

**Southern Region Small Fruits Consortium
Progress Report: 2014**

Proposal Category: _____ Research X Outreach

Proposal Status: X New Proposal _____ Previously funded by SRSFC

Title: Double Pruning in Grapevines (2014 E-02)

Name, Mailing and Email Address of Principal Investigators:

David W. Lockwood
Dept. of Plant Sciences
252 EPS, 2431 Joe Johnson Dr.
Univ. of TN
Knoxville, TN 37996-4561
telephone: 865-974-7421
Email: dlockwood@utk.edu
FAX: 865-974-1947

Phillip M. Brannen
Dept. of Plant Pathology
307 Miller Plant Sciences Bldg.
Univ. of GA
Athens, GA 30602-7274
telephone: 706-542-1250
Email: pbrannen@uga.edu
FAX: 706-542-4102

Faith Critzer
117 Food Safety & Processing Bldg.
2605 River Dr.
Univ. of TN
Knoxville, TN 37996-4591
telephone: 865-974-7274
FAX: 865-974-7332
Email: faithc@utk.edu

Objectives:

1. To determine the influence of various pruning times and regimes on:
 - time of bud break
 - degree of fruit set
 - ripening time
 - fruit quality parameters (soluble solids, juice pH, titratable acidity)
 - yield
 - disease incidence (specifically *Botryosphaeria* spp. And *Eutypa lata*)

2. To measure the time involved with conducting different pruning regimes

Justification and Description:

Spring frosts/freezes are annual threats to fruit growers. In recent years, severe cold damage occurred in vineyards during the springs of 2007 and 2012. Passive control techniques such as site selection and development, cultivar/rootstock selection, trellising options and vineyard floor management programs are important in lessening the potential for significant cold injury to vines and the developing crop. Active control systems such as heating, wind and irrigation may offer some supplemental protection during adverse weather conditions. However, they are expensive and have definite limitations. The cold event of 2007 consisted mainly of an advective freeze for which the above-mentioned radiation frost controls are essentially useless. Delaying bud break, however, could have been effective since the critical temperatures for cold damage to grape buds, like those of other fruit crops, are higher as the buds develop.

Modifications to pruning, specifically the time and the method(s) used may offer some additional protection against spring cold events. Delayed pruning (Lockwood, Ruzzo), also referred to as “long pruning” (Howell), can be used to delay bud break in the area on a cane where the crop is desired. Due to apical dominance, buds on the terminal portion of canes will break and start to grow well in advance of those on the basal portion of these canes. Waiting until new shoots on the terminals of canes are several inches in length before the canes are pruned can delay bud break in the desired fruiting zone by up to two additional weeks (Howell), which may well be past the time when a late frost/freeze event will occur. The major challenges with delayed pruning are completing the pruning operation before too much new growth has occurred and protecting buds and tender shoots on canes to be retained from damage as prunings are removed from the vine canopy.

Double pruning (Lockwood) may be an answer to the objections concerning delayed pruning. With double pruning, all the canes that will not be used to bear the upcoming crop are removed prior to bud break on the vine. The remaining canes are not pruned until several inches of new shoot growth has developed on the terminal portion of the cane. They are then pruned back to the desired bud number. With double pruning, most of the time involved in actually pruning vines and removing the brush from the vineyard is done early when time constraints may not be as severe and the chances of damage to remaining canes and buds is much less. Bud break in the desired fruiting zone will be delayed, although perhaps not as much as with delayed pruning.

In addition to later bud break, yields and fruit quality may be influenced by delayed pruning. Studies in New Zealand (Friend) have shown that delayed pruning increased yields by 93%, 63% and 82% over the three seasons that the trial ran, respectively. It was also found that cluster weights and the proportion of seeded berries increased in response to delayed pruning.

Delayed bud break may also have postponed flowering and set to a time when climatic conditions were more favorable for bud development and fruit set.

Double pruning of grapevines could result in the reduced likelihood of *Eutypa* (Weber) and *Botryosphaeria* (D. Gubler, personal communications) infections. The initial pruning (prepruning) could be done in late fall to early winter, when canes are cut back, leaving 12 to 18 inches of the cane beyond the point where final pruning will occur. Any *Botryosphaeria* and/or *Eutypa* infection that might occur at the cut surface of the cane is removed when the final pruning is done in late winter to early spring when pruning cuts heal more quickly and the likelihood of infections will, therefore, be decreased. With double pruning, it may be possible to substitute a cultural practice for a fungicide application for the control of these cane diseases.

This study would look at the time of pruning and multiple prunings as ways to delay bud break in the fruiting zone of the vine until chances of a late frost/freezing event are greatly reduced while possibly enhancing both yield/fruit quality and lessening the potential for *Botryosphaeria* and *Eutypa* infection at the pruning site. It is recognized that one year's experience will not be sufficient to develop definitive information on the reduction of either *Botryosphaeria* or *Eutypa* diseases, however, it could provide direction regarding the need for further investigations and set up sites for monitoring over time as these practices are repeated in coming years.

The proposed treatments are:

1. Prune at normal times during dormancy.
2. Preprune in late fall to early winter and do the final pruning just prior to bud break.
3. Delay all pruning until 2 to 4 inches of new shoot growth has developed on the apical portion of canes.
4. Double pruning – remove all canes not to be used for fruiting during dormancy followed by pruning remaining canes back to the desired bud count once 2 to 4 inches of terminal growth have developed on the apical portion of the remaining canes.

Treatments will be applied to at least three or four of the same cultivars in a total of three to four vineyards in Georgia and Tennessee.

Delayed/Double Pruning Treatments – Spur Pruning (amended for 2015 trials)

For use on spur-pruned systems (high-wire bilateral cordon, VSP, Geneva double curtain, Lyre)

Treatments:

1. Normal pruning time and method
2. Delayed pruning – no pruning done until bud break on terminals of canes
3. Double pruning for **disease control**:

- a. pre-prune all canes to 5 to 7 nodes in midwinter
- b. final pruning just prior to bud break on tips of pre-pruned spurs (prune to 2 to 2 to 3 buds)
- 4. Double pruning for **delay of bud break:**
 - a. mid-winter, remove unwanted canes entirely, but leave desired canes unpruned
 - b. at bud break on terminals of retained canes, prune back to desired bud count on spurs (2 to 3 buds)
- 5. Double pruning for **disease control AND delay of bud break:**
 - a. prune unwanted canes back to 5 to 7 buds during midwinter, leave canes for fruiting spurs unpruned
 - b. at bud break on unpruned canes,
 - completely remove undesired spurs
 - cut desired canes back to the proper # of buds on spurs (2 to 3 buds)

Delayed/Double Pruning Treatments – Cane Replacement

Treatments:

- 1. Normal pruning time and technique
- 2. Delayed pruning until bud break at cane terminals
- 3. Double pruning
 - midwinter - remove all unwanted canes, leave desired canes unpruned
 - at bud break on desired canes, prune back to desired bud count
(depending on variety, about 8 to 10 buds/cane)

Data to be collected will include:

- 1. Time of pruning(s)
- 2. Time of bud break for buds left to bear the crop
- 3. Time required to do the actual pruning operations
- 4. Time of harvest
- 5. Fruit quality parameters (soluble solids, juice pH & titratable acidity)
- 6. Yield
- 7. Evidence of *Botryosphaeria/Eutypa*

Results of 2014 Trials:

Trials for delaying bud break were instituted in several Tennessee vineyards. All trials were done on vines being spur pruned. Bud break on double pruned/delayed pruned vineyards was between 12 and 14 days later than on vines pruned midwinter. A radiation frost event occurred on the morning of April 12 resulting in significant damage to many fruit crops throughout Tennessee. Crop loss on double pruned/delayed pruned vines was significantly less than on vines pruned midwinter. In a vineyard set up for overhead irrigation for frost protection, bud break on double pruned vines was delayed to the point that overhead irrigation was not needed during the April 12 frost event.

Since delayed pruning, and to a lesser extent, double pruning, creates additional work in the spring, growers are looking at utilizing these practices primarily on early blooming cultivars (i.e. Chardonnay) and cultivars that tend to be low in regards to secondary bud fruitfulness.

Budget:

Travel:	\$3,500	
<u>Equipment & supplies</u>	<u>1,500</u>	refractometer(s), pH meter
Total	\$5,000	

References:

Friend, Adam and Michael Trought. 2007. Delayed winter spur-pruning in New Zealand can alter yield components of Merlot grapevines. Australian J. of Grape and Wine Research. 13(3): 157-164

Howell, Gordon S. and R. Keith Striegler. 1986. Pruning grapevines in Michigan. Cooperative Extension Service, Michigan State Univ. Extension Bull. E-1935.

Lockwood, David> 2001. Grape Growing in Tennessee. Univ. of Tennessee Extension Bull. PB-1475.

Ruzzo, David. 2010. Frost Protection. WineMaker Magazine. Apr./May 2010

Úrbez-Torres, J. R., Battany, M., Bettiga, L. J., Gispert, C., McGourty, G., Roncoroni, J., Smith, R. J., Verdegaal, P., and Gubler, W. D. 2010. *Botryosphaeriaceae* species spore-trapping studies in California vineyards. *Plant Dis.* 94:717-724.

Weber, Edward A., Florent P. Trouillas and W. Douglas Grulber. 2007. Double pruning of grapevines: a cultural practice to reduce infections by *Eutypa lata*. *Am. J. Enol. Vitic.* 58(1):61-66.