

# Yellow Jacket Fruit Tree and Vineyard Research and Demonstration Project: 2017 Report

- Gus Westerman** - Colorado State University Extension, Dolores County Director  
**Tom Hooten** - Colorado State University Extension, Montezuma County Director  
**Abdel Berrada** - Colorado State University Southwestern Colorado Research Center Manager

**Figure 1. AmeriCorps volunteers assist with the 2017 Tree Planting Workshop held in April. 100 rare and endangered apple trees provided by the Montezuma Orchard Restoration Project were planted in 2017.**



## **Project Background**

The Fruit Tree and Vineyard Research and Demonstration Project was implemented in April 1991, and is a cooperative effort among Montezuma County Extension, Dolores County Extension, Natural Resources and Conservation Service in Dolores County, and the Colorado State University Southwest Colorado Research Center at Yellow Jacket, Colorado. The completion of the Dolores Irrigation Project resulted in a substantial number of new client requests for local research based information/data on fruit tree and vineyard varieties, equipment usage, and cultural practices. Prior to this project, all fruit tree information originated from the Grand Junction area Experiment Stations which have a considerably different growing environment. Presently, the Team is evaluating 70 different fruit tree varieties

including 21 field apples, 38 trellised apple varieties, 2 apple varieties planted in a "super high density," 5 peach varieties, 4 pear varieties, and 3 plum varieties. The Team is also studying 1 raspberry variety, and 14 grass varieties. The only remaining original grape variety is Lemberger. Interest has been expressed in planting modern hybrid grapes to evaluate performance however this has not been undertaken as the focus has shifted to heritage varieties and varieties conducive for cider production. In 2017 the High Altitude Fruit Tree Project partnered with the Montezuma Orchard Restoration Project or MORP. MORP has been working to locate, identify, and propagate rare and endangered heritage apple varieties in the Four Corners Region. In 2017 26 varieties with a total of 100 trees, procured from MORP were planted on heavily dwarf rootstock continuing the high density trellised planting. The goal is to study how these varieties perform on modern rootstock and in a modern commercial setting. The High Altitude Fruit Tree Project will trial these varieties in a modern commercial setting and evaluate their performance. In the spring of 2018 100 more trees from MORP will be planted. These will include both trellised dwarf trees and full size field trees. The focus for this planting is on the newly emerging cider market in the Four Corners Region.

Orchard management practices such as irrigation techniques, frost and freeze management, high-density apple planting, trellised apple planting, fruit thinning, tree pruning, and integrated pest (insect, disease, weed, and wildlife) management have been tested and demonstrated. Thirteen grass species or varieties and one legume were planted between fruit tree and grape rows in 1993 and 1995 to control soil erosion and suppress weeds. A popular fruit tree pruning workshop is held every year. The proceeds from the sale of the fruit during an annual "U-Pick" help fund the operation of the orchard. The annual "U-Pick" attracts hundreds of people and is also used as an educational opportunity to inform the public of different fruit varieties and their uses, fruit processing and preservation, as well as proper long-term storage of fruit. The fruit tree and vineyard demonstration project is managed by the Extension personnel of Dolores and Montezuma Counties. It has generated considerable interest and attracts a large number of visitors throughout the year, including students from Fort Lewis College in Durango and San Juan College in New Mexico, elementary students and teachers from area elementary schools, and visitors from the Ute Mountain Ute Senior Center. Volunteer labor, which is essential, from the Master Gardener Program was very limited in 2017. Dolores County furnished a seasonal employee to work 20 hours per week during the summer months to offset the lack of volunteers. Dolores County Extension office staff also spent considerable time assisting with the project over the season.

### **Highlights of the 2017 Season**

In 2017 100 trees procured from the Montezuma Orchard Restoration Project were planted in a high density trellised setting. This allowed a tree planting workshop and a grafting workshop to be conducted to expand the educational opportunities the project provides. A 10 person AmeriCorps crew assisted in planting these trees. 4 trees were lost giving a 96% survival rate as of November 2017. The crop loss presented an opportunity to remove 12 large field trees to make room for new varieties. The removed trees include 5 Golden Delicious, 3 Cameo, and 3 Scarlet Gala. These were removed because the project has an abundance of Golden Delicious and Scarlet Gala, and the Cameos were getting very large and difficult to manage. 2 Cameos remain in the project. The 2017 season was a poor year for fruit production in SW Colorado with the total fruit production of 85 lbs. for the 3 acre project. Due to winter

snow, pruning operations began the 1st week of February and were completed the second week of March. Prunings were cleared by the 2nd week in April. A dormant oil and micronutrient application was not conducted in 2017 due to lack of an appropriate frost-free period before bud break. The 2017 spring was warm early on which allowed the trees to break dormancy in mid-March. Early varieties of peaches, pears, and plums bloomed in the first week of April. Full bloom on most varieties hit the second and third weeks of April. By mid-May natural thinning had occurred rendering a nice fruit set allowing for limited chemical thinning of all apple varieties which was planned to take place. The morning of May 19<sup>th</sup> showed a low temperature of 25.8 degrees Fahrenheit causing nearly 100% loss of the fruit crop. From May 19<sup>th</sup> on there was no crop to manage. No insect or bird control was conducted. Weed management was accomplished through timely application of glyphosate and was very successful. Outbreaks of powdery mildew began as soon as temperatures came up in June and were managed throughout the season with timely fungicide applications. Bayleton and Topsin fungicides were alternated to combat chemical resistance. There are dire concerns as we move into the late fall. Temperatures have been unseasonably warm for the fall of 2017. Blooms were observed on several apple varieties during the 3<sup>rd</sup> week in November along with significant bud swell on many apple trees. The trees are observed to be breaking dormancy severely reducing cold hardiness. Tree damage is expected from freezing temperatures and will be assessed in the spring of 2018. Workshops for the 2017 season include the Pruning Workshop, Grafting Workshop, and Tree Planting Workshop.

#### **Variety Testing Results to Date**

**Apples** – The 2017 crop was non-existent due to the freeze on May 19<sup>th</sup>. Sporadic production was observed from the Nured Jonathan rendering approximately 15 pounds of fruit from the 10 trees. The apples have performed exceptionally well since they began producing. With the exception of 7 seasons (freezing temperatures in 2001, 2014, 2015, and 2017; hail in 1995, 2003, 2004, and 2015), the orchard has experienced consistent production. Even with the hail damage in 2004, over 7,000 pounds of fruit was sold. Tree losses included 8 trees out of 226 planted, with 3 of those lost as the result of severe trunk damage due to excessive crop overload. Of the 2017 planting 3 trees were lost to pocket gopher damage and 1 to an unidentified canker. Ten trees were lost in the trellis due to herbicide drift in 2010. They were replaced in 2011 with Improved Golden Delicious and four new varieties: Scarlet Spur, Spartan, Ruby Mac, and Schlect Spur which have come into production and are producing well. With the exception of varieties on the wrong rootstock for field or trellis applications, additional varieties that are questionable for our area include Honey Crisp, Improved Red Delicious, and possibly Idared. The Nured Jonathan was the only variety that showed any consistent production in 2017.

**Peaches** – The 2017 season was non-existent due to frost with no production from the 5 current varieties. A much different situation exists here when compared with the apples. Virtually all of the plantings (old and new) have suffered 50% tree losses within the first year. This is attributed in part to a late planting date for peaches and the possibility that planted trees were of too large a diameter with a limited root system. The peach trees arrived partially leafed out, and when this is compounded with tree transplant shock, early tree death is inevitable. The first 2 varieties planted in 1991, Redskin and

J.H. Hale, have been eliminated with one crop in seven years and significant yearly die-back. Four new varieties have been added: Flamin'Fury PF#15A, Starfire FA11, Suncrest, and Red Globe which seem to have more promise. The severe hail of 2004 damaged the upper surface of branches that led to infection with perennial canker. Many of the peach trees exhibit gradual decline and branch death since then. Perennial canker continued to develop in 2014 leading to infection and death of larger branches and persisted in 2017.

**Pears** – The 2017 pear crop was poor due to frost with 30 pounds from the 4 current varieties. The four varieties planted; Max Red Bartlet, Du Comice, D'Anjou, and Bronze Beauty have all developed well with minor problems. They do require considerable limb training and are highly susceptible to the pear slug and pear psylla. A small outbreak of Fire Blight occurred in 2007, but immediate action of pruning out the infected wood, complete cleanup of leaves and debris and several applications of Streptomycin have apparently taken care of the problem for now. No evidence of the disease has been observed to date (2016). Pears take time to produce with the Max Red and Du Comice (planted in 1996) producing their first crop in 2001. All trees are now in production and have produced generously with the exception of 2013 and Bronze Beauty in 2014. Production was low for unknown reasons.

**Plums** – The 2017 plum crop was poor due to frost with 40 pounds from the current 3 varieties. Production was consistent across the three varieties however the fruit on the President trees did not reach an edible state until after our harvests were complete. Three varieties of plum on Myro rootstocks (Empress, Improved Duarte, and President) were planted in 2008 in three row-groups of five trees each. Initial growth was very good. However, in 2010 President suffered significant die-back to the main scaffold limbs due to freezing temperatures. The damaged trees required substantial reconstructive pruning. Recovery has been very good. Observations will continue. The first significant crop of 1,000 lbs. was produced in 2012. Production was 2,000 lbs. in 2013 and only 500 lbs. in 2014. 2015 production was almost non-existent due to spring frosts during bloom.

**Grapes** - Of the original 8 varieties planted in 1994, Seyval Blanc, Pinot Noir, and White Riesling were removed in 1998. These varieties require a longer growing season than what is "normal" for the location of the vineyard. In their place, Cayuga White, DeChaunac, Edelweiss, and Chardonel were planted in 1999. The performance of these four varieties has been extremely disappointing. The year 2001 was the third growing season and the vines have not performed any better. The reason for this poor performance is baffling as these vines received the same treatment as the more mature plantings. In 2000, there was a 100% infestation of crown gall in the Foch, Gewurztraminer, Merlot, and Chardonnay vines. When the infestation of 2000 occurred in all of the 4 above named varieties, they were removed.

The only remaining original planting is Lemberger. This red variety has produced crops from the third season until present. Shoot thinning and cluster removal prior to veraison are methods used to promote fruit development and maturation. This is continuing, though labor for the tasks is limited. Discussion has occurred regarding elimination of the grape trial due to poor performance.

**Grasses** - Thirteen different grasses along with one legume were planted between the fruit tree rows in the demonstration orchard between April 1993 and November 1995 to evaluate their erosion control potential. These were dryland plantings with no supplemental water given. Lovington blue grama, Canbar canby bluegrass, birdsfoot trefoil/Ephraim crested wheatgrass mix, and Topgun buffalograss have been judged unsuitable for erosion control.

### **Irrigation**

The team is currently evaluating a variety of irrigation systems including various types of drip emitters, several types of maxi and mini sprinklers, pulsators, and surface drip tubing. We currently use a 50-mesh filtration system due to very good irrigation water quality. Plugging of the filter screens has not been a problem, though they do need occasional cleaning. Our only significant problem has been with the maxi and mini sprinklers that have moving parts. A slight buildup of calcium carbonate causes the spinners to jam and spray only in one direction. These were removed and replaced with static sprinkler heads with a 360-degree spray pattern. Another issue recently emerged as ground squirrels took up residence near the orchard. Their persistent damage to the irrigation systems has increased the labor for maintenance.

### **Additional Investigations**

Work continues on frost protection management for the fruit trees and grapes, bird control, and integrated pest management of insects and diseases. Workshops on pruning and fruit management are conducted every year in cooperation with the Colorado Master Gardener program. Volunteers from the program are instrumental in maintaining the viability of the orchard project. Volunteer labor from the Master Gardener Program was very limited in 2017.

Strong emphasis continues to be placed on demonstrating, evaluating, and testing varieties, irrigation equipment, orchard equipment, and cultural practices that are cost effective, user friendly, and available through local suppliers.

The team continues to investigate marketing opportunities as well as "Home-Based Business" opportunities as they relate to fruit and vineyard product utilization, i.e. fruit by-products. In addition, there has recently been interest from landowners to begin to rejuvenate some of the old, neglected apple orchards in Montezuma County. This may be due to the surging interest in local food production that has been burgeoning in SW Colorado over the last several years. Another result of this growing interest is the creation of the non-profit Montezuma Orchard Restoration Project (MORP). One activity of MORP is the grafting of historic, heritage apple varieties found in SW Colorado onto modern rootstocks to preserve the variety in a cultural setting. Some of these heritage varieties were planted at the Extension Fruit Tree Project at the SWCRC in the spring of 2017 as well as some classical cider apple varieties. The Fruit Tree and Vineyard Research and Demonstration Project will continue to attract interest and visitors as it remains relevant to the needs of the stakeholders in Southwest Colorado.

