Investigating Bio-Dynamic practices in a Midwestern context

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The Investigation

- Will minimizing chemical interventions, and maximizing soil, vineyard, and environmental diversity generally have a positive outcome on vineyard health, and consequently, on wine quality?

The Bottom Line

Norton Control
Medium-deep ruby color. Rich fruit and coal tar. Spicy palate with well-enrobed tannins.Lingering finish. GOLD

Norton Control
Deep ruby color. Rich blueberry nose is simple and plain, in need of development. Dense, soft tannins, ample body and tart acidity. Would benefit from more exposure to oak and time to develop. A fine example of the pure grape in a warm climate allowing it to mature, but somewhatnaïve. GOLD

Wetumpka Control
Golden color. Intriguing aromas of lilac and honeysuckle. Full body, ample tannin, simple flavors,driving acidity.

Biodynamic Norton
Deep ruby color. Rich nose of blueberry, five spice and anthracite coal. Dense, soft tannins, ample body and likeable acidity. Long rich finish and an aftertaste of impossible persistence. DOUBLEGOLD

Biodynamic Wetumpka
Golden color. Cured meat. Full body, round tannin, intriguing flavors, crisp acidity.

The Groundwork

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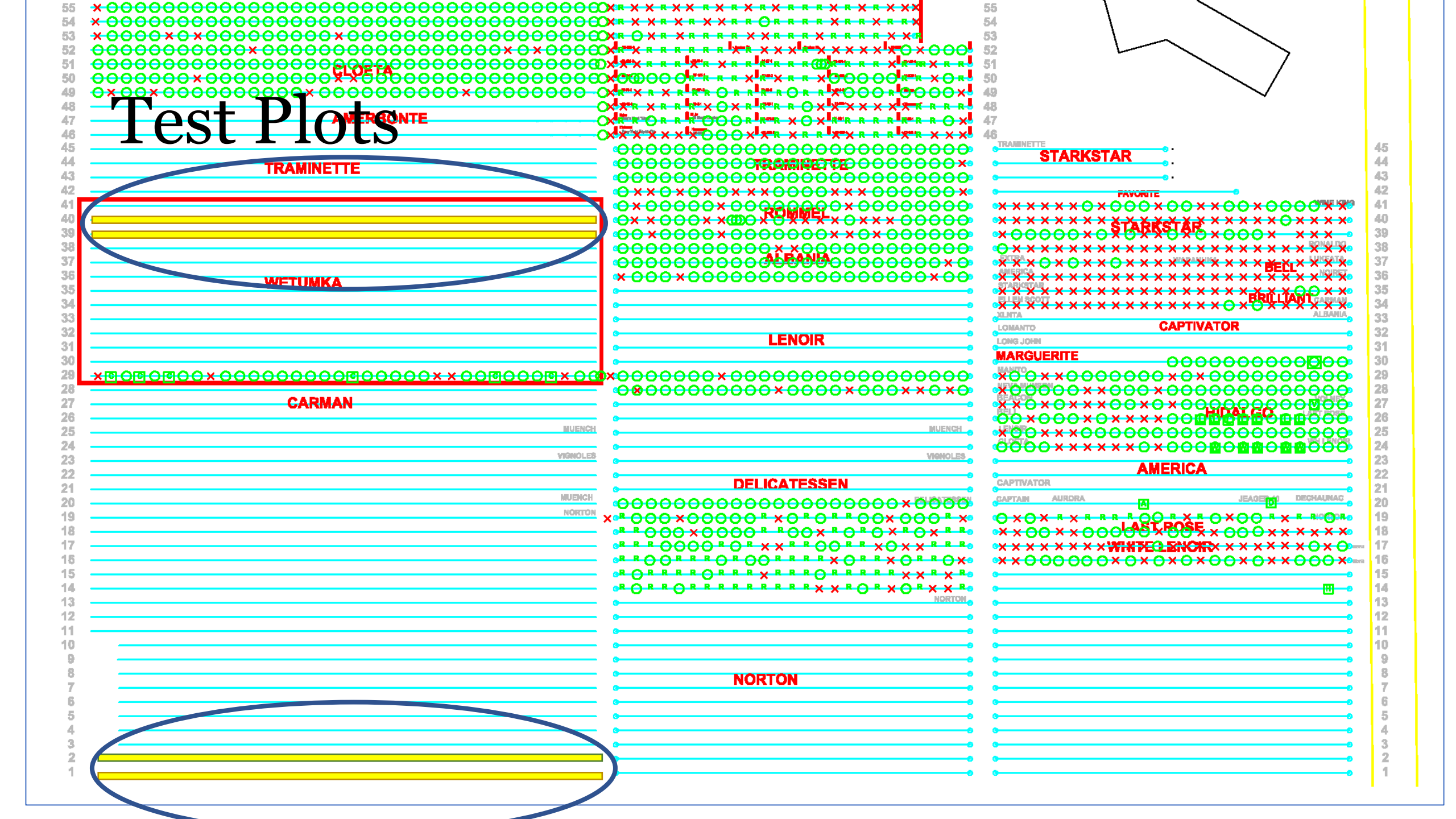
Test Plots


CLOSTA
AMERICONTE
TRAMINETTE
WETUMKA
CARMAN
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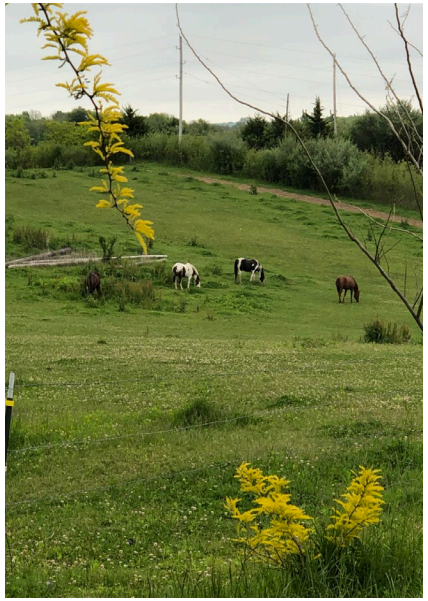
ROMMEL
ALBANIA
LENOIR
MUENCH
VIGNOLES
DELICATESSEN
NORTON
NORTON
STARKSTAR
FAVORITE
STARKSTAR
BELL
BRILLIANT
CAPTIVATOR
MARGUERITE
HIDALGO
AMERICA
CAPTIVATOR
LAST ROSE
WHITE LENOIR

Preparation - Soils






- March - Tested soil

(Summer) – Added Compost

Summary of Initial Soil Test

- pH, in a healthy range: overall average pH of 5.88
  - A soil with pH of 6 has 10 times more hydrogen than hydroxyl ions. Thus, we have good nutrient availability to our plants.
- Areas on average where we are low in nutrients
  - Phosphorus
- Areas on average where we are high in nutrients
  - Magnesium
  - Calcium
  - Potassium
- Overall nutrient requirements
  - Nitrogen
    - Average (30 pounds per acre)
  - P_2O_5
    - Average (100 lbs per acre)
  - K_2O
    - Average (30 lbs per acre)

Vineyard Management

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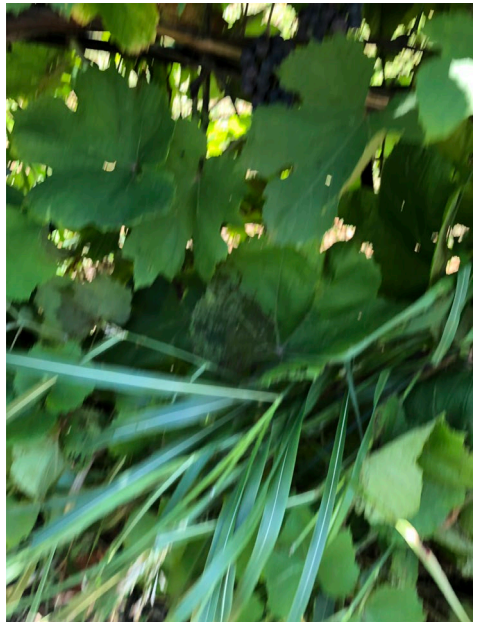
Ground Cover

April:

Planted Kentucky Blue Grass,
Snow pea, white and red clover



June-August:

Second round of interseeding

Created compost pile

Canopy Management

Thinning

Weeding

Veraison

June-August: Initial berry sampling

Canopy

- Canopy in the biodynamic areas were significantly denser, and more time-consuming to thin

Winemaking

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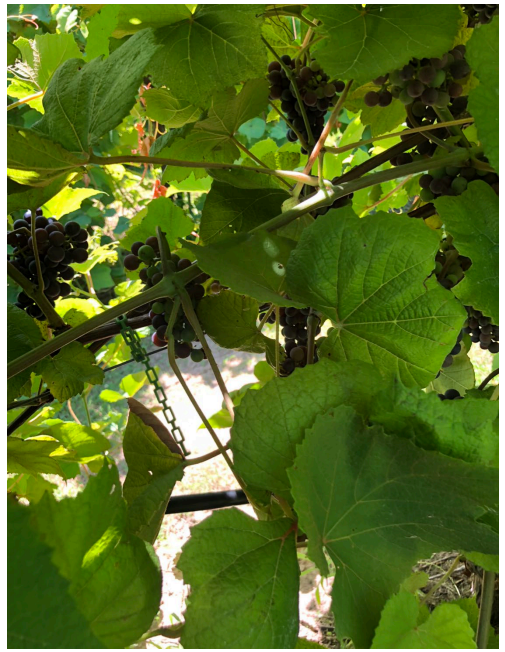
Harvest



Berry Sampling

Date	Varietal	Brix	pH
11-Aug	Wetumka V block	10	
17-Aug	Norton East Block	15	
17-Aug	Norton West Block	16	
17-Aug	Norton Center Block	16	
17-Aug	Norton BD	14	
17-Aug	Wetumka	14	
24-Aug	Norton West Block	16.9	2.98
24-Aug	Norton Center block	16.1	3.01
24-Aug	Norton East Block	15	3.02
24-Aug	Norton BD	17	3.05
24-Aug	Wetumka BD	14	2.91
24-Aug	Wetumka	14.5	3.05

Berry Sampling Comments

- 8/24-Non-BD Norton
  - Very Acidic, Watermelon, very herbaceous , tart
- 8/24-BD Norton
  - Darkest in color, still tart, tastes like other blocks, but the best tasting at this stage
- 8/24 Non-BD Wetumka
  - Caramel, guava, banana, mango, still tart
- 8/24 BD Wetumka
  - Same as non-bd

Pruning & Canopy Management

Biodynamic Norton

- Pruning
  - Method – Cane Pruning
  - Date – 2/26/20 & 2/27/20
  - Hours Spent – 6.50
  - Labor - 2 people
- Bud Thinning
  - Date – 5/21/2020
  - Hours Spent – 0.67
  - Labor – 1 person
- Shoot Thinning/Positioning
  - Date – 9/1/2020
  - Hours Spent – 12
  - Labor – 1 person

Pruning & Canopy Management

Biodynamic Wetumka

- Pruning
  - Method – Spur Prune
  - Date – 1/15/20
  - Hours Spent – 2.20
  - Labor - 1 person
- Bud Thinning
  - Date – 5/26/20
  - Hours Spent – 1.45
  - Labor – 1 person
- Shoot Thinning/Positioning
  - Date – 6/18/20
  - Hours Spent – 8
  - Labor – 1 person
- Additional Leaf Pulling
  - Date – 8/13/20
  - Hours Spent – 2
  - Labor – 2 people

Harvest Yield

VARIETAL	YIELD LBS
BD WETUMKA	7.34
BD NORTON	8.72
WETUMKA	7.43
NORTON	8.13

BD Norton Harvest Labor and Notes

- Date – 10/3/20
- Hours Spent Harvesting – 17.50 hours
- Notes- The Biodynamic Norton Rows were in significantly worse condition. 40% of the crop was “raisined.”

BD Wetumka Harvest Labor and Notes

- Date – 9/18/20 and 9/19/20
- Hours Spent – 12
- Notes - Fruit quality was good, a little underripe. Zero bird damage. Wetumka shatters (grapes falling off the vine) with the slightest shake of the vine. There was no discernable difference between the control and the BD fruit in this regard.

Winemaking Methods

- Red wine making
  - Non-BD Nortons were made by crushing/pressing fruit, then keeping freshly pressed skins in order to make red wine (open bin fermentation)
  - BD Norton, was crushed and immediately inoculated
- White winemaking
  - Non-BD Wetumka, was crushed, pressed, cold soaked, bentonite addition, then inoculated 24 hours later. 2 lots were split, other lot was treated as an amber (fermented on the skins post crush).
  - BD Wetumka, crushed, pressed, cold soak, then inoculated juice with no Bentonite.

Evaluation

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Soil Nutrient Management: pH

		Norton Biodynamic 1W	Norton Biodynamic 2C	Norton Biodynamic 1E	Norton Center 5	Norton East 5	Wetumka 40W	Wetumka 39C	Wetumka 40E	Wetumka West 32
PH	1/9/2020		6.2		6.1	6.2		5.6		
	5/5/2020	5.9		6.9			5.6	5.5	5.6	
	1/19/2021	5.4	6.1	7.0	6.4	6.0	5.8	5.7	5.6	5.9
Phosphorus	1/9/2020		28		28	12		38		
	5/5/2020	17		34			42	20	30	
	1/19/2021	15	12	27	52	4	48	74	42	65
Potassium	1/9/2020		342		378	299		419		
	5/5/2020	303		296			324	264	261	
	1/19/2021	291	264	319	444	331	375	349	331	364
Calcium	1/9/2020		4479		5173	4345		4933		
	5/5/2020	4066		6847			4311	4739	4497	
	1/19/2021	5275	3705	5993	4646	4889	3867	4615	4188	4831
Magnesium	1/9/2020		582		601	589		745		
	5/5/2020	711		748			850	948	731	
	1/19/2021	874	515	537	578	792	681	740	586	825
Organic Matter	1/9/2020		1.7		1.9	2.0		2.2		
	5/5/2020	2.1		1.5			1.9	2.0	1.6	
	1/19/2021	1.7	0.1	1.5	2.3	1.6	2.0	2.1	1.1	2.0
Neutralizable acidity	1/9/2020		0.5		1	1		2		
	5/5/2020	1.5		0.0			2.5	2.0	1.5	
	1/19/2021	2.0	1.0	0.0	1.0	1.5	2.0	2.0	1.5	2.0
Cation Exchange Capacity	1/9/2020		14.6		16.9	14.7		18.0		
	5/5/2020	15.0		20.6			17.2	18.1	16.1	
	1/19/2021	19.2	12.7	17.6	15.6	17.4	15.0	17.1	14.8	18.0

pH has the ability to help retain nutrients, and affects P & K

Soil Nutrient Management: Phosphorus

		Norton Biodynamic 1W	Norton Biodynamic 2C	Norton Biodynamic 1E	Norton Center 5	Norton East 5	Wetumka 40W	Wetumka 39C	Wetumka 40E	Wetumka West 32
PH	1/9/2020		6.2		6.1	6.2		5.6		
	5/5/2020	5.9		6.9			5.6	5.5	5.6	
	1/19/2021									
Phosphorus	1/9/2020		28		28	12		58		
	5/5/2020	17		34			42	20	30	
	1/19/2021	15	12	27	52	4	48	74	42	65
Potassium	1/9/2020									
	5/5/2020	303		296			324	264	261	
	1/19/2021	291	264	319	444	331	375	349	331	364
Calcium	1/9/2020		4479		5173	4345		4933		
	5/5/2020	4066		6847			4311	4739	4497	
	1/19/2021	5275	3705	5993	4646	4889	3867	4615	4188	4831
Magnesium	1/9/2020		582		601	589		745		
	5/5/2020	711		748			850	948	731	
	1/19/2021	874	515	537	578	792	681	740	586	825
Organic Matter	1/9/2020		1.7		1.9	2.0		2.2		
	5/5/2020	2.1		1.5			1.9	2.0	1.6	
	1/19/2021	1.7	0.1	1.5	2.3	1.6	2.0	2.1	1.1	2.0
Neutralizable acidity	1/9/2020		0.5		1	1		2		
	5/5/2020	1.5		0.0			2.5	2.0	1.5	
	1/19/2021	2.0	1.0	0.0	1.0	1.5	2.0	2.0	1.5	2.0
Cation Exchange Capacity	1/9/2020		14.6		16.9	14.7		18.0		
	5/5/2020	15.0		20.6			17.2	18.1	16.1	
	1/19/2021	19.2	12.7	17.6	15.6	17.4	15.0	17.1	14.8	18.0

40-50ppm is desirable
East Block went from 12 to 4
BD had 3X K, did not drop as much over the course of the season

Soil Nutrient Management: Potassium

		Norton Biodynamic 1W	Norton Biodynamic 2C	Norton Biodynamic 1E	Norton Center 5	Norton East 5	Wetumka 40W	Wetumka 39C	Wetumka 40E	Wetumka West 32
PH	1/9/2020		6.2		6.1	6.2		5.6		
	5/5/2020	5.9		6.9			5.6	5.5	5.6	
	1/19/2021	5.4	6.1	7.0	6.4	6.0	5.8	5.7	5.6	5.9
Phosphorus	1/9/2020		28		28	12		58		
	5/5/2020	17		34			42	20	30	
	1/19/2021									
Potassium	1/9/2020		342		378	299		419		
	5/5/2020	303		296			324	264	261	
	1/19/2021	291	264	319	444	331	375	349	331	364
Calcium	1/9/2020		4479		5173	4345		4933		
	5/5/2020	4066		6847			4311	4739	4497	
	1/19/2021	5275	3705	5993	4646	4889	3867	4615	4188	4831
Magnesium	1/9/2020		582		601	589		745		
	5/5/2020	711		748			850	948	731	
	1/19/2021	874	515	537	578	792	681	740	586	825
Organic Matter	1/9/2020		1.7		1.9	2.0		2.2		
	5/5/2020	2.1		1.5			1.9	2.0	1.6	
	1/19/2021	1.7	0.1	1.5	2.3	1.6	2.0	2.1	1.1	2.0
Neutralizable acidity	1/9/2020		0.5		1	1		2		
	5/5/2020	1.5		0.0			2.5	2.0	1.5	
	1/19/2021	2.0	1.0	0.0	1.0	1.5	2.0	2.0	1.5	2.0
Cation Exchange Capacity	1/9/2020		14.6		16.9	14.7		18.0		
	5/5/2020	15.0		20.6			17.2	18.1	16.1	
	1/19/2021	19.2	12.7	17.6	15.6	17.4	15.0	17.1	14.8	18.0

250-300 ppm is desirable
P contributes plant hardiness

Soil Nutrient Management: Organic Matter

		Norton Biodynamic 1W	Norton Biodynamic 2C	Norton Biodynamic 1E	Norton Center 5	Norton East 5	Wetumka 40W	Wetumka 39C	Wetumka 40E	Wetumka West 32
PH	1/9/2020		6.2		6.1	6.2		5.6		
	5/5/2020	5.9		6.9			5.6	5.5	5.6	
	1/19/2021	5.4	6.1	7.0	6.4	6.0	5.8	5.7	5.6	5.9
Phosphorus	1/9/2020		28		28	12		58		
	5/5/2020	17		34			42	20	30	
	1/19/2021	15	12	27	52	4	48	74	42	65
Potassium	1/9/2020		342		378	299		419		
	5/5/2020	303		296			324	264	261	
	1/19/2021	291	264	319	444	331	375	349	331	364
Calcium	1/9/2020		4479		5173	4345		4933		
	5/5/2020	4066		6847			4311	4739	4497	
	1/19/2021	5275	3705	5993	4646	4889	3867	4615	4188	4831
Magnesium	1/9/2020		582		601	589		745		
	5/5/2020	711		748			850	948	731	
	1/19/2021	874	515	537	578	792	681	740	586	825
Organic Matter	1/9/2020		1.7		1.9	2.0		2.2		
	5/5/2020	2.1		1.5			1.9	2.0	1.6	
	1/19/2021	1.7	0.1	1.5	2.3	1.6	2.0	2.1	1.1	2.0
Neutralizable acidity	1/9/2020									
	5/5/2020	1.5		0.0			2.5	2.0	1.5	
	1/19/2021	2.0	1.0	0.0	1.0	1.5	2.0	2.0	1.5	2.0
Cation Exchange Capacity	1/9/2020		14.6		16.9	14.7		18.0		
	5/5/2020	15.0		20.6			17.2	18.1	16.1	
	1/19/2021	19.2	12.7	17.6	15.6	17.4	15.0	17.1	14.8	18.0

2-3% is typically considered ideal, however this land was chosen for its low OM, to retard herbaceous growth

Soil Nutrient Management: Cation Exchange Capacity

		Norton Biodynamic 1W	Norton Biodynamic 2C	Norton Biodynamic 2E	Norton Center 5	Norton East 5	Wetumka 40W	Wetumka 39C	Wetumka 40E	Wetumka West 32
PH	1/9/2020		6.2		6.1	6.2		5.6		
	5/5/2020	5.9		6.9			5.6	5.5	5.6	
	1/19/2021	5.4	6.1	7.0	6.4	6.0	5.8	5.7	5.6	5.9
Phosphorus	1/9/2020		28		28	12		58		
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	1/19/2021	1.7	0.1	1.5	2.3	1.6	2.0	2.1	1.1	2.0
Neutralizable acidity	1/9/2020		0.5		1	1		2		
	5/5/2020	1.5		0.0			2.5	2.0	1.5	
	1/19/2021									
Cation Exchange Capacity	1/9/2020		14.6		16.9	14.7		18.0		
	5/5/2020	15.0		20.6			17.2	18.1	16.1	
	1/19/2021	19.2	12.7	17.6	15.6	17.4	15.0	17.1	14.8	18.0

Correlates with Organic matter. The higher the CEC the greater the capacity of the soil to hold nutrients

Wine Tasting Results

Biodynamic Norton
Deep ruby color. Rich nose of blueberry, five spice and anthracite coal. Dense, soft tannins, ample body and likeable acidity. Long rich finish and an aftertaste of impossible persistence. DOUBLEGOLD
The BD Norton was distinctly more floral and approachable than the control Norton.

Biodynamic Wetumpka
Golden color. Cured meat. Full body, round tannin, intriguing flavors, crisp acidity.
The BD Wetumka had similar characteristics, but the aromas, flavors, and finish were differently distributed during the tasting experience.

- Clark Smith *
- Jerry Eisterhold
- Jean-Louis Horviller

Next Steps

Vox will expand this treatment in the vineyard.
Desirable vine quality

Increase vineyard (soil and canopy diversity and fruit health) over time

Reduced labor (spraying and treatments) overall, notwithstanding some additional labor required for canopy treatment and ground cover management

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