education events that were held where they were able to increase their knowledge on local specialty crop production, Nevada farmers, and nutritional benefits linked to commonly produced Nevada crops. Agriculture teachers benefitted through expanding their knowledge on specialty crop education that can be applied in the class room and farm to school/school to farm opportunities in Nevada. Farmers were impacted due to the increase in awareness of local agriculture including agritourism events, farmers markets, and farm to school opportunities,

## Lessons Learned

By broadening education efforts from strictly class-room to event focused training, a larger audience was able to be captured and additional content was added including benefits of Nevada pollinators, how to plant specialty crops, and common practices employed by growers to maximize production. Further, by targeting home school groups and inviting farmers to participate in events, an added market opportunity was made available to growers. Although only one farmer opted to participate, we are hopeful that more participation will be experienced as the event gains recognition in future years.

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## Project Title

Urban Roots' Young Farmers & Farm Stands Initiative

## Project Summary

There is a rising consumer-driven demand for a new approach to food production; one that calls for localized farming operations and markets. According to the USDA publication “Know Your Farmer, Know Your Food,” in 2011, 85% of customers polled by the National Grocers Association stated that they chose their grocery based on the availability of local products for purchase. Furthermore, the University of Nevada-Reno released a report generated by the University Center for Economic Development, which found that 90% of Northern Nevada market attendees had previously attended a Northern Nevada Farmers Market. Moreover, the Nevada Agricultural Foundation finds that Community Supported Agriculture (CSA), Farmers Markets, Road Stands and Contract Production exist as many families’ primary source of food.

However, as the market moves to increasingly support localized farms and food products, available farmland and farmers are on the decline. The average age of farmers is increasing; in 2002 an average farmer in Washoe County was 57 years old and as they reach the retirement age, their lands are not necessarily ensured for farming and ranching practices<sup>5</sup>. Youth are no longer remaining on the farm and today 1% of the population lives on the farm compared to 40% in the early 1900s<sup>6</sup>. There is a steady decrease in available farmland as erosion, pollution and urban encroachment continue to grow<sup>7</sup>.

This project aimed to address these concerns by educating youth about the availability and values of specialty crop agriculture in Nevada through interdisciplinary curriculum and connections to farmers in the Reno area. Furthermore, it provided students with agricultural growing techniques and business skills necessary for growing and selling nutritious produce at a Farm Stand. Student field trips to local farms allowed participating students to gain first-hand experiences of farming practices specific to Nevada, increasing their likelihood of pursuing a career in agriculture upon graduation.

A middle or high school environment is an ideal place for integrating real-life problems and applying solutions through simple experimentation while providing hands-on education.

## Project Approach

Urban Roots was successful in accomplishing the activities outlined in the original Work Plan though the timeline to complete many of these tasks was expanded and project partnerships have evolved and changed over the three-year course of the grant.

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<sup>5</sup> [www.sbcouncil.org/population-growth](http://www.sbcouncil.org/population-growth)

<sup>6</sup> USDA “Know Your Farmer, Know Your Food” pg 12

<sup>7</sup> [nevadaagriculturalfoundation.org](http://nevadaagriculturalfoundation.org)

The goals of this grant were to establish farm clubs at schools, develop farmer-school relationships, develop farm stands at schools, and develop curriculum and teacher trainings to make this program able to transition to new schools. The original partners on the grant were the High Desert Farming Initiative (HDFI) and the Academy of Arts, Careers, and Technology (AACT).

In the early stages of the grant, 2014, Urban Roots successfully developed the initial curriculum and led lessons in the classroom and at the garden site with AACT students. The Urban Roots Farm Manager ‘adopted’ AACT and worked closely with students on plant care and garden maintenance. In the fall of 2014, AACT students participated in field trips to HDFI. Surveys were administered to the students in the fall of 2014 to gauge their knowledge on specialty crop subjects and their interest in continuing their education at the University of Nevada’s College of Agriculture, Biology, and Natural Resources and agriculture in general.

This work continued in 2015 as Urban Roots continued to develop curriculum and expanded the classroom experience to Washoe Innovations and Pyramid Lake Jr./Sr. High School. Both schools participated in in-class lessons from Urban Roots educators and were mentored by the Urban Roots Farm Manager. Both schools also participated in a field trip to the Urban Roots teaching farm. Surveys were conducted with all of these students.

In 2016, the program once again expanded to include Clayton Middle School and Pine Middle School. Participation at both schools included farmer-student mentoring and in-class lessons. Surveys were completed for both schools.

As expansion into middle and high schools has been slow, Urban Roots implemented a teen leadership summer camp in July-August of 2016. Each week, up to ten teens aged 12-15 were able to attend a week of project-based day camp at the Urban Roots Teaching Farm. Originally, this camp was intended to take place at the Renown Teaching Farm but construction on that site has faced several issues making camp there impossible. The teen camp utilized the curriculum designed for the Young Farmer and Farm Stands project. Teens were mentored by Urban Roots educators and designed a project to make improvements on the teaching farm. Each week ended with a harvest and Farm Stand run by the teens at the camp family program on Friday afternoons. In this way, teens were able to apply the economics lessons learned through this program and Urban Roots was able to make progress in the Farm Stands initiative.

Urban Roots also conducted two teacher workshops in the late winter/spring of 2016, one at the Urban Roots Teaching Farm and one in Smith Valley.

The funds expended in this grant did not benefit other commodities

The major school partner in this grant was AACT. This relationship was especially important in 2014 with students and one teacher being actively involved in bringing the farm stand curriculum

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into that school. This partnership lessened during 2015 and 2016 as Urban Roots began to work with other schools.

The Nevada Department of Agriculture (NDA) and the Desert Research Institute (DRI) partnered with Urban Roots to conduct the teacher workshops in 2016. NDA helped Urban Roots to get Nevada Department of Education approval for these workshops so that teachers were able to earn a .5 in-service credit for each workshop they attended. DRI presented at these workshops to bring attention to other resources available to teachers interested in hands-on learning modules.

Finally, HDFI was available to students participating in this program as a field trip destination. Their hoop houses provided an excellent showcase for the students on how agriculture can be done in Nevada and to introduce them to the University of Nevada and the opportunities that may be available to them there. Field trips to HDFI mostly happened in 2014 and 2015 with field trips to Urban Roots in 2015 and 2016.

## Goals and Outcomes Achieved

*Outcome #1: Expand interdisciplinary state standard high school curriculum for science, history, health, and economics classes through focus on specialty crop agriculture as a livelihood.* Urban Roots has developed curriculum to meet the goals set forth in this outcome. Focused lessons for each of these topics have been developed and implemented at area middle and high schools, detailed in Table 1 below. Example lessons are attached to this report.

Schools	In Class Lessons	Field Trips	Teacher Training	Farm Club/Farm Stand
Academy of Arts, Careers, and Technology (High School)	Yes	Yes	No	Yes (in existence before grant program – used a learning tool to transfer to other schools).
Washoe Innovations High School	Yes	Yes	Yes	No
Pyramid Lake JR/SR High School	Yes	Yes	Yes	No – plans to implement when hoop house is fixed.
Clayton Middle School	Yes	No	Yes	No
Pine Middle School	Yes	No	Yes	Garden Club/Seedling Sale

**Table 1:** Participating schools in YFFS program with levels of participation indicated.

*Outcome #2: Foster connections between local farmers and schools thereby increasing interest in and demand for specialty crops in Washoe County School communities.*

Urban Roots made contact with several farmers and connected them to AACT. The Urban Roots Farm Manager acted as the farmer mentor for the remaining schools because of limited time and conflicting schedules between schools and farmers. Farmers are listed below. Lasting

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connections between schools and area farmers have been difficult to maintain so the Urban Roots Farm Manager and Educators continue to act in this capacity.

## Farmers

1. Urban Roots Farm Managers (Blaine Pickett 2014-2015), Rebekah Stetson (2016)
2. Urban Roots Educators
3. Andrew Yokum – River School Farm
4. Nikki Boyce – River School Farm
5. Anna Breen – Girl Farm
6. Wendy Baroli – Girl Farm
7. Dan Baily – Dharma Bees
8. Neil Bertrando – RT Permaculture & Loping Coyote

Most of the schools participating in the program have not begun a formal farm club with a student-initiated farm stand as envisioned at the outset of this grant. Pine Middle School has a Farm Club and conducts a seedling sale. The other participating schools have not created formal farm/garden clubs. Delayed opening of the Renown teaching farm, caused Urban Roots to focus attention on developing and implementing a teen camp program at the Urban Roots teaching farm. These teens worked closely with the Urban Roots Educators and Farm Manager to complete teen-designed projects and to design and run a Farm Stand during the camp (Table 2).

Camp Program	# Students	Specialty Crops	Yield (lbs)
July 5-8, 2016	3	Peas, Beans, lettuce, zucchini, cut flowers	~4 lbs
July 11 – 15, 2016	5	Carrots, radishes, Cucumbers, cut flowers	~5 lbs
July 18 – 22, 2016	7	Cucumbers, cut flowers, herbs (mint, oregano)	~8 lbs
July 25 – 29, 2016	4	Tomatoes, cucumbers, herbs (mint, oregano), cut flowers	~9 lbs
August 1-5, 2016	4	Tomatoes, cucumbers, summer squash, onion, melon, herbs (mint)	~15 lbs

**Table 2:** Summer Camp Farm Stand crop results.

*Outcome #3: Increased interest in agriculture as a career option for high school students upon graduation.* Surveys were conducted with all students participating in the program.

Across these programs, 156 students participated. Fifty percent (50.64%) showed an increased interest in agriculture and 86.53% an increased knowledge of specialty crops. Urban Roots is unable to measure or obtain data on the impact of this program on CABNR’s enrollment, we did

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measure their interest in attending CABNR. While for many of these students, college decisions are still several years in their future, 28.85% are expressing an increased interest in CABNR.

Results of these surveys are summarized in Table 3 below. A sample student survey has been attached and listed in the *Additional Information* section.

School/Program	# Participant s	# increased interest in agriculture	# increased knowledge of specialty crops	# increased interest in CABNR
AACT	41	17	37	10
Washoe Innovations	12	6	12	2
Pyramid Lake	10	3	8	2
Clayton	21	13	18	13
Pine	49	25	40	8
Camp: July 5-8, 2016	3	0	2	1
Camp: July 11 – 15, 2016	5	4	5	4
Camp: July 18 – 22, 2016	7	5	6	4
Camp: July 25 – 29, 2016	4	4	4	1
Camp: August 1-5, 2016	4	2	3	0

**Table 3:** Survey results for students participating in the YFFS program.

Urban Roots also conducted two teacher workshops (agendas attached) in February/March of 2016, one at the Urban Roots teaching farm and one in Smith Valley. Thirty-three teachers attended these trainings from nine schools (six middle and high schools, three elementary schools). Seven teachers at three middle and high school expressed interest in continued partnership with Urban Roots to bring the farm stand curriculum into their schools.

## Beneficiaries

The beneficiaries of the grant were the students and teachers that participated in the program. One hundred and fifty-six students participated at five schools and in five camp programs. Six farmers at four farms (not including the Urban Roots Farm Manager and teaching staff) participated. The Farm Stands produced 41 pounds of produce and thirteen varieties of specialty crops. Thirty-three teachers participated in teacher workshops based on the curriculum developed as part of this grant.

## Lessons Learned

# 12-25-B-1683 Specialty Crop Block Grant/ Nevada Final Report

Plant Industry Division



Urban Roots has learned that working with schools to introduce a new project like a Farm/Garden Club and a farm stand is very slow moving. New gardens must be approved by WCSD facilities' employees and follow guidelines outlined in the school district garden handbook. Developing a sustainable Farm/Garden Club is asking each school for a large commitment of time from their staff and students and parents, in many cases are hesitant to get involved for the same reasons. It is difficult to convince already overburdened parents and teachers to take on another project, even with support from an outside organization like Urban Roots. In conversations with other middle schools, Swope and Dilworth in particular, teachers are looking at ways to incorporate this curriculum into the regular school day. Swope in particular is interested in moving forward with Urban Roots in the second phase of the Young Farmer and Farm Stand project.

## Contact Person

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## Additional Information (Optional)

- Lessons (2 outlines, 2 power points)
- Student survey (1)
- Workshop agendas (2), Photos (2), Flyer (2)