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Virginia On-Farm Wheat Test Plots

2025

A summary of replicated research and demonstration plots conducted by Virginia Cooperative Extension in cooperation with local producers and agribusinesses

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Introduction

The On-Farm Wheat Variety and Research Test Plots results presented in this publication are a collaborative effort between Virginia Cooperative Extension (VCE) Agents and Specialists, producer-cooperators, and agribusinesses to provide research-based information and results on not only variety selection and performance, but also other emerging management practices of interest through replicated on-farm trials to assist producers in making sound agronomic management decisions based on unbiased information.

The authors of this publication would like to thank the numerous producers and agribusinesses that made this work possible for their cooperation and support in obtaining the data presented in this publication. This publication is made available at the VCE website (<https://ext.vt.edu>). It 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 are 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 32nd year of this ongoing annual project. Further work is planned for the upcoming 2025-2026 growing season. 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 high-yielding and profitable crop in 2026.

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 Virginia Cooperative Extension Office.

DISCLAIMER:

Commercial products are named in this publication for informational purposes only. The Virginia Cooperative Extension does not endorse these products and does not intend to discriminate against other products that may also be suitable.

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Photo Credits: Robbie Longest, Essex ANR Agent; Turner Minx, King and Queen / King William ANR Agent; Dr. Joseph Oakes, EVAREC Superintendent

General Summary

THE SEASON: Planting was delayed in the fall of 2024 in many locations due to a lack of soil moisture, as below-average rainfall led to a very dry October and early November in eastern Virginia. This was followed by wet conditions in early 2025, which made nutrient applications difficult in February and March. Favorable conditions post-jointing in many locations supported good yield potential with minimal disease pressure and cooler conditions around grain fill, resulting in great yields at many locations. Locations that followed poor corn crops in 2024 experienced some lodging due to carryover fertility that was not taken up by the previous corn crop. Frequent rainfall near the end of harvest plagued some producers, reducing test weight and quality factors, including falling number on some acres.

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 2024-2025. Seven varieties of soft red winter wheat (SRWW) were entered and tested in the counties of Charlotte, King and Queen, Prince George, the city of Virginia Beach, and the EVAREC. Variety yield and test weight summaries can be found on pages 12 and 13, respectively. An agronomic traits table found on page 14 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 ensure accurate planting populations.

OTHER RESEARCH:

Impact of Planting Date on Wheat Development, Freeze Susceptibility & Yield:

VCE ANR agents partnered with Dr. Joseph Oakes at EVAREC for a second year to implement three site studies evaluating four different planting dates on wheat development, freeze susceptibility, and yield. These plots were monitored for tiller development by collecting aerial NDVI using a drone. Complete results are located on pages 16-19. This work is planned to be continued in the 2025-2026 growing season.

Evaluating the Use of Foliar Copper Products in Wheat Production

ANR agents, in cooperation with producer-cooperators, evaluated a commercially available product at five on-farm locations for its impact on grain yield, moisture, and test weight. Results can be found on pages 20-22 of this publication.

It is advisable to exercise caution when selecting 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 in relation to your own 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.



County On-Farm Wheat Variety Plots

Charlotte County Wheat Variety Plot

Cooperators: **Producer:** Brian and Clark Poindexter
Extension: Bruce Jones, VCE – Appomattox
Joanne Jones, VCE – Charlotte

Previous Crop: Corn
Soil Type: Cecil fine sandy loam
Tillage: No-till
Planter/Row Width: John Deere 1590 Drill / 7.5 inch
Planting Date: November 12, 2024
Planting Population: 125 lbs./acre
Fertilizer: **Pre-plant** Chicken litter
Feb. 13 40 #N (32% liquid N w/ stabilizer)
March 27 60 #N (32% liquid N w/ stabilizer)

Crop Protection: Miravis Ace Fungicide (12.7 oz./acre)
Harvest Date: June 23, 2025

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
VCIA	15VTK-1-101	56.9	10.1	116.3
VCIA	VT Pitman	58.7	10.9	112.1
DynaGro	9422	55.7	11.9	114.0
USG	3673	58.9	10.2	113.6
Chemgro	Fairland	57.3	10.6	110.3
Southern Harvest	5123	56.3	11.3	110.7
Inspire FS	748	59.8	10.6	104.3
Mercer (CHECK)	MBX 120	57.4	10.9	106.6
AVERAGE		57.6	10.8	111.0

Discussion: Excellent yields at this location with an overall average of 111.0 bushels per acre! The field received an application of chicken litter in the fall of 2024, prior to planting.

Eastern Virginia AREC Wheat Variety Plot

Cooperators: **Producer:** EVAREC Faculty and Staff
Extension: Joseph Oakes, VT – EVAREC Superintendent
 Robbie Longest, VCE –Essex

Previous Crop: Corn
Soil Type: Suffolk sandy loam
Tillage: Turbo-till before planting
Planter/Row Width: Great Plains 1206NT / 7.5 inch
Planting Date: October 31, 2024
Planting Population: 120 lbs./acre
Fertilizer: **Pre-plant** 28-0-0-5
Jan. 21 25 lbs./acre (12-0-0-1.5S)
Feb. 19 25 lbs./acre (12-0-0-1.5S)
April 2 60 lbs./acre (24-0-0-3S)

Crop Protection: **March 10** Harmony Extra SG (0.75 oz./acre)
 Starane Ultra (5.5 oz./acre)
 Liberate Surfactant

Harvest Date: June 13, 2025

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
USG	3673	60.8 A	13.8	87.8 B
Inspire FS	748	57.8 C	12.9	58.0 D
DynaGro	9422	56.0 D	13.0	58.6 D
VCIA	VT Pitman	59.4 B	16.5	88.6 B
Chemgro	Fairland	59.7 B	13.2	70.6 C
Southern Harvest	5123	60.3 A	14.3	98.5 A
VCIA	15VTK-1-101	58.1 C	18.2	90.0 B
AVERAGE		58.9	14.6	78.9
LSD (0.05)		1.0	-	8.4

**Results with the same letter are not statistically different for test weight and yield.*

Discussion: Due to logistical reasons, no fungicide was applied to this location. Heavy leaf rust (*Puccinia triticina*) pressure was observed in the plots, and there were major differences in the varieties' response and susceptibility to the leaf rust pathogen, resulting in yield loss in the susceptible varieties. The aerial photo (Figure 1) on the next page depicts the varieties that were observed to be resistant or moderately resistant, resulting in better plant health and slower dry-down, with plants remaining green for longer. Figure 2 shows symptoms of the leaf rust pathogen appearing as orangish-brown pustules that contain the spores. This disease can have severe negative implications for yield if left untreated, and severe flag leaf infections can directly impact grain yield. It is highly recommended to select varieties that have a good disease rating package for many of the commonly observed wheat diseases, and to couple that with a good fungicide stewardship program.



Figure 1: Aerial photo taken from a drone over the EVAREC wheat variety plot on May 20, 2025. The photo shows the four varieties that appear green (VCIA 15VTK-1-101, Southern Harvest 5123, VT Pitman, and USG 3673) were observed to have much less incidence of leaf rust and were also observed to have higher yields on average at harvest.



Figure 2: Photo of wheat flag leaf exhibiting a leaf rust infection in a susceptible variety.

King and Queen County Wheat Variety Plot

Cooperators: **Producer:** Beaver Dam Farm – Bruce and Michael Carlton
Extension: Turner Minx, VCE – King and Queen / King William
 Robbie Longest, VCE –Essex

Previous Crop: Corn
Soil Type: Tetotum fine sandy loam
Tillage: Turbo-till before planting
Planter/Row Width: John Deere 1590 / 7.5 inch
Planting Date: October 16, 2024
Planting Population: 30 seeds/row foot
Fertilizer: **Pre-plant** Broadcast liquid dairy manure (4,000 gal./acre)
Jan. 30 #N (24-0-0-3S) + 120 lbs./acre potash
Feb. 50 #N (24-0-0-3S) + Mn
March 50 #N (24-0-0-3S) + Mn + B

Crop Protection: **March** Fungicide + Insecticide
Harvest Date: June 12, 2025

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
USG (CHECK)	3463	58.8	12.4	94.5
Chemgro	Fairland	57.6	13.4	104.7
DynaGro	9422	58.4	11.6	94.8
Inspire FS	748	60.3	12.9	104.9
VCIA	VT Pitman	60.9	13.3	99.3
USG	3673	56.0	14.2	103.4
Southern Harvest	5123	57.9	14.0	95.9
VCIA	15VTK-1-101	54.3	18.7	90.7
AVERAGE		58.0	13.8	98.5

Discussion: Outstanding yields at this location with several varieties averaging over 100 bushels per acre! This location experienced a dry fall in 2024 after planting; however, stands were excellent, and minimal disease pressure was observed. The grower selected to add USG 3463 as a check variety.

Prince George County Wheat Variety Plot

Cooperators: **Producer:** Reiter Family Farm
Extension: Scott Reiter, VCE – Prince George

Previous Crop: Corn
Soil Type: Emporia fine sandy loam
Tillage: Great Plains TurboMax
Planter/Row Width: John Deere1590 / 7.5 inch
Planting Date: November 18, 2024
Planting Population: 28 seeds/row foot (165 lbs./acre)
Fertilizer: **Pre-plant** 30-40-120-24S
Feb. 28 50-0-0-6S
March 30 60-0-0-7S

Crop Protection: **Feb. 28** Harmony Extra (0.8 oz./acre)
Harvest Date: June 21, 2025

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
VCIA	VT Pitman	56.9	10.6	75.2
USG	3673	55.0	10.9	77.1
DynaGro	9422	55.0	10.9	82.8
Southern Harvest	5123	57.7	11.1	75.8
Inspire FS	748	56.3	9.8	82.1
Chemgro	Fairland	56.7	10.8	82.4
VCIA	15VTK-1-101	56.4	9.8	77.7
VCIA	VT Pitman	56.2	9.9	78.3
USG (Check)	3352	55.9	10.6	80.0
AVERAGE		56.2	10.5	79.0

Discussion: A very consistent test across all varieties this year. This test was conducted a little later, as we waited for rain to restore soil moisture. Grower included USG 3352 as a check, along with the VT Pitman used as a check across all locations.

Virginia Beach Wheat Variety Plot

Cooperators: **Producer:** NEXTGEN Farms – Ryan Dudley
Extension: Roy Flanagan, VCE – Virginia Beach
Nathan Sedghi, VCE –Chesapeake

Previous Crop: Soybean
Soil Type: State loam
Tillage: No-till
Planter/Row Width: 7.5 inches
Planting Date: November 1, 2024
Planting Population: 170 lbs./acre
Fertilizer: **Nov. 7** 5.1-17.1-34.9-4.29S (325 lbs./acre) w/ Titan
March 11 40-0-0-6S (250 lbs./acre)
April 0-0-24 (1 gal./acre)

Crop Protection: **Nov. 10** Anthem Flex (3.5 oz./acre)
March 12 BigSweetYield (1 lb./acre)
Yield Booster (1 qt./acre)
Axial Bold (15 oz./acre)
2,4-D LV (1 pt./acre)
April 22 BigSweetYield (1 lb./acre)
Slant (4 oz./acre)
Crusader (3.2 oz./acre)

Harvest Date: June 11, 2025

Brand	Variety	Test Weight (Lbs./Bu.)	Moisture (%)	Yield (Bu./A @13.5%)
Great Heart	9271	56.8	14.1	69.5
Chemgro	Fairland	58.8	14.1	74.8
VCIA	VT Pitman	59.4	13.9	74.0
Inspire FS	748	62.1	13.3	71.3
USG	3673	58.3	14.5	76.0
Southern Harvest	5123	57.9	14.4	72.2
VCIA	15VTK-1-101	59.4	13.8	71.6
DynaGro	9422	57.2	14.1	72.5
Great Heart	9530	59.6	14.0	67.7
AVERAGE		58.8	14.0	72.2

Discussion: Overall, a good yielding test at this location. The grower selected to add Great Heart 9271 and 9530 to the test.

Variety Yield Summary by Location

(bushels/acre @ 13.5% moisture)

Company	Variety	Charlotte	EVAREC	King and Queen	Prince George	Virginia Beach	Variety AVERAGE *
USG	3673	113.6	87.8	103.4	77.1	76.0	91.6
Southern Harvest	5123	110.7	98.5	95.9	75.8	72.2	90.6
VCIA	VT Pitman ¹	112.1	88.6	99.3	75.2	74.0	89.8
VCIA	15VTK-1-101	116.3	90.0	90.7	77.7	71.6	89.3
Chemgro	Fairland	110.3	70.6	104.7	82.4	74.8	88.6
DynaGro	9422	114.0	58.6	94.8	82.8	72.5	84.5
Inspire FS	748	104.3	58.0	104.9	82.1	71.3	84.1
	Location AVERAGE *	111.6	78.9	99.1	79.0	73.2	

1 VCIA VT Pitman was used as a check across all locations

§ Color scale for yields indicates higher yields in green, and lower yields in red within the test location (column)

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

- Variety seed treatments differed based on company submission, but were the same within variety across locations

Variety Test Weight Summary by Location (pounds/bushel)

Company	Variety	Charlotte	EVAREC	King and Queen	Prince George	Virginia Beach	Variety AVERAGE *
Inspire FS	748	59.8	57.8	60.3	56.3	62.1	59.3
VCIA	VT Pitman ¹	58.7	59.4	60.9	56.9	59.4	59.1
Chemgro	Fairland	57.3	59.7	57.6	56.7	58.8	58.0
Southern Harvest	5123	56.3	60.3	57.9	57.7	57.9	58.0
USG	3673	58.9	60.8	56.0	55.0	58.3	57.8
VCIA	15VTK-1-101	56.9	58.1	54.3	56.4	59.4	57.0
DynaGro	9422	55.7	56.0	58.4	55.0	57.2	56.5
	Location AVERAGE *	57.7	58.9	57.9	56.3	59.0	

1 VCIA VT Pitman was used as a check across all locations

§ Color scale for test weight indicates higher test weights in green, and lower test weights in red within the test location (column)

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

- Variety seed treatments differed based on company submission, but were the same within variety across locations

2025 Variety Performance Summary and Disease Ratings

(Source: VT Small Grains Breeding and Research Program OVT, 2023- 2025)

Brand	Variety	Yield (Bu./A)	Test Weight (Lbs./Bu.)	Heading Date (Julian)	Height (in.)	Lodging	Powdery Mildew* (23' & 25')	Leaf Rust* (23', 24', 25')	FHB Plant Response* (23' & 25')	BYDV (24' & 25')	Awns (A, TA, AL)
USG	3673 ^b	103.1	58.3	117.8	32.2	1.2	4.5	0.1	3.0	2.0	AL
Southern Harvest	5123 ^b	103.0	58.3	118.2	32.5	1.2	4.2	0.3	3.0	3.0	AL
VCIA	VT Pitman ^b	104.4	58.8	117.0	31.7	0.8	2.1	0.1	2.8	2.0	A
VCIA	15VTK-1-101 ^b	102.7	57.6	118.4	29.3	0.9	1.1	0.2	3.5	2.5	A
Chemgro	Fairland ^c	-	-	-	-	-	-	-	-	-	A
DynaGro	9422 ^b	98.5	56.3	117.7	33.6	1.2	3.2	6.7	3.5	3.5	A
Inspire FS	748 ^a	85.2	55.4	121	25.0	1.8	1.2	5.6	1.0	4	A

^a A single year of data (2025)

^b Three-year data average (2023, 2024, 2025)

^c No data available as not entered into the Virginia state soft winter wheat OVT

* The 0-9 rating indicates a genotype's response to disease or lodging, where 0 = highly resistant and 9 = highly susceptible

(Data for the reported disease ratings is derived from the years reported in the column heading if data were available for the variety)

FHB = Fusarium Head Blight Response Score

BYDV = Barley Yellow Dwarf Virus Score

Awns: A = Awned, TA = Tip-Awned, and AL = Awnless



Other Research

Impact of Planting Date and Weather Patterns on Wheat Development, Freeze Susceptibility, & Yield

King William County Location

Cooperators: **Producer:** Thomas Fox
Extension: Turner Minx, VCE – King William
 Joseph Oakes, EVAREC – Superintendent
 Robbie Longest, VCE – Essex

Previous Crop: Corn
Soil Type: Slagle loam
Tillage: No-till
Planter/Row Width: John Deere 1590 / 7.5 inch
Planting Dates: October 20, 2024
 November 5, 2024
 November 20, 2024
 December 5, 2024

Variety: DynaGro 9172

Fertilizer: **Pre-plant:** Oct. 25 40# N with sulfur
In-season: Feb. 28 50# N with sulfur
 Mar. 14 50-50-100

Crop Protection: Feb. 28 Quelex, Zidua, Rifle, Radiate
 May 5 Miravis Ace Fungicide

Harvest Date: June 25, 2025

Plant Date	Yield (Bu./A @ 13.5%)	Test Weight (Lbs./Bu.)
20-Oct	92.5 AB	60.7 A
5-Nov	94.7 A	60.4 A
20-Nov	82.7 BC	58.7 A
5-Dec	81.0 C	58.0 A
mean	87.7	59.5
LSD (0.05)	10.2	6.5

**Results with the same letter are not statistically different for yield and test weight.*

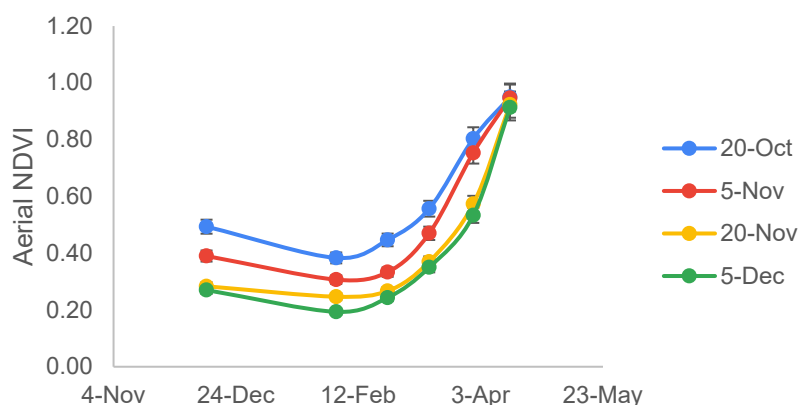


Figure 3: Aerial NDVI throughout the growing season, which serves as a proxy for tiller development and overall growth at King William County.

Richmond County Location

Cooperators: Eastern Virginia AREC, Joseph Oakes
Previous Crop: Soybean
Soil Type: Kempsville sandy loam
Tillage: No-till
Planter/Row Width: Great Plains 1205NT / 7.5 inch
Planting Dates: October 16, 2024
 October 31, 2024
 November 14, 2024
 December 2, 2024
Variety: DynaGro 9172
Fertilizer: Pre-plant: Oct. 16 28-0-0-5S
In-season: Jan. 23 25# N (12-0-0-1.5S)
 Feb. 19 25# N (12-0-0-1.5S)
 Mar. 28 60# N (24-0-0-3S)
Crop Protection: Mar. 10 Harmony Extra + Starane Ultra Herbicide
 April 5 Harmony Extra + Starane Ultra Herbicide
 April 9 Fitness Fungicide
 April 28 Tombstone Insecticide
 May 8 Miravis Ace Fungicide
Harvest Date: June 21, 2025

Plant Date	Yield (Bu./A @ 13.5%)	Test Weight (Lbs./Bu.)
16-Oct	61.1 A	57.0 B
31-Oct	58.1 AB	56.9 B
14-Nov	45.6 B	57.3 B
2-Dec	25.3 C	58.0 A
mean	47.5	57.3
LSD (0.05)	13.4	0.5

**Results with the same letter are not statistically different for yield and test weight.*

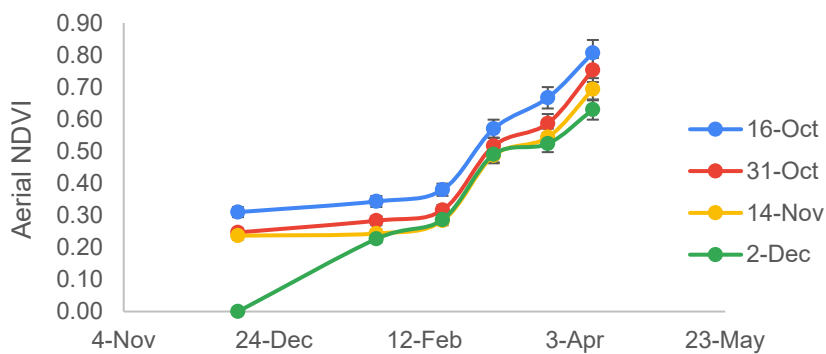


Figure 4: Aerial NDVI throughout the growing season, which serves as a proxy for tiller development and overall growth at Richmond County.

Westmoreland County Location

Cooperators: Eastern Virginia AREC, Joseph Oakes
Previous Crop: Corn
Soil Type: Suffolk sandy loam
Tillage: No-till
Planter/Row Width: Great Plains 1205NT / 7.5 inch
Planting Dates: October 16, 2024
 October 31, 2024
 November 14, 2024
 December 2, 2024
Variety: DynaGro 9172
Fertilizer: Pre-plant: Oct. 9 28-0-0-5S
In-season: Jan. 21 25# N (12-0-0-1.5S)
 Feb. 19 25# N (12-0-0-1.5S)
 Apr. 2 60# N (24-0-0-3S)
Crop Protection: Mar. 10 Harmony Extra + Starane Ultra Herbicide
Harvest Date: June 13, 2025

Plant Date	Yield (Bu./A @ 13.5%)	Test Weight (Lbs./Bu.)
16-Oct	72.9 A	54.4 A
31-Oct	56.8 B	52.5 B
14-Nov	47.9 B	52.8 B
2-Dec	28.9 C	50.9 C
mean	51.7	52.6
LSD (0.05)	11.7	0.9

**Results with the same letter are not statistically different for yield and test weight.*

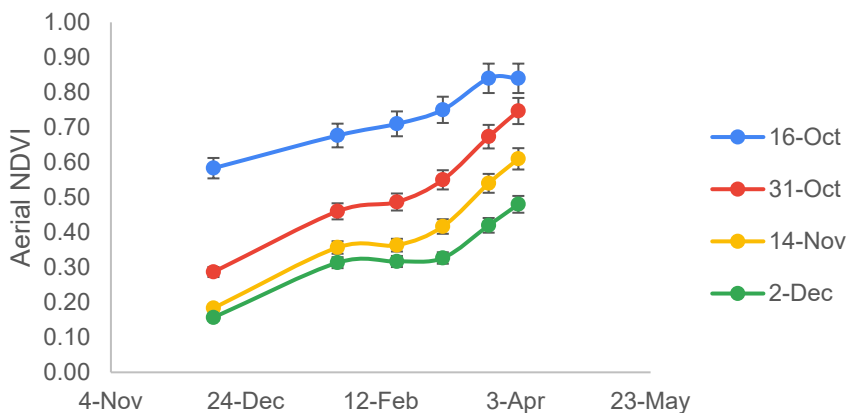


Figure 5: Aerial NDVI throughout the growing season, which serves as a proxy for tiller development and overall growth at Westmoreland County.

Discussion: The purpose of this trial is to determine if Virginia wheat growers can afford to shift their planting dates later to stave off a spring freeze, while still achieving adequate tiller growth in the fall by accumulating 700 GDD before December 31. Aerial NDVI data collected throughout the growing season shows that while there was a significant difference in growth and tiller development between the two October plant dates, both had higher tiller densities than the two November planting dates. Across six site-years in 2024 and 2025, there was no difference in yield or test weight between mid-October and late-October plant dates, and therefore, no yield penalty was observed when delaying planting until November 1, as reported in the table below. This research suggests that, if necessary, planting dates can be shifted to late October without incurring a yield penalty. Thank you to the Virginia Small Grains Board for funding this research!

Yield and Test Weight Averages across six site-years in 2024 and 2025

Plant Date	Yield (Bu./A @ 13.5%)	Test Weight (Lbs./Bu.)
PD 1 (mid Oct.)	75.3 A	56.5 A
PD 2 (late Oct.)	76.3 A	56.5 A
PD 3 (mid Nov.)	65.6 B	58.1 A
PD 4 (late Nov.)	51.8 B	55.3 A
mean	67.3	56.6
LSD (0.05)	4.7	2.0

**Results with the same letter are not statistically different for yield and test weight.*

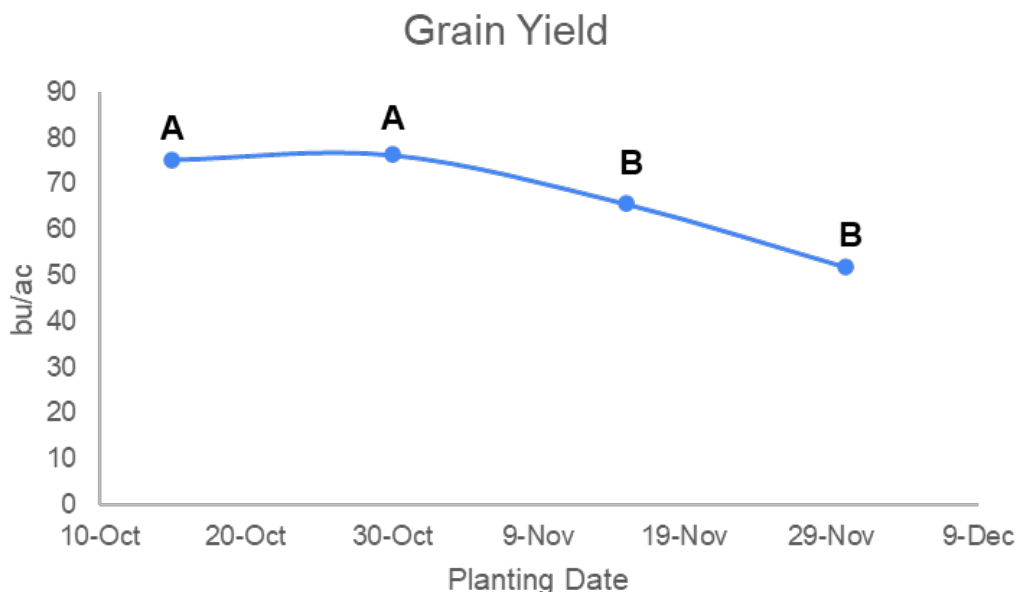


Figure 6: Average grain yields (bushels/acre) across six site-years in 2024 and 2025 for the four different target planting dates.

Evaluating the Use of Foliar Copper Products in Wheat Production

BACKGROUND: Wheat producers are becoming more interested in intensively managing their wheat crops to realize maximum yield potential to hopefully support profitability and good grain quality. One topic of interest is tissue testing to determine if any nutrient deficiencies are present, focusing on many of the macro- and micronutrients essential to healthy plant development, pollination, and grain fill. Virginia Cooperative Extension Agents were invited to evaluate a commercially available copper product on-farm with producer-cooperators for its potential impact on wheat grain yield and test weight. Copper is an essential micronutrient for plant growth and development, and wheat can be extremely sensitive to copper deficiency, and most prevalent in high organic matter soils. Referencing the North Carolina Cooperative Extension Small Grain Production Guide (2021), it mentions that “proper levels of copper (Cu) in the plant enhance protein content of the kernel and grain yield” and “deficiency symptoms include stunting, leaf tip or shoot die-back, and light green upper leaves” but also a characteristic “pigtailling” or twisting of the leaf tip (Post et al., North Carolina Small Grain Production Guide, 2021). According to the Virginia Cooperative Extension Agronomy Handbook (Publication 424-100 (SPES-299P)), an 80-bushel wheat crop takes up about 0.08 pounds per acre of Cu, with 0.06 and 0.02 pounds/acre in the grain and straw, respectively. Numerous extension publications report a tissue sufficiency range for winter wheat of 4.5 – 15 ppm. Copper can be supplied to a cropping system either pre-plant as a soil-applied amendment, or in-season as a foliar-based application using chelated formulations, and/or copper oxides.

PROJECT OUTLINE: ANR Agents worked with producer-cooperators to evaluate Badge® SC, a fungicide/bactericide from *Gowan*® that contains both copper hydroxide and copper oxychloride in on-farm strip trials as a demonstration. During the 2025 growing season, five test locations across four counties evaluated the use of the product as a fungicide, and assessed any additional impacts on grain yield and test weight resulting from the copper active ingredients. Growers selected when and how to apply the product, with some applying with their topdress nitrogen applications, and some by itself with water at the labeled rate of 1.8 pints/acre. Tissue samples were collected before application and again approximately two weeks after application from the treated and untreated plots, and sent to a laboratory for analysis to determine tissue Cu concentrations. Plots were harvested with grain yield (bushels/acre) and test weight (pounds/bushel) being recorded. Some locations elected to include an additional foliar copper product commercially available as a chelated copper foliar feed for comparison.

LOCATIONS:

Essex County #1
Essex County #2
Richmond County
Northumberland County
Virginia Beach

RESULTS: Tissue sample results for plant tissue copper concentrations (ppm) for four out of five locations are reported below in Figure 7. Two test locations, Richmond County and Northumberland County, were observed to be deficient (<4.5 ppm Cu) in the pre-treatment samples, with tissue copper concentrations of 1 ppm at both locations. In contrast, the two Essex County locations were both observed to be above the sufficiency range. All locations were observed to have higher tissue copper concentrations in the post-application sampling than the untreated check, with varying degrees of range.

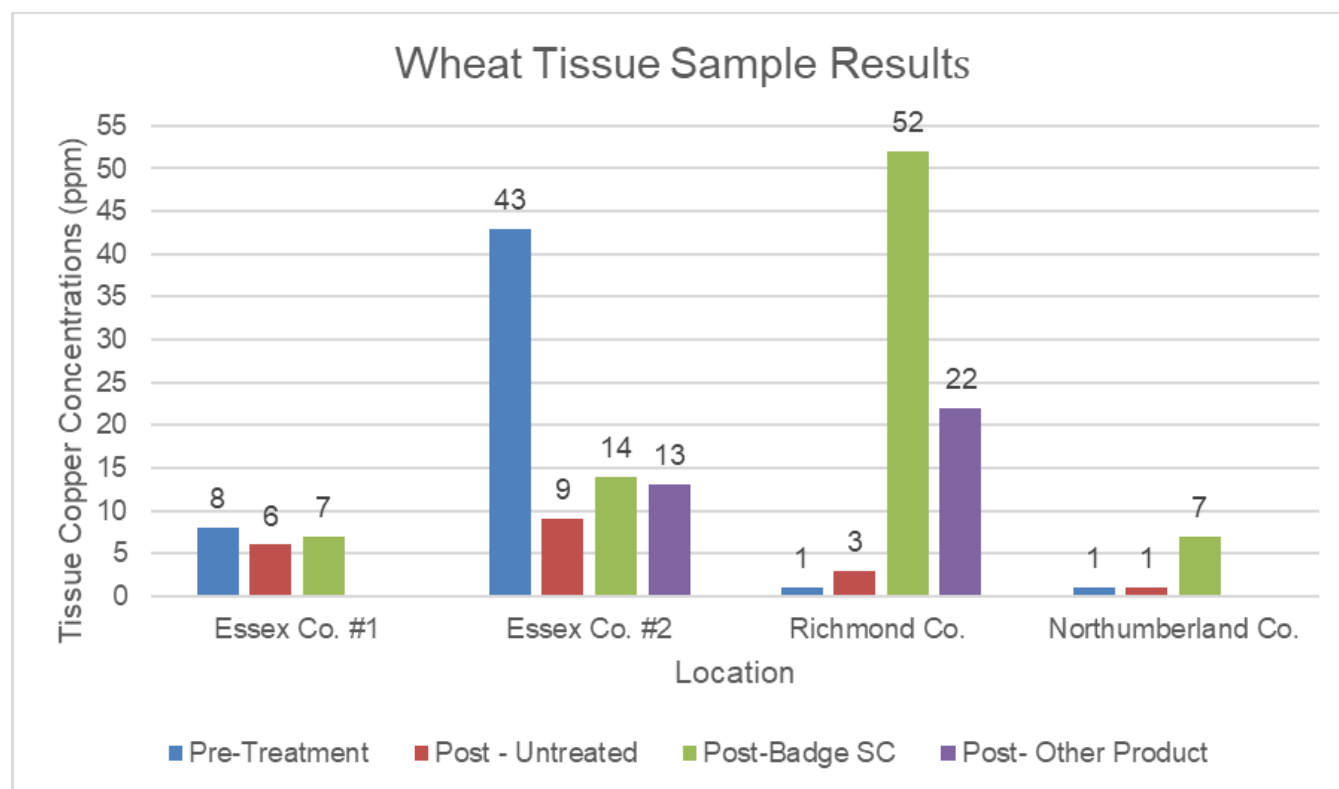


Figure 7: Plant tissue Cu concentrations (ppm) at four of the test locations for the pre-application and post-application treatments. *Tissue samples were unable to be collected at the Virginia Beach location.

Location averages across reps for yield, moisture, and test weight were summarized for the two Essex County locations, the Northumberland County location, and the Virginia Beach location. Yield data for the Richmond County location was unavailable at the time of publishing this report. The Badge SC® treatment was observed to have a numerically higher grain yield average compared to the check at two of the four locations, with the Northumberland location resulting in the largest yield increase compared to the check of 13 bushels per acre. This was not consistent across locations, as two locations were observed to have a slightly lower average yield for the Badge SC® treatment.

Across all locations, a general trend of increased grain test weights for the Badge SC® treatments compared to the check was observed with 0.5, 0.6, 0.1, and 1.5 pounds per bushel increases at the Essex #1, Essex #2, Northumberland, and VA Beach locations, respectively.

Location	Treatment	Yield (Bu./A)	Moisture (%)	Test Weight (Lbs./Bu.)
Essex #1	Check	88.9	10.8	55.0
Essex #1	Badge SC [®]	88.2	10.9	55.5
Essex #2	Check	70.3	11.0	51.8
Essex #2	Badge SC [®]	71.5	11.1	52.4
Essex #2	Kickstand [®]	69.6	10.9	52.6
Northumberland	Check	98.0	13.3	58.3
Northumberland	Badge SC [®]	111.0	13.4	58.4
Northumberland	Kickstand [®]	96.0	13.6	58.3
VA Beach	Check	64.8	15.1	60
VA Beach	Badge SC [®]	62.5	15.1	61.5

Further research is required to assess the impact of foliar copper products on grain yield and test weight in wheat production systems in Virginia. This work was done in large-scale strip trial plots on-farm, and in-field variability can impact results. It is unclear whether the results can be attributed to the additional copper applied to the plant or to the disease prevention aspect of the product, which may have resulted in increased yields at two of the locations due to improved plant health.

In the case of copper or any other plant nutrient, it is recommended to first determine if a nutrient deficiency is present by using proper tissue testing procedures before considering additional applications.

We plan to continue to monitor copper concentrations in Virginia wheat fields during the 2025-2026 season and explore additional tests to determine its impact on grain yield and test weight. We would like to thank *Gowan*[®] and Thomas Ruffin for their interest and support of this research.

References

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Post, A., Bertone, M., Cowger, C., Crozier, C., Everman, W., Gatiboni, L., Hardy, D., Heiniger, R., Heiniger, R., Hicks, K., Kulesza, S., Murphy, P., Reisig, D., and Washburn, D. 2021. *Small Grain Production Guide 2021*. NC State Extension. <https://smallgrains.ces.ncsu.edu/small-grain-production-guide-2021/>

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

