Virginia Cooperative Extension
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2023
VIRGINIA ON-FARM WHEAT TEST PLOTS

A Summary of Replicated Research and Demonstration Plots Conducted by Virginia Cooperative Extension in Cooperation with Local Producers and Agribusinesses

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Financial Assistance Provided by the Virginia Small Grains Board

Introduction

The On-Farm Variety and Research Publications are a collaboration between county agents, producers, crop specialists, and agribusinesses to provide research-based information on not only variety selection, but other management practices such as new cultivation, fertilization, planting, and harvesting practices of small grain. It is the intent of all the cooperators involved to provide an unbiased publication that provides assistance in variety selection as well as information related to other current small grain topics.

The authors of this publication wish to thank the many producers and agribusinesses for their cooperation in obtaining the data in this publication. Without their support, this information would not be available, and the resulting publication would not be possible. This publication is made available at the VCE website (https://ext.vt.edu/), and is also available from any local county agricultural Extension agent, who can request copies from Robbie Longest in the Essex County VCE Office. If you are a person with a disability and desire assistance or accommodation and would like to request a fully accessible copy of this publication, please contact Robbie Longest in the Essex VCE Office at 804-443-3551 or robbiel7@vt.edu.

The fieldwork and printing of this publication is supported by the Virginia Small Grains Board Check-Off funds. **The cooperators gratefully acknowledge and thank the Virginia Small Grains Board for their continued support.**

This is the thirtieth year of this ongoing annual project. Further work is planned for the upcoming 2023-2024 growing season. The demonstration and research plot results discussed in this publication are a cooperative effort by eight Virginia Cooperative Extension ANR agents, one retired agent, and the EVAREC superintendent. We are proud to present this year's on-farm small grain plot work to you. We hope the information in this publication will help farmers produce a profitable crop in 2024.

If you are a producer interested in participating in on-farm plot work, or have research ideas that you would like to see evaluated through this project, please contact your local Extension office.

In Memoriam

Michael G. Broaddus
July 19, 1962 – April 6, 2023

Mike Broaddus (kneeling) educating on how to estimate wheat yields and evaluate the crop for quality before harvest. (Photo Credit: Robert Harper – Virginia Farm Bureau Grains Division)

Michael “Mike” Broaddus served as the Virginia Cooperative Extension Agricultural and Natural Resources (ANR) Extension Agent for Caroline and King George Counties for approximately 10 years, coordinating and contributing greatly to the Virginia On-Farm Wheat Test Plots program. Mike’s leadership to the program and his eagerness to help and educate agricultural producers spanned across not only his home communities, but across Virginia. His efforts and dedication to on-farm research and agronomic advancement impacted many lives. This year’s On-Farm Wheat Test Plots Publication is dedicated in memory of Mike for his service and passion as an ANR Agent, colleague, and friend.

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Figure 1: Soft red winter wheat grain following harvest.

Photos: Courtesy of Robbie Longest, Joseph Oakes, and Robert Harper.

General Summary

A. THE SEASON: The 2022-2023 small grain growing season proved to be variable for Virginia producers. Fall planting and early season growing conditions got off to a great start, with an overall mild winter and great spring growing conditions. Freeze damage and disease pressure was minimal this season, and a dryer and cooler than average spring set up the 2023 crop for great potential. Many areas harvested an above-average to near record wheat crop, however unfortunately weather challenges in late June and early July delayed and impacted harvest resulting in decreased grain quality through sprouting (Figure 3) and lower test weights in some areas.

B. VARIETY SELECTION: Proper variety selection continues to be crucial for producing high-yielding, good quality wheat. With so many options being commercially available, replicated yield data such as that presented in this publication is of great value to producers in helping make this important decision. Many agronomic factors should be considered when selecting a variety such as yield, grain quality, disease resistance package, lodging susceptibility, response to fertility, heading date, stress tolerance, etc. Virginia Cooperative Extension agents, along with producer-cooperators, planted five wheat variety plots throughout eastern and central Virginia in 2022-2023. Nine varieties of soft red winter wheat (SRWW) and one variety of hard red winter wheat (HRWW) was entered and tested in the counties of Appomattox, Brunswick, Essex, New Kent, and Westmoreland. Variety yield and test weight summaries can be found on pages 13 and 14 respectively. An agronomic traits table found on page 22 reports heading date, plant height, and several disease resistance ratings for the tested varieties. Wheat seed size varies, resulting in differences in planting rates and pounds of seed per acre sowed. Included on page 23 is a planting chart for different sized wheat seed as a reference to insure accurate planting populations.

C. OTHER RESEARCH:

Using Aerial Imagery to Apply Nitrogen in Winter Wheat: Crop scouting and management using aerial imagery & remote sensing is gaining popularity and implementation. Work is being done to validate NDVI and NDRE sensing using drone technology to make prescriptive recommendations for nitrogen applications in wheat at GS 25 & GS 30, based on canopy reflectance and tiller density. This work was continued from 2022 with the goal of producers being able to fly fields, and use a created map to make variable rate applications based on tiller density.

Investigating Increased Row Spacing for Winter Wheat: Wheat is typically grown in drilled rows with a spacing of 7-7.5” row spacings, or broadcast and incorporated. Some producers are interested in experimenting with row spacing to plant in other spacings (15 inch) in an effort to encourage better plant tillering and hopefully improve yields. A study was conducted in 2022-2023 looking at wider row spacing.

It is advisable to be cautious when choosing a variety from any publication that reports yield data, particularly single-year single-location data. Simply choosing the top yielding variety found in this publication may or may not be the best choice for your style of production and farm. Please consider the production practices listed for each location versus yours when selecting a variety and anticipating its performance. It is advised to consult other replicated yield data over multi-year, multi-location trials in addition to these results when selecting varieties.

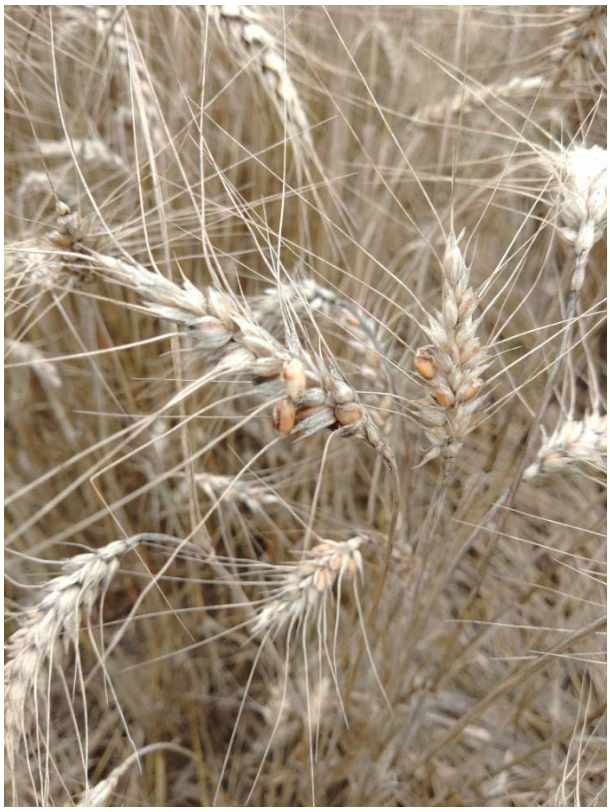

Figure 2: Shattering of wheat grain can be observed in this photo as a result of weather challenges at harvest. Seeds have begun to sprout and fall from the glumes on the head, resulting in decreased yields and harvest efficiency. (Photo credit Robbie Longest)

Figure 3: Sprout damage was observed by many producers during the 2023 wheat harvest as a result of frequent rainfall and cloudy weather on mature grain, delaying harvest and decreasing grain quality. (Photo credit Robbie Longest)

County On-Farm Wheat Variety Plots

Appomattox County Wheat Variety Plot

Cooperators: **Producer:** Chris Booth
Extension: Bruce Jones–ANR, Appomattox
Joanne Jones – ANR, Charlotte

Previous Crop: Full - season soybeans
Soil Type: Cullen loam
Tillage: No-till
Planter/Row Width: 10 ft. John Deere 750 / 7.5 inch spacing
Planting Date: November 21, 2022
Planting Population: 120 pounds/A
Fertilizer: Planting 30-30-30
Mar. 3 52 #N (28-0-0-5S)

Crop Protection: **Burndown:** glyphosate
In-Season: Mar. 3 Harmony Extra, Calvary II, Montys humi-till, FS Aquasupreme surfactant
Harvest Date: July 12, 2023

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
Chemgro	Fairland	58.8	12.9	99.8
Pioneer	26R59	59.0	13.2	103.3
Revere	2169	58.0	12.6	100.8
USG	3352	58.7	12.7	104.7
Southern Harvest	9520	59.8	12.2	96.3
Progeny	#BINGO	57.6	12.7	99.2
VCIA	Liberty 5658	57.8	12.1	93.0
DynaGro	9151	60.1	12.1	108.5
VIPG (HRWW)	Phoenix 29	58.9	12.2	89.2
Syngenta Agripro	GP 381	56.9	11.7	88.7
AVERAGE		**58.6**	**12.4**	**97.7**

Discussion: Use these results and other replicated yield data when making seed selections for the 2023-2024 growing season.

Brunswick County Wheat Variety Plot

Cooperators: **Producer:** William and Howard Wright
Extension: Taylor Clarke – ANR, Mecklenburg

Previous Crop: Soybeans
Tillage: No-till
Planter/Row Width: JD 750 no-till drill / 7.5 inch spacing (plots 30 ft. wide)
Planting Date: November 22, 2022
Planting Population: 1.4 – 1.6 million seeds/A
Fertilizer: **Pre-plant:** 30-60-90
In-season: 20 #N w/ herbicide; 80 #N as 24S
Crop Protection: **In-season:** Powerflex (2.0 oz./A)
Miravis Ace (13.7 oz./A) + Tombstone (2.0 oz./A) at 50% heading
Harvest Date: June 18, 2023

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
CHECK	VNS	60.1	15.5	89.3
USG	3352	61.2	13.1	83.0
Progeny	#BINGO	60.6	13.1	92.0
Revere	2169	62.0	13.4	84.7
VIPG (HRWW)	Phoenix 29	63.3	12.9	83.3
Southern Harvest	9520	62.0	13.6	87.4
Pioneer	26R59	61.9	13.1	88.0
DynaGro	9151	63.3	12.2	80.7
Chemgro	Fairland	61.7	12.5	93.9
VCIA	Liberty 5658	62.7	12.3	84.2
Syngenta Agripro	GP 381	61.3	12.2	79.4
Check	VNS	60.9	13.0	85.6
AVERAGE		**61.8**	**13.1**	**86.0**

Discussion: Use these results and other replicated yield data when making seed selections for the 2023-2024 growing season.

Essex County Wheat Variety Plot

Cooperators: **Producer:** Dunbrooke Farms – Lane and Patrick Brooks
Extension: Robbie Longest – ANR, Essex

Previous Crop: Corn
Soil Type: Kempsville/Suffolk sandy loam
Tillage: Turbo-till prior to planting
Planter/Row Width: John Deere 1990 airdrill / 7.5 inch spacing
Planting Date: November 4, 2022
Planting Population: ~ 3 bu./A (36 seeds per row foot)

Fertilizer:	**Pre-plant:**	Oct. 10	16-50-120-12S
	In-season:	Jan. 24	24-0-0-3 (70 #N)
		Mar. 15	24-0-0-3 (50 #N)
Crop Protection:	**Burndown:**		Devour (2 pt./A)
	In-season:	Jan. 24	Vigil (4 oz./A), Harmony Extra SG (0.75 oz./A)
		Mar. 15	Quelex (0.75 oz./A), Vigil (4 oz./A), Ravage (3 oz./A), MaxxGro for Wheat (1 qt./A)
		May 2	Sphaerex (7.2 oz./A)

Harvest Date: July 3, 2023

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield Bu./A @13.5%	Adjusted Yield Bu./A @13.5%
CHECK - Croplan	CP 9606	54.4	13.0	103.4	105.7*
VCIA	Liberty 5658	55.5	12.6	99.8	99.8
VIPG (HRWW)	Phoenix 29	58.6	12.4	101.6	101.6
Pioneer	26R59	54.7	13.4	107.8	110.2*
Syngenta AgriPro	GP 381	54.5	12.2	109.3	109.3
DynaGro	9151	56.2	12.8	109.3	109.3
USG	3352	52.2	12.7	103.4	105.6*
Southern Harvest	9520	54.2	12.7	107.4	107.4
Progeny	# BINGO	54.8	13.1	111.4	111.4
Chemgro	Fairland	55.2	12.7	96.1	98.2*
Revere	2169	54.2	12.5	112.1	112.1
CHECK - Croplan	CP 9606	53.5	12.5	99.2	101.4*
Average		**54.8**	**12.7**	**105.1**	**106.0**

Discussion: * Yields of five plots were adjusted to reflect sprayer track losses. These plots were adjusted for 2.2% loss as a result of two 12 in. tire tracks being in those plots. Plots were 30 feet wide, and the sprayer covered 90 feet per pass, thus the 2.2% estimated loss. Overall excellent yields at this location. Use these results and other replicated yield data when making seed selections for the 2023-2024 growing season.

New Kent County Wheat Variety Plot

Cooperators: **Producer:** Davis Produce, Paul Davis
Extension: Forrest Hobbs, VCE – New Kent/James City

Previous Crop: Corn
Soil Type: Tetotum fine sandy loam
Tillage: No-till
Planter/Row Width: JD no-till drill/ 7.5 inch spacing
Planting Date: October 27, 2022
Planting Population: 28 seeds per row foot
Fertilizer: **Pre-plant:** Oct. 27 30-60-80 broadcast
In-season: Dec. 5 20# N
Feb. 8 40# N + Impact F (1 qt./A)
Mar.6 50# N
Crop Protection: Dec. 5 Powerflex (2 oz./A), Metribuzin (2.5 oz./A) in ½ water + ½ nitrogen
Mar. 7 Palisade (5.5 oz./A)
Apr. 24 Miravis Ace (13.7 oz./A)
Harvest Date: June 19, 2023

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
Check – VIPG (HRWW)	Vision 45	58.5	13.6	88.2
VIPG (HRWW)	Phoenix 29	62.1	12.3	96.7
Syngenta AgriPro	GP 381	61.4	12.4	128.7
Chemgro	Fairland	61.6	12.7	123.2
DynaGro	9151	64.0	12.7	129.0
VCIA	Liberty 5658	63.3	12.9	129.3
Pioneer	26R59	60.7	13.1	98.0*
Progeny	# BINGO	61.6	12.4	129.4
Revere	2169	61.2	12.5	120.8
Southern Harvest	9520	61.4	13.0	125.6
USG	3352	62.0	12.5	136.6
AVERAGE		**61.6**	**12.7**	**118.7**

* Deer damage was observed in these plots

Discussion: Perfect growing conditions with a mild winter and cool spring temperatures. Plenty of sunshine and not too wet. Our best wheat crop ever.

Westmoreland County Wheat Variety Plot

Cooperators: **Producer:** Louis Chandler, F.F. Chandler Jr.
Extension: Stephanie Romelczyk, VCE – Westmoreland, Trent Jones, VCE – Northumberland/Lancaster

Previous Crop: Corn
Soil Type: Kempsville loam, Savannah loam
Tillage: No-till
Planter/Row Width: 7.5 inch spacing
Planting Date: November 3, 2022
Planting Population: 32 seeds per row foot

Fertilizer:	**Pre-plant**:	Oct. 1	40-40-60-5S
	In-season:	Feb. 7	40-0-0-5S, NutriSync Copper (1 qt./A)
		Mar. 15	70-0-0-8.75S, Black Label Zn (0.5 gal./A), TERRAMAR (1 qt./A)
		Apr. 27	Maximum N-Pact K (1 gal./A)
Crop Protection:	**Pre-plant:**		Gramoxone (1 qt./A) + Fitness (0.4 (oz./A) + Liberate (0.5 pt./100 gals.)
	In-season:	Dec. 14	Anthem Flex (3 oz./A) + Liberate (0.5 pt./100 gals.) + Tombstone Helios (1.5 oz./A) + Radiate (2 oz./A)
		Feb. 7	Quelex (0.75 oz./A) + Liberate (1 pt./100 gals.) + Radiate (2 oz./A)
		Mar. 15	Fitness (4 oz./A)
		Apr. 27	Miravis Ace (13.7 oz./A) + Liberate (0.5 pt./100 gals.) + Tombstone (1.5 oz./A)

Harvest Date: July 13, 2023

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
Progeny	#BINGO	55.1	12.3	124.0
Syngenta Agripro	GP 381	57.0	12.9	128.2
Revere	2169	56.4	12.5	125.0
USG	3352	56.6	13.1	121.0
Chemgro	Fairland	56.4	12.1	122.8
Southern Harvest	9520	57.2	12.1	118.1
DynaGro	9151	59.6	11.8	119.8
VIPG (HRWW)	Phoenix 29	60.8	11.5	114.1
Pioneer	26R59	57.9	12.0	124.7
VCIA	Liberty 5658	57.8	11.7	119.4
AVERAGE		**57.5**	**12.2**	**121.7**

Discussion: Excellent yields. Field space ran out at one location, so Progeny #BINGO, Syngenta Agripro GP 381, and Revere 2169 were planted at a nearby field with similar soil type.

2023 Virginia Cooperative Extension On-Farm Wheat Variety Plots
Variety Yield Summary
(bushels/acre @ 13.5% moisture)

Company	Variety	Location					Variety AVERAGE *
		Appomattox	Brunswick	Essex	New Kent	Westmoreland	
Progeny	#BINGO	99.2	92.0	111.4	129.4	124.0	**111.2**
Syngenta AgriPro	GP 381	88.7	79.4	109.3	128.7	128.2	**106.9**
Revere	2169	100.8	84.7	112.1	120.8	125.0	**108.7**
DynaGro	9151	108.5	80.7	109.3	129.0	119.8	**109.5**
VIPG (HRWW)	Phoenix 29	82.9	83.3	101.6	96.7	114.1	**95.7**
Southern Harvest	9520	96.3	87.4	107.4	125.6	118.1	**107.0**
USG	3352	104.7	83.0	105.6	136.6	121.0	**110.2**
Pioneer	26R59	103.3	88.0	110.2	98.0	124.7	**104.8**
VCIA	Liberty 5658	93.0	84.2	99.8	129.3	119.4	**105.1**
Chemgro	Fairland	99.8	93.9	98.2	123.2	122.8	**107.6**
Location AVERAGE *		**97.7**	**85.7**	**106.5**	**121.7**	**121.7**	

§ Color scale for yields indicates higher yields in green, and lower yields in red within test location (column)
* Location and Variety yield averages derived across reported test locations and varieties

2023 Virginia Cooperative Extension On-Farm Wheat Variety Plots
Variety Test Weight Summary
(pounds/bushel)

Company	Variety	Location					Variety AVERAGE *
		Appomattox	Brunswick	Essex	New Kent	Westmoreland	
Progeny	#BINGO	57.6	60.6	54.8	61.6	55.1	**57.9**
Syngenta AgriPro	GP 381	56.9	61.3	54.5	61.4	57.0	**58.2**
Revere	2169	58.0	62.0	54.2	61.2	56.4	**58.4**
DynaGro	9151	60.1	63.3	56.2	64.0	59.6	**60.6**
VIPG (HRWW)	Phoenix 29	58.9	63.3	58.6	62.1	60.8	**60.7**
Southern Harvest	9520	59.8	62.0	54.2	61.4	57.2	**58.9**
USG	3352	58.7	61.2	52.2	62.0	56.6	**58.1**
Pioneer	26R59	59.0	61.9	54.7	60.7	57.9	**58.8**
VCIA	Liberty 5658	57.8	62.7	55.5	63.3	57.8	**59.4**
Chemgro	Fairland	58.8	61.7	55.2	61.6	56.4	**58.7**
Location AVERAGE *		**58.6**	**62.0**	**55.0**	**61.9**	**57.5**	

***** Location and Variety test weight averages derived across reported test locations and varieties

Other Research

Validating the Use of Aerial Imagery to Apply Nitrogen in Winter Wheat

Overview: The purpose of this trial is to examine the effectiveness of using aerial indices to apply nitrogen fertility at Zadok's Growth Stage (GS) 25, instead of the traditional method of counting tillers. Traditional fertility recommendations in Virginia soft red winter wheat call for nitrogen to be applied at GS 25 if there are less than 50 tillers per square foot in order to stimulate tiller growth until GS 30 when the bulk of in-season nitrogen is applied. However, due to field variability and time constraints of counting tillers, this method can be inaccurate and time consuming. Therefore, an effort to estimate tiller density remotely is essential. Over the past three growing seasons, our team has identified that aerial remote sensing with an unmanned aerial vehicle (UAV) can accurately estimate tiller density in research plots. Normalized difference vegetative index (NDVI) and normalized difference red edge (NDRE) are vegetative indices that are derived from multispectral aerial images that can assess crop nutrition status. Over the past two years, these indices have been collected at four locations. Aerial NDVI estimated tiller density with an accuracy of 75% and aerial NDRE with an accuracy of 71%; and both accurately showed whether or not N was needed at this stage. These studies were done in small research plots. The purpose of these on farm trials is to validate the small plot work and examine in production scale field settings.

Figure 4: Dr. Joseph Oakes prepares the UAV that carries the NDVI and NDRE sensors for flight over wheat plots to measure tiller densities at GS 25.

Prince George Location

Cooperators:	**Producer:**	Todd Price, Spring Grove, VA	
	Extension:	Joseph Oakes, Eastern Virginia AREC Scott Reiter, VCE – Prince George	
Previous Crop:		Corn	
Soil Type:		Pamunkey loam	
Tillage:		No-till	
Planter/Row Width:		John Deere 1590/ 7.5 inch spacing	
Planting Date:		October 19, 2022	
Planting Population:		28 seed per row foot	
Variety:		USG 3472	
Fertilizer:	**Pre-plant:**	Oct. 15	40-60-80
	In-season:	Feb. 7 and Mar. 20	Based on treatments
Crop Protection:		Nov. 1	Salvo (12 oz./A) + Anthem Flex (3.5 oz./A)
Harvest Date:		June 15, 2023	

Table 1: Nitrogen application rates and method

Plot #	GS 25 Rate (# N / A)	GS 30 Rate (# N / A)	Method
101	0	120	NDVI
102	0	120	NDRE
103	40	80	Tiller Density
201	0	120	NDRE
202	40	80	Tiller Density
203	0	120	NDVI
301	40	80	Tiller Density
302	0	120	NDVI
303	0	120	NDRE

Discussion: In this study, three treatments were replicated three times. The three treatments were nitrogen application methods: applying nitrogen based on tiller density, NDVI, or NDRE at GS 25. Treatments were applied in strips 500 feet long and 80 feet wide (the width of the sprayer). GS 25 nitrogen was applied based on either tiller density, NDVI, or NDRE as shown in Table 1. Remaining nitrogen was then applied at GS 30 to equal a total of 120 lbs. for all strips. GS 25 and GS 30 nitrogen were applied as 24-0-0-3.

In the strips where tiller density was used, tiller counts recommended to apply an average of 50 lbs. of nitrogen at GS 25. Meanwhile, in strips where NDVI and NDRE were used, both recommended an average of 60 lbs. of nitrogen to be applied at GS 25. At harvest, there was no statistical difference in grain yield among the three methods (Figure 5).

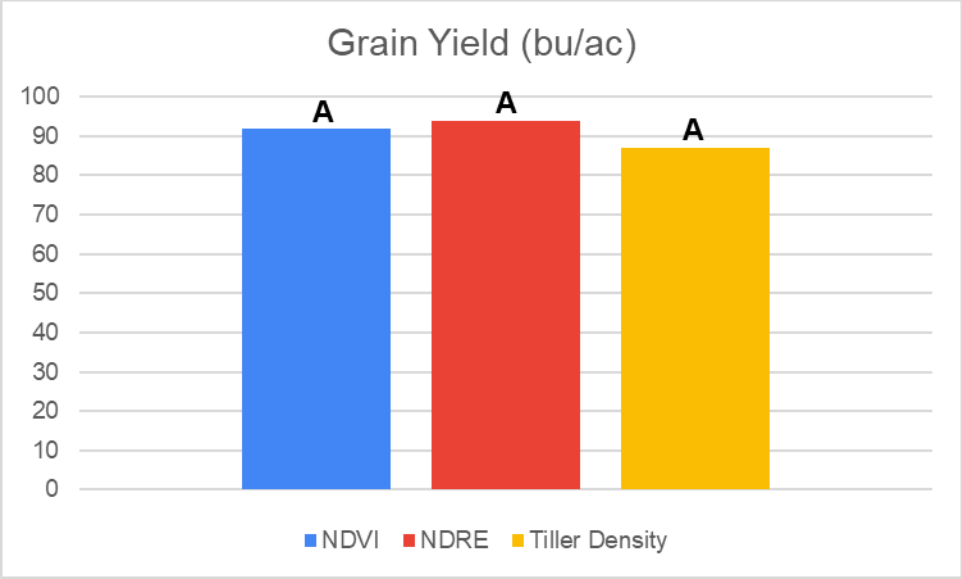

Figure 5: Grain yield among the three different nitrogen application recommendation methods. The same letters are not significantly different at LSD $p<0.05$.

This data shows that estimating tiller density and applying nitrogen at GS 25 with aerial indices recommends similar nitrogen rates as tiller density and achieves the same grain yield. While tiller density recommended GS 25 N and the aerial indices did not, tiller density was right on the threshold. Forty-seven tillers (right under the 50-tiller threshold) were observed in the plot where tiller density was used. Current and future work is looking to use these indices to create variable rate application maps based on NDVI to allow the sprayer to apply the nitrogen as needed based on the aerial NDVI.

Dinwiddie Location

Cooperators:	**Producer:**	Nick Moody, Darvills, VA
	Extension:	Joseph Oakes, Eastern Virginia AREC Mike Parrish, VCE – Dinwiddie
Previous Crop:		Soybean
Soil Type:		Appling/Cecil
Tillage:		No-till
Row Width:		7.5 inch row spacing
Planting Date:		November 10, 2022
Planting Population:		3 units/A
Variety:		SY-Viper
Fertilizer:	**Pre-plant:**	Nov. 40-0-0-8S
	In-season:	Based on treatments
Crop Protection:		Gramoxone, Finesse, Quelex, Miravis Ace
Harvest Date:		June 15, 2023

Table 2: Nitrogen application rates and method

Plot #	GS 25 Rate (# N / A)	GS 30 Rate (# N / A)	Method
101	60	60	NDVI
102	60	60	Tiller Density
201	60	60	Tiller Density
202	60	60	NDVI
301	60	60	NDVI
302	60	60	Tiller Density

Discussion: In this study, two treatments were replicated three times. The two treatments were nitrogen application methods: applying nitrogen based on tiller density and NDVI at GS 25. Treatments were applied in strips 385 feet long and 80 feet wide (the width of the sprayer). GS 25 nitrogen was applied based on either tiller density or NDVI as shown in Table 2. Remaining nitrogen was then applied at GS 30 to equal a total of 120 lbs. for all strips. GS 25 and GS 30 nitrogen were applied as 24-0-0-3.

As shown in Figure 6, both methods (tiller density and NDVI) recommended 60 lbs. of N at GS 25. Since both methods recommended the same amount of N at GS 25, there was not a statistical difference in final grain yield.

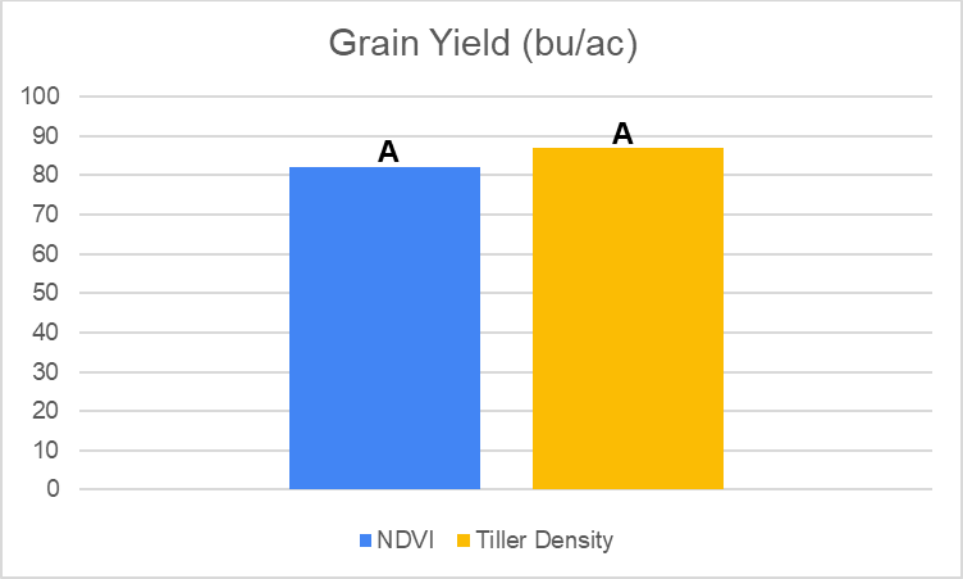

Figure 6: Grain yield among the two different nitrogen application recommendation methods. The same letters are not significantly different at LSD $p<0.05$.

The data from these two on-farm studies shows that estimating tiller density and applying nitrogen using aerial indices recommends similar nitrogen rates as counting tillers. Therefore, grain yield is not significantly different. This shows that aerial NDVI can be used to develop prescription maps for a sprayer to apply nitrogen. Future work will focus on developing prescription maps that are compatible with variable rate sprayers.

Special thanks to growers Todd Price and Nick Moody for their assistance with this study, and to the Virginia Agriculture Council for funding this study.

Evaluating Various Row Spacings for Wheat Production

Richmond County Wheat Row Spacing Comparison Plot

Cooperators:	**Producer:**	Jason Sanford
	Extension:	Trent Jones, VCE – Northumberland and Lancaster
Previous Crop:		Corn
Tillage:		No-till
Row Width:		Drilled (7.5 in.), Planted (15 in.)
Planting Date:		November 3, 2022
Planting Population:		Drilled (1.65 M Seed/ A), Planted (1.5 M Seed/ A)
Variety:		AgriMaxx 513
Crop Management & Fertilizer:		
	Oct. 20	249.76 lb./A MAP, 31 lb. N
	Dec. 11	217.2 lb./A Potash
	Dec. 12	1.9 gal. Ammonium Thiosulfate, 7 gal. UAN, 1 qt. Accomplish LM, 32 oz. Anthem Flex, 2 qt. Nutrisync Copper, 7 oz. Quelex, 2 oz. Radiate
	Feb. 4	7 gal. UAN, 1.9 gal. Ammonium Thiosulfate
	Mar. 1	14 gal. 32% UAN, 1.9 gal. Ammonium Thiosulfate
	Mar. 23	11 oz. Palisade Max, 4 oz. Stratego Yield
	Apr. 4	1.9 gal. Ammonium Thiosulfate, 14 gal. 32% UAN, 1 gal. Black Label Zinc
	May 2	8 oz. Sphaerex
Harvest Date:		June 29, 2023

Treatment			Moisture (%)	Yield (Bu./A)
Planted (15”)	(Rep 1)	(Wheel Track)	12.9	116
Drilled (7.5”)	(Rep 1)		13.1	129
Planted (15”)	(Rep 2)		13.2	120
Drilled (7.5”)	(Rep 2)		13.0	121
			Planted Average	118
			Drilled Average	125

Discussion: Wheat drilled at 7.5 inch spacing and planted at 15 inch spacing were compared side by side under the same management practices and field conditions to determine how plant spacing affected crop performance and yield. Treatments drilled at 7.5 inch spacing averaged 125 Bu./A, and treatments planted at 15 inch spacing averaged 118 Bu./A. It is important to note two variables that likely influenced yield in this comparison. First, planting population for the drilled and planted treatments were similar, but not standardized. 150,000 more seed were planted per acre in the drilled treatments. Additionally, the “Planted 1” treatment contained a sprayer track that likely negatively influenced yield within the treatment and thus influenced the overall planted average yield.

2023 Variety Performance Summary and Disease Ratings

(Source: VT Small Grains Breeding and Research Program, 2021- 2023)

Brand	Variety	Heading Date (Julian)	Height (in.)	Powdery Mildew*	Leaf Rust*	FHB Plant Response
Progeny	#BINGO[b]	122	33	3.0	-	3.0
Syngenta AgriPro	GP 381[b]	120	31	1.5	-	3.5
Revere	2169[d]	121	36	2.1	4.3	3.5
DynaGro	9151[d]	121	36	1.9	5.8	4.5
VIPG (HRWW)	Phoenix 29[a]	119	36	2.1	1.4	4.0
Southern Harvest	9520[d]	123	34	0.9	3.0	3.5
USG	3352[c]	122	35	3.3	4.9	3.8
Pioneer	26R59[d]	120	32	1.5	4.6	4.8
VCIA	Liberty 5658[d]	117	37	2	0.6	4.0
Chemgro	Fairland	-	-	-	-	-

[a] Single year data (2023) / (2022) [b]

[c] Two-year average (2022 and 2023)

[d] Three-year average (2021, 2022, 2023)

* The 0-9 ratings indicate a varieties response to disease where 0 = highly resistant and 9 = highly susceptible.

Wheat Seed Size Planting Conversion Table

	SEEDS PER ROW FOOT (7.5” row spacing)					
	19	22	25	28	31	34
	SEEDS PER SQUARE FOOT					
	30	35	40	45	50	55
SEEDS/POUND	**POUNDS OF SEED/ACRE (divided by 60 equals bushels/acre)**					
10,000 (large seed)	131	152	174	196	218	240
11,000	119	139	158	178	198	217
12,000	109	127	145	163	182	200
13,000	101	117	134	151	168	184
14,000	93	109	124	140	156	171
15,000	87	102	116	131	145	159
16,000	82	95	109	123	136	150
17,000	77	90	102	115	128	141
18,000	73	85	97	109	121	133
19,000	69	80	92	103	115	126
20,000 (small seed)	65	76	87	98	109	120