Effects of Leaf Removal Timing and Extent on Crop Yield, Disease Incidence, and Primary Chemistry in Chardonnay

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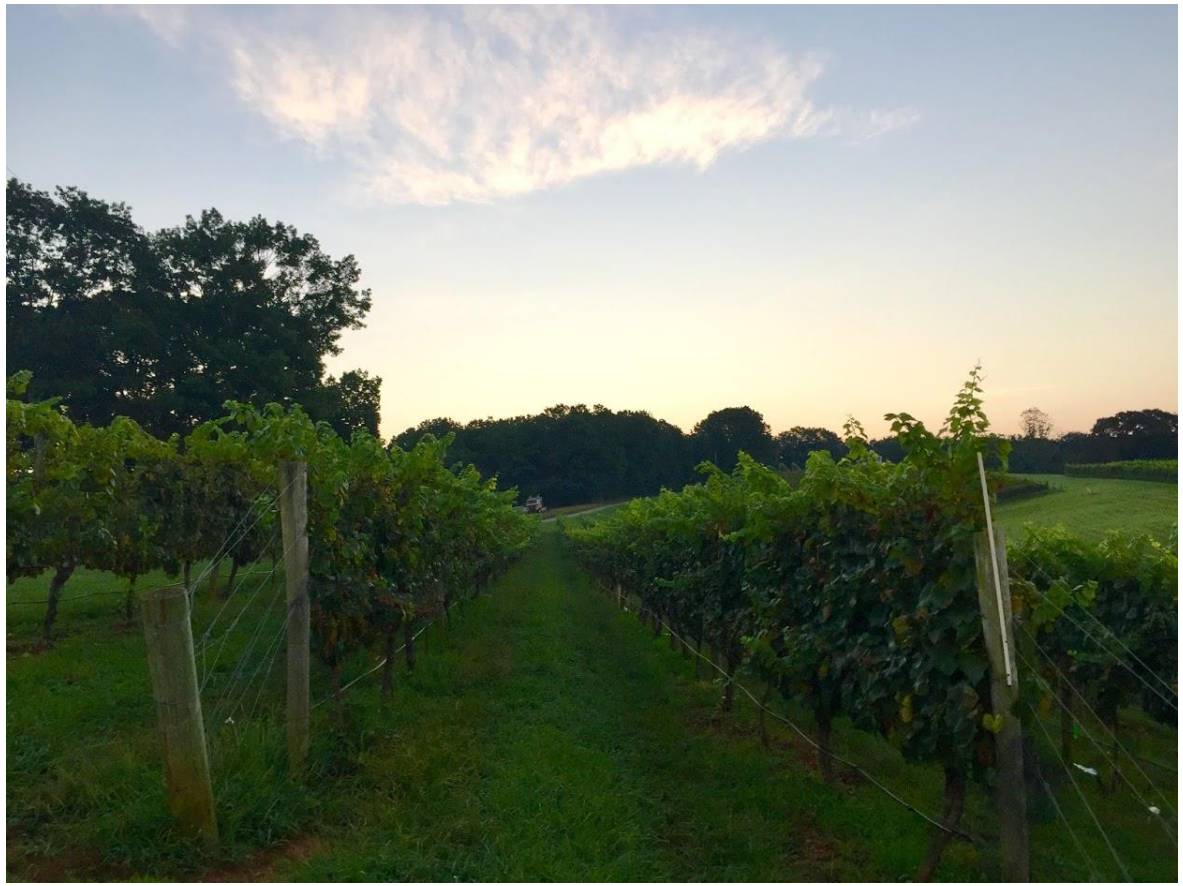
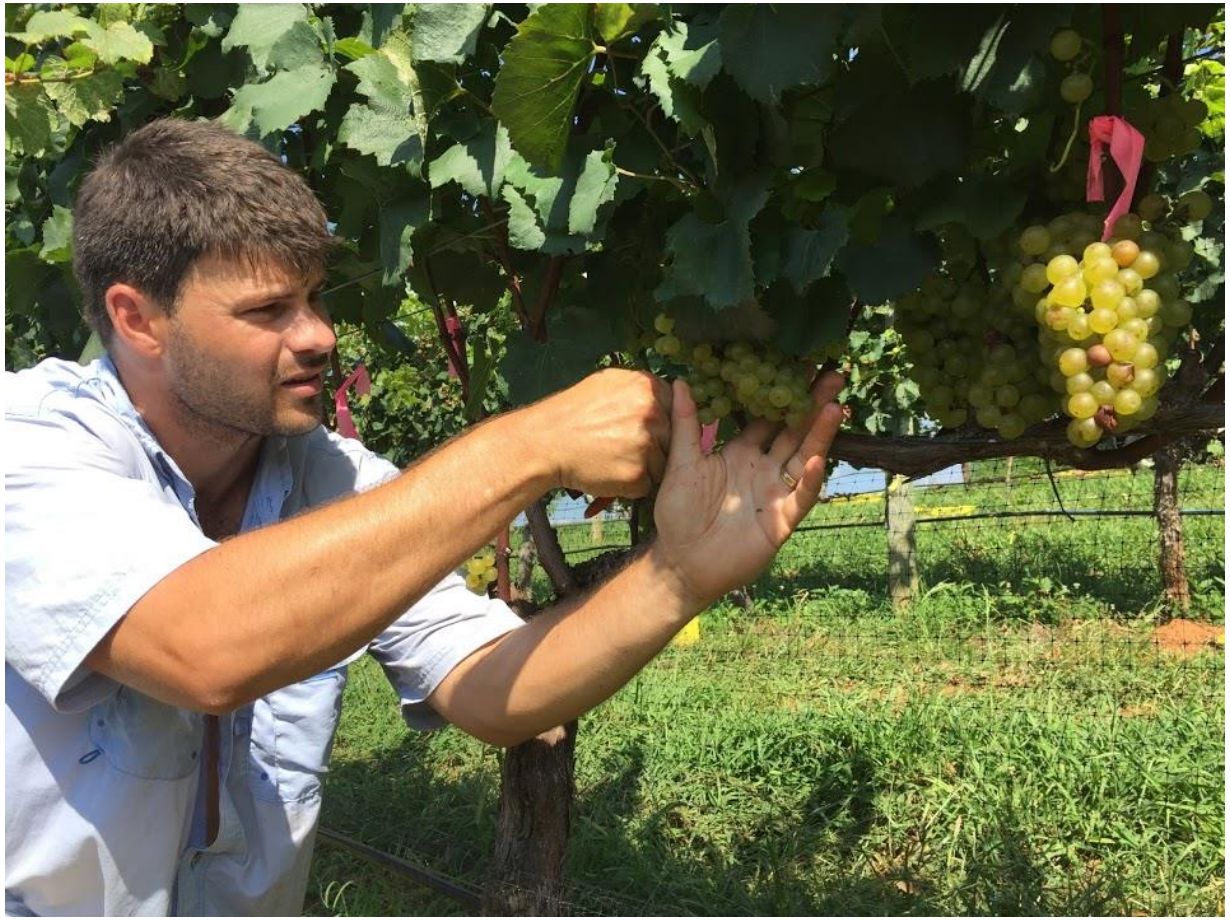


Chardonnay is one of the most widely grown cultivars in the world

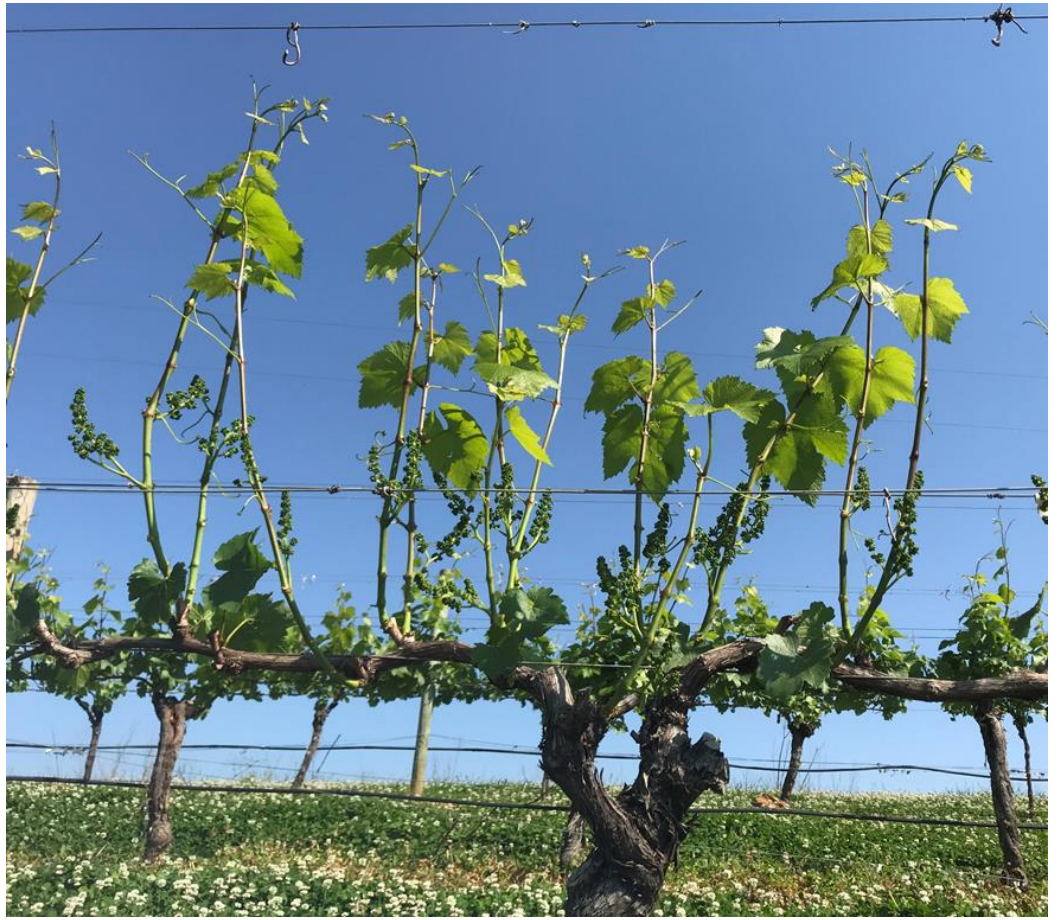


Goals

- Remove four and six basal leaves from each shoot either pre-bloom, post-fruit set, or in combination of both.
- Maintain or improve crop production and wine quality potential
- Decrease disease incidence

Treatments

- No leaf removal (NO)
- Pre-bloom removal of 4 leaves (PB-4)
- Pre-bloom removal of 6 leaves (PB-6)
- Post-fruit set removal of 4 leaves (PFS-4)
- Post-fruit set removal of 6 leaves (PFS-6)
- Pre-bloom removal of 2 leaves and post-fruit set removal of 2 leaves (PB2/PFS2)
- Pre-bloom removal of 3 leaves and post-fruit set removal of 3 leaves (PB3/PFS3)



Pre-bloom vs Post-fruit set

Hypotheses

- Leaf removal will reduce acidity and increase or maintain Brix.
- Leaf removal will reduce disease incidence and severity
- Pre-bloom leaf removal will reduce crop yield because of decreased fruit set.

Botrytis and sour rot - 2017

2017				
Treatment	Botrytis Incidence	Botrytis Severity	Sour rot Incidence	Sour rot Severity
NO	68.0	8.97 a	56.8	6.86
PB-4	60.8	4.70 b	56.8	4.26
PB-6	61.6	5.06 ab	61.6	3.89
PFS-4	61.6	4.70 b	60.0	3.41
PFS-6	51.2	2.02 b	48.8	2.20
PB2/PFS2	58.4	3.90 b	58.4	2.09
PB3/PFS3	62.4	3.70 b	56.8	3.16

Botrytis and sour rot - 2018

2018				
Treatment	Botrytis Incidence	Botrytis Severity	Sour rot Incidence	Sour rot Severity
NO	63.2a	9.60a	73.6a	11.3a
PB-4	25.6bc	1.74ab	47.2ab	2.12b
PB-6	18.4bc	1.05ab	48.0ab	2.67b
PFS-4	32.0b	2.49ab	48.0ab	2.47b
PFS-6	12.8c	0.58b	27.2b	0.95b
PB2/PFS2	32.0b	3.11ab	47.2ab	3.66b
PB3/PFS3	15.2bc	1.63ab	36.0b	2.34b

Crop yield components - 2017

Treatment	Berry number per cluster	Cluster weight (g)	Crop weight (US Ton/acre)
NO	94.5 bc	184.7 bc	3.87 ab
PB-4	96.1 bc	198.1 bc	3.73 ab
PB-6	84.3 c	169.9 c	3.22 b
PFS-4	117.9 a	241.2 a	4.92 a
PFS-6	115.2 a	220.9 ab	4.14 ab
PB2/PFS2	110.3 ab	221.8 ab	4.18 ab
PB3/PFS3	102.6 ab	202.3 bc	4.09 ab

Crop yield components - 2018

Treatment	Berry number per cluster	Cluster weight (g)	Crop weight (US Ton/acre)
NO	87.8 ab	153.5 ab	4.70 ab
PB-4	92.1 ab	159.2 ab	5.29 ab
PB-6	74.0 b	123.0 b	3.44 b
PFS-4	111.2 a	179.9 a	6.15 a
PFS-6	105.5 a	165.4 a	5.41 ab
PB2/PFS2	98.3 ab	160.8 ab	5.38 ab
PB3/PFS3	94.9 ab	149.5 ab	5.11 ab

Primary fruit chemistry - 2017

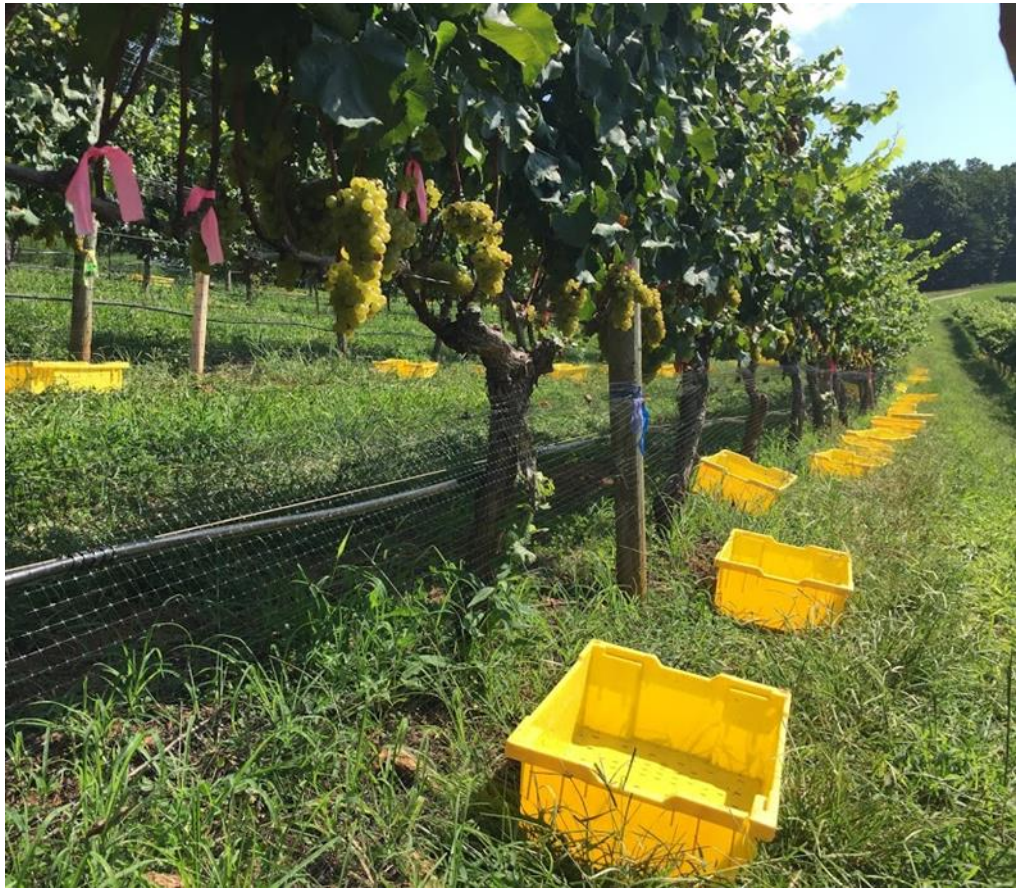
Treatment	Brix	Titratable Acidity	pH	Brix:TA
NO	17.8 b	10.1 a	3.27 b	1.77 c
PB-4	18.5 a	9.30 b	3.30 ab	2.00 b
PB-6	18.9 a	8.91 bc	3.33 ab	2.13 ab
PFS-4	18.4 ab	9.02 bc	3.31 ab	2.05 b
PFS-6	18.7 a	8.50 c	3.33 ab	2.21 ab
PB2/PFS2	18.6 a	8.77 bc	3.31 ab	2.13 ab
PB3/PFS3	18.8 a	8.26 c	3.35 a	2.28 a

Primary fruit chemistry - 2018

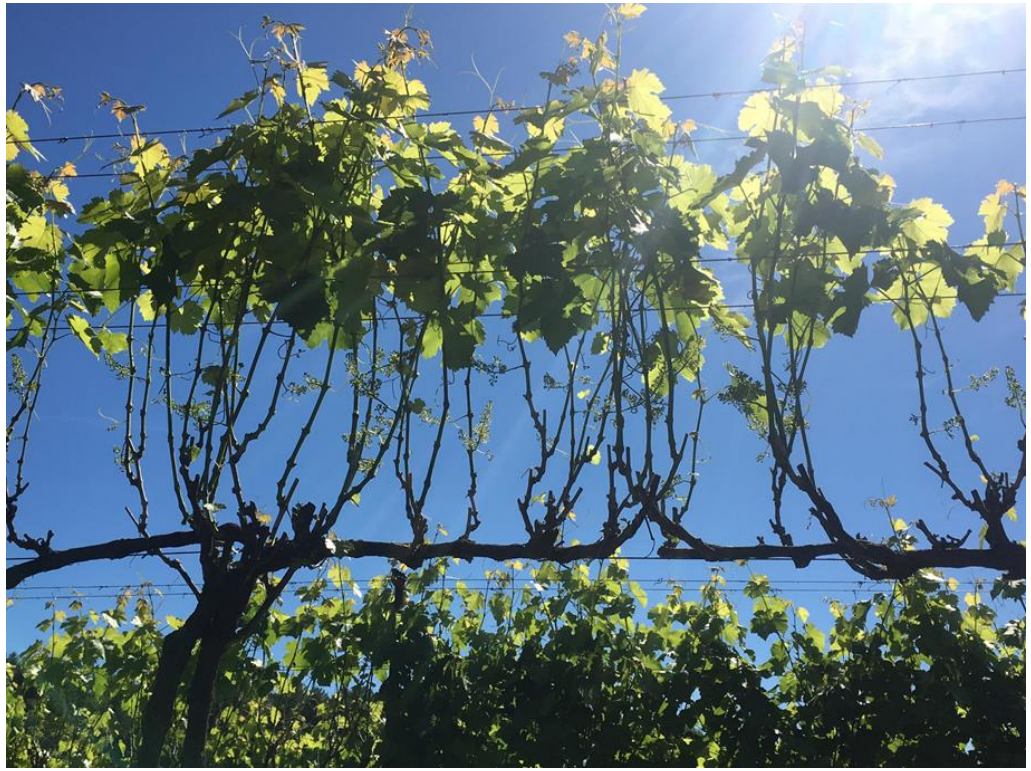
Treatment	Brix	Titratable Acidity	pH	Brix:TA
NO	20.4 b	8.98 a	3.36 b	2.28 b
PB-4	21.4 a	8.38 ab	3.42 ab	2.57 a
PB-6	21.3 a	8.26 ab	3.44 a	2.59 a
PFS-4	21.2 a	8.33 ab	3.41 ab	2.55 a
PFS-6	21.3 a	8.19 b	3.42 ab	2.60 a
PB2/PFS2	21.5 a	8.14 b	3.41 ab	2.65 a
PB3/PFS3	21.4 a	7.86 b	3.45 a	2.73 a

Discussion

- In humid climates, leaf removal can improve airflow and spray penetration leading to reduction in disease
- Leaf removal will not negatively impact fruit quality and can improve or maintain Brix and Titratable Acidity (TA)
- Post-fruit set leaf removal results in higher crop yields than pre-bloom leaf removal.



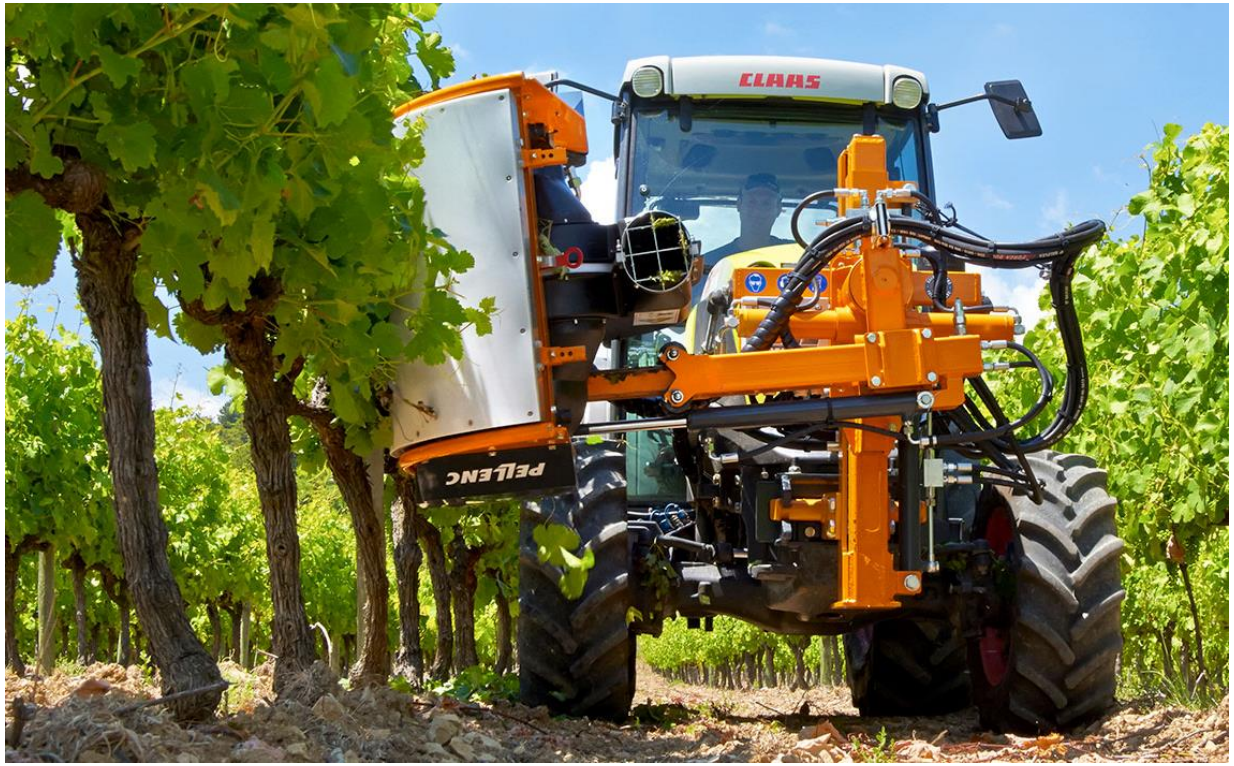
Take Home



- In some instances, fruit zone leaf removal before bloom causes reduced fruit set
  - And subsequently reduced crop yield
- Removal of 4-6 leaves post-fruit set is the sweet spot for Chardonnay that will help to reduce disease, improve primary chemistry, and maintain crop yields
- REMOVE LEAVES

Continuing Research

- Mechanical leaf removal
- Different Cultivars
- Removing portions of leaves to determine cause of reduced fruit set in some cultivars.
- Analyze aromatics in Chardonnay and other cultivars



https://pellenc.com/agri/produits/leaf-remover/?lang=en

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Questions?