Evaluation of cane and spur pruning effect on Traminette crop yield and fruit composition. (progress report)

Cain Hickey (PI)
University of Georgia
Horticulture Department
322 Hoke Smith Building
Athens, GA 30602
vitis@uga.edu

Mark Hoffman (co-PI)
North Carolina State University
Horticulture Department
2721 Founders Drive
Room 258
Raleigh, NC 27601
mhoffma3@ncsu.edu

Rachael White (co-PI)
Graduate Research Assistant
Horticulture Department
University of Georgia
324 Hoke Smith Building
Athens, GA 30602

Karen Blaedow (co-PI)
North Carolina State University Cooperative Extension
Henderson County
100 Jackson Park Rd.
Hendersonville, NC 28792
kebussey@ncsu.edu

Steven Patrick (co-PI)
University of Georgia
Cooperative Extension
Habersham County
555 Monroe St.
Clarkesville, GA 30523
stevep@uga.edu

Nathan Eason (co-PI)
University of Georgia
Cooperative Extension
White County
1241 Helen Hwy Suite 110
Cleveland, GA 30528
neason@uga.edu

Clark MacAllister (co-PI)
University of Georgia
Cooperative Extension
Dawson County
298 Academy Ave
Dawsonville, GA 30534
clarkmac@uga.edu

Eric Case
Vineyard Manager
Burntshirt Vineyards
2695 Sugarloaf Rd.
Hendersonville, NC 28792
eric@burntshirtvineyards.com

Public Abstract: Traminette, a white-berried, French-American, hybrid winegrape cultivar, is widely planted throughout the eastern US. Despite its popularity, relatively few formal field research studies have been conducted on Traminette. Traminette is known for bearing a relatively light crop but producing ample vegetative growth. There is thus a need to evaluate methods to improve Traminette crop yield in southeastern US vineyards through novel practices. A pruning trial was carried out in a commercial Traminette vineyard in Hendersonville, NC. Spur pruning density was set by dormant pruning to 20 buds per vine (10, two-bud spurs). Canes were trained bilaterally (two canes per vine) and were pruned to 100%, 75%, and 50% of the buds retained in the Spur treatment; thus, cane pruning treatments were either: two, 10-bud canes (20 total buds per vine); two, eight-bud canes (16 total buds per vine); or, two, five-bud canes (10 total buds per vine), respectively. Pruning did not affect shoot number, cluster number, or crop yield per bud. Pruning further did not affect juice sugar, pH, or acidity at harvest. These preliminary results from the first field season suggest that spur and cane pruning similarly impact Traminette productivity, regardless of bud number retained per cane or vine.

Introduction: Traminette is a white-berried, French-American, hybrid winegrape cultivar produced from a cross between J.S. Seyve 23.416 (*Vitis* spp.) and Gewürztraminer (*Vitis vinifera*). Traminette has been widely planted throughout the eastern US over the last two decades. Despite its popularity, relatively few formal field research studies have been conducted on Traminette (Bordelon et al. 2008; O'Daniel et al. 2012). It is further notorious for bearing a relatively light crop but producing large amounts of vegetative growth. That industry anecdote is supported by the Virginia Commercial Grape Report, which reported an average of 3.1 tons per acre in Traminette vineyards compared to 4.7 and 4.1 tons per acre in other hybrid cultivars Vidal blanc and Chambourcin, respectively (Wood et al. 2017). There is thus a need to evaluate methods to improve Traminette crop yield in southeastern US vineyards through more novel methods than previous studies on bud density (O'Daniel et al. 2012) and trellis division (Bordelon et al. 2008).

Two common training/pruning methods are cordon training/spur pruning (henceforth called "spur pruning") and head training/cane pruning (henceforth called "cane pruning"). Spur pruning is by far the most widely implemented pruning method in southeastern US winegrape vineyards. Growers are hesitant to cane prune due to the fear (without proof) that removal of a large mass of dormant grapevine wood will substantially reduce crop yield. That "fear" should be alleviated by several recent studies that have shown cane pruning to be a viable option across several cultivars and regions (Hatch 2015; Lockwood et al. 2016; Skinkis and Gregory 2017; White et al. 2018). Those studies have confirmed that crop yield and fruit quality are unaffected by pruning method in Cabernet Sauvignon, Pinot noir, and Petit Manseng (Hatch 2015; Skinkis and Gregory 2017; White et al. 2018) but improved by cane relative to spur pruning in Sauvignon blanc (Lockwood et al. 2016). If Traminette is similar to cultivars like Sauvignon blanc, which has lower fruitfulness in basal- relative to apically positioned buds, then cane pruning could improve Traminette crop yield relative to spur pruning.

Several veteran southeastern US vineyard managers and Traminette growers have expressed high interest in learning more about cane pruning effects in modest-yielding Traminette vineyards (Personal communication with Eric Case and Matt Chobanian, 2018). The evaluation of pruning method in Traminette may seem narrowly-focused. However, the Co-PIs maintain that small refinements to generally unquestioned, widely adopted, viticulture management practices (e.g. pruning) could have great long-term impact if it stimulates assessment across the broad range of cultivars and growing conditions throughout the southeastern US. The field study took place at Burntshirt Vineyards' Sugarloaf Vineyard site in Hendersonville, NC. The anticipated vineyard in Georgia (see proposal) was not available in 2019, so we plan to use funds to execute another year of data collection in North Carolina in 2020, and perhaps 2021 if funds are available.

Materials and Methods: This project evaluated spur pruning and cane pruning to different cane lengths in a commercial Traminette vineyard in Hendersonville, NC. Vines were trained to low fruiting wires and vertical shoot positioning was aided by catch wires. Vine spacing was six feet and row spacing was 10 feet. Spur pruning (Spur) density was set by dormant pruning to 20 buds per vine (10, two-bud spurs). Canes were trained bilaterally (two canes per vine) and were pruned to 100%, 75%, and 50% of the buds retained in the Spur treatment; thus, cane pruning treatments were either: two, 10-bud canes (20 total buds per vine); two, eight-bud canes (8 BC; 16 total buds per vine); or, two, five-bud canes (5 BC; 10 total buds per vine), respectively. Adventitious, non-count shoots arising from any vine tissue other than one-year old buds were thinned. Since unequal bud numbers were retained per vine, select data is expressed on per bud basis where logical.

Results and Discussion (to date, 2019 season):

Shoot number. There were no significant differences in the number of shoots that emerged from retained buds (Table 1). This suggests that spur and cane pruning produce a similar count shoot numbers regardless of the number of buds retained on canes.

Table 1 Pruning treatment effect on shoot numbers in Traminette in 2019.

Treatment effects	**Shoot counts per bud retained** 2019
Pruning [a]	
5 BC	0.97
8 BC	0.91
10 BC	0.90
Spur	1.01
Significance [b]	ns

[a] 5 BC = two, 5 bud canes; 8 BC = two, 8 bud canes; 10 bud cane = two, 10 bud canes; Spur = pruned to 20 buds via 10, two-bud spurs.
[b] Statistical significance of treatment effects (p > F; ns = not significant at 0.05 level). Means in same treatment group (i.e., columns) not followed by the same letter were statistically significantly different at $\alpha = 0.05$ based on adjusted *p* values using Tukey's honest significant difference.

Crop yield components. Treatment did not affect crop yield per retained bud (Table 2). Logically, cluster number per vine was highest in Spur (32), followed by 10 BC (30), and 8 BC (24) (data not shown) but there was no difference in the cluster number per retained bud (Table 2). There were no differences in cluster weight, berry number per cluster, or individual berry weight.

Treatment effects	**Crop yield (lbs per bud retained)**	**Cluster number (per bud retained)**	**Cluster Weight (g)**	**Berry # / Cluster**	**Berry Weight (g)**
	2019	2019	2019	2019	2019
Pruning [a]					
5 BC	0.45	1.72	129.1	62	2.1
8 BC	0.45	1.52	131.6	65	2.0
10 BC	0.40	1.49	122.8	60	2.0
Spur	0.45	1.58	131.9	62	2.1
Significance [b]	ns	ns	ns	ns	ns

Table 2 Pruning treatment effect on components of crop yield in Traminette in 2019.

[a] 5 BC = two, 5 bud canes; 8 BC = two, 8 bud canes; 10 bud cane = two, 10 bud canes; Spur = pruned to 20 buds via 10, two-bud spurs.
[b] Statistical significance of treatment effects (p > F; ns = not significant at 0.05 level). Means in same treatment group (i.e., columns) not followed by the same letter were statistically significantly different at α = 0.05 based on adjusted *p* values using Tukey's honest significant difference.

Primary fruit composition. Treatment had no effect on soluble solids, titratable acidity, or pH (Table 3).

Table 3 Pruning effect on primary juice composition in Traminette at harvest in 2018 and 2019.

Treatment effects	**Soluble solid content (ºBrix)**	**Titratable Acidity (TA)**	**pH**
	2019	2019	2019
Pruning [a]			
5 BC	22.6	5.7	3.3
8 BC	22.9	5.8	3.2
10 BC	22.6	5.7	3.2
Spur	22.4	5.8	3.2
Significance [b]	ns	ns	ns

[a] 5 BC = two, 5 bud canes; 8 BC = two, 8 bud canes; 10 bud cane = two, 10 bud canes; Spur = pruned to 20 buds via 10, two-bud spurs.
[b] Statistical significance of treatment effects (p > F; ns = not significant at 0.05 level). Means in same treatment group (i.e., columns) not followed by the same letter were statistically significantly different at α = 0.05 based on adjusted *p* values using Tukey's honest significant difference.

Our results suggest that Traminette shoot production and crop yield per bud is not affected by pruning choice, nor by the number of buds retained per cane. These results refute two industry anecdotes: (1) that cane pruning reduces crop yield relative to spur pruning, and (2) that shorter canes result in greater consistency in shoot production and greater crop yield relative to longer canes. Pruning to different bud numbers per cane was an attempt to evaluate the latter industry anecdote, by retaining cane lengths that would emulate a between-vine spacing less than six feet. Thus, closer vine spacing may not affect Traminette productivity in cane pruning situations. Our crop yield data was presented on a "per bud" basis. Crop yield per bud was *numerically* greater in short (5 BC, 8 BC) relative to long (10 BC) canes. However, in a vineyard with a between-row spacing of nine feet, pruning to five- or eight-bud canes would produce an average of 0.6 greater tons per acre relative to pruning to 10-bud canes. This makes a small, anecdotal case for closer between-vine spacing when cane pruning. Data will be taken again in 2020 to confirm or refute if these observations are maintained across field seasons.

References:

Bordelon, B.P., P.A. Skinkis, and P.H. Howard. 2008. Impact of Training System on Vine Performance and Fruit Composition of Traminette. AM. J. Enol. Vitic. 59:39-46.

Crawford, W. 2018. Georgia Vineyards and Wineries. BookLogix, Alpharetta, GA.

English J.T., C.S. Thomas, J.J. Marois, and W.D. Gubler. 1989. Microclimates of grapevine canopies associated with leaf removal and control of Botrytis bunch rot. Phytopathology 79:395-401.

Hatch, T. 2015. A demonstration of head training/cane pruning to cordon training/spur pruning on Cabernet Sauvignon. Virginia Vineyards Association Winter Technical Conference, Charlottesville, VA, January 2015.

Lockwood D., P. Brannen P, P.W. Shelby, N. Eason, and C. MacAllister. 2016. Cordon and trunk renewal; practices for maintaining productivity in mature vineyards. Southern Region Small Fruits Consortium Extension Proposal – Final Report, Dec 1, 2016.

O'Daniel, S.O., D.D. Archbold, and S.K. Kurtural. 2012. Effects of Balanced Pruning Severity on Traminette (Vitis spp.) in a Warm Climate. Am. J. Enol. Vitic. 63:284-290.

Personal communication concerning Traminette growth and performance. 2018. Eric Case, Burntshirt Vineyards; and Matt Chobanian, Habersham Winery.

Reisch, B.I., R.M. Pool, W.B. Robinson, T. Henick-Kling, B.K. Gavitt, J.P. Watson, M.H. 408 Martens, R.S. Luce and H.C. Barrett. 1996. Traminette grape. N.Y. Food and Life Sci. Bul. 149.

Skinkis P.A., and K.M. Gregory. 2017. Spur pruning may be a viable option for Oregon Pinot noir producers despite industry fears of lower productivity. Catalyst 1:67-72.

White, R.S., J. Scaduto, and C.C. Hickey. 2018. Retro-fitting a tight, vertically-shoot positioned training system to increase crop yield and maximize fruit quality in Petit Manseng. American Society of Enology and Viticulture Eastern Section Conference. Philadelphia, PA, July 2018.

Wood, V., S. Custer, K. Watson, and B. Chibbaro. 2017. Virginia 2017 Commercial Grape Report. Virginia Wine Board Marketing Office, 600 E. Main St., Suite 308, Richmond, VA 23219. https://www.virginiawine.org/grape-reports