



# Viticulture, enology and marketing for cold-hardy grapes



## Effects of Spacing, Training, and Pruning on Vine Performance and Fruit Quality of St. Croix

Gouveia Vineyard  
Wallingford, CT

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**Background and Rationale:** Most inland Connecticut growers continue to depend on French-American hybrids or other cold-hardy cultivars for the bulk of their production. These hybrids can be very productive and are relatively resistant to freeze damage. Many have growth habits quite different from those of *Vitis vinifera*, however, and may have the potential for greater production and higher fruit quality when grown on high training systems and divided canopies. Some Connecticut growers with newer plantings are employing wider vine spacing and divided canopies, but no efforts at within-vineyard comparisons have been made.

**Treatments: Four training systems were followed:**

- Geneva Double Curtain (GDC)
  - Horizontally divided canopy, top-wire trained.
  - Combed
- Hudson River Umbrella (HRU)
  - Top-wire trained
  - Combed
- Smart-Dyson (SD)
  - Vertically divided canopy, mid-wire trained.
  - Catch wires above and below
- Vertical Shoot Positioning (VSP)
  - Mid-wire trained
  - Catch wires above
  - Hedged

Each of these training methods was either cane or spur pruned. Plant spacing was 6 feet for the cane pruned plants and either 6 or 8 feet for the spur pruned plants. Thus there were a total of 12 treatments replicated 4 times within the experimental plot with at least 4 plants per replicate.



**Spur pruned Hudson River Umbrella.**

**Methods:** Vines were planted in 2008. Training and pruning were performed from early-March to mid-April each year. It took 3-4 years to establish the high wire cordons for the GDC and HRU spur pruned vines. By 2012 all training systems were incorporated into the plot. In that year two late frosts in the first week of May occurred after bud break and there was little or no fruit produced. In 2014, there was an 8 hour period (4 January 12AM 8AM) during which temperature remained below 0 F. The result was considerable bud mortality (> 40 %).



**Smart-Dyson cane pruned at 6 foot spacing**

**Results:** Judicious pruning on the spur trained vines compensated for the bud loss and spur pruned vines still produced a good crop. However, this was not possible on cane pruned vines resulting in less fruiting canes and clusters per foot of row. Thus, cane pruned vines tended to have less yield (Table 1). The productivity of the GDC and HRU trained vines was roughly twice as much as the other treatments when expressed on a per unit length of fruiting cane or cordon basis (Table 1). There was no significant effect on berry weight or chemistry due to training or pruning method (Table 2).

**Table 1.** Yield components for St. Croix Trial at Wallingford CT in 2014.

Training	Pruning	Spacing	Clusters <sup>a</sup> /vine	Yield <sup>a</sup> kg/vine	# Shoots <sup>a</sup> /vine	Yield <sup>ab</sup> kg/m
GDC	Cane	6	72.6 cd	5.33 bc	48.40 cd	1.46 a
	Spur	6	135.1 bc	6.78 ab	103.08 b	1.85 a
		8	201.7 a	9.59 a	154.47 a	1.97 a
HRU	Cane	6	45.1 cd	2.50 bc	29.47 d	1.37 ab
	Spur	6	76.6 c	3.61 c	80.53 bc	1.98 a
		8	104.5 bc	5.01 bc	99.33 b	2.05 a
SD	Cane	6	61.5 cd	3.32 bc	45.06 cd	0.91 bc
	Spur	6	63.3 cd	2.55 c	77.06 bc	0.70 bc
		8	88.7 bc	3.59 bc	122.33 ab	0.74 bc
VSP	Cane	6	23.3 d	1.04 d	19.15 d	0.57 c
	Spur	6	45 cd	2.11 cd	65.81 bc	1.15 bc
		8	52 cd	1.95 cd	78.88 bc	0.80 bc

<sup>a</sup> Values followed by the same letter are not significantly different ( $p>0.05$ , Student-Neuman-Keulls).

<sup>b</sup> Yield density per meter of fruiting cordon or cane.

**Table 2.** Chemical analyses for St. Croix Trial at Wallingford CT in 2014.

Training	Pruning	Spacing	Berry <sup>a</sup> Weight g	°Brix <sup>a</sup>	TA <sup>a</sup> g/l	pH <sup>a</sup>
GDC	Cane	6	1.90 a	18.66 a	0.69 a	3.74 a
	Spur	6	2.02 a	19.05 a	0.68 a	3.74 a
		8	1.95 a	19.49 a	0.70 a	3.72 a
HRU	Cane	6	1.95 a	18.93 a	0.69 a	3.76 a
	Spur	6	2.07 a	19.03 a	0.74 a	3.71 a
		8	2.11 a	18.93 a	0.74 a	3.73 a
SD	Cane	6	1.92 a	19.20 a	0.74 a	3.76 a
	Spur	6	2.00 a	18.81 a	0.78 a	3.68 a
		8	1.89 a	19.29 a	0.75 a	3.71 a
VSP	Cane	6	2.03 a	19.40 a	0.69 a	3.81 a
	Spur	6	2.10 a	19.58 a	0.75 a	3.74 a
		8	2.05 a	19.40 a	0.77 a	3.72 a

<sup>a</sup> Values followed by the same letter are not significantly different ( $p>0.05$ , Student-Neuman-Keulls).

**What the results mean:**

- The Geneva Double Curtain had the greatest productivity due to the doubling of the length of the fruiting canes/cordons. However, on a per unit length basis, the HRU yielded comparably.
- Top-wire trained vines out-produced middle-wire trained vines by about a factor of two.
- Fruit chemistry and berry size was remarkably constant irrespective of training and pruning treatments, as well as plant spacing.