

# Challenges and Efforts to Maintain Winter Barley as a Viable Crop in the Eastern U.S.



Northern Neck of Virginia Historical Society  
HARVEST SCENE. WARSAW, VA.



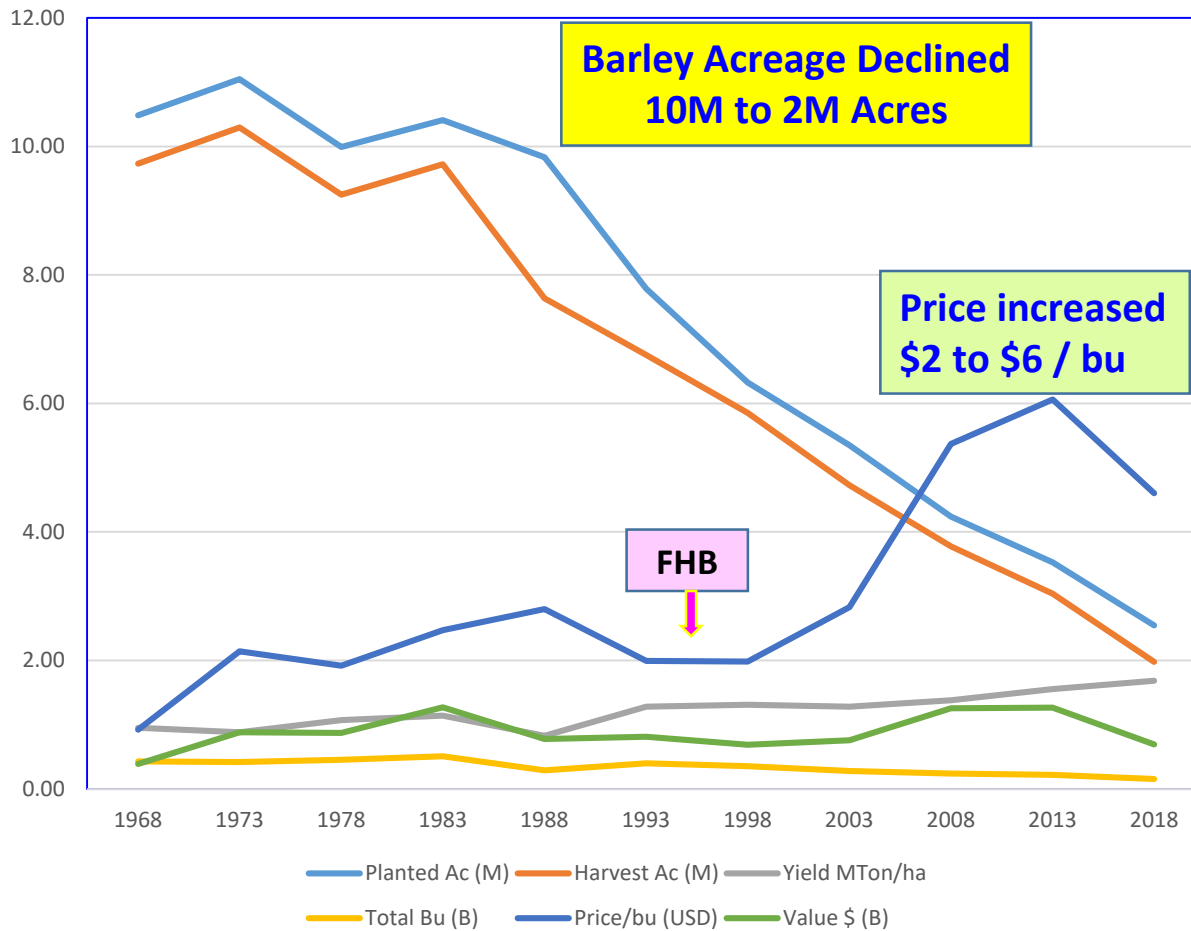
www.shutterstock.com · 151797305

Carl A. Griffey\*, Wynse S. Brooks, Mark E. Vaughn, Joshua C. Fitzgerald, and  
Wade E. Thomason

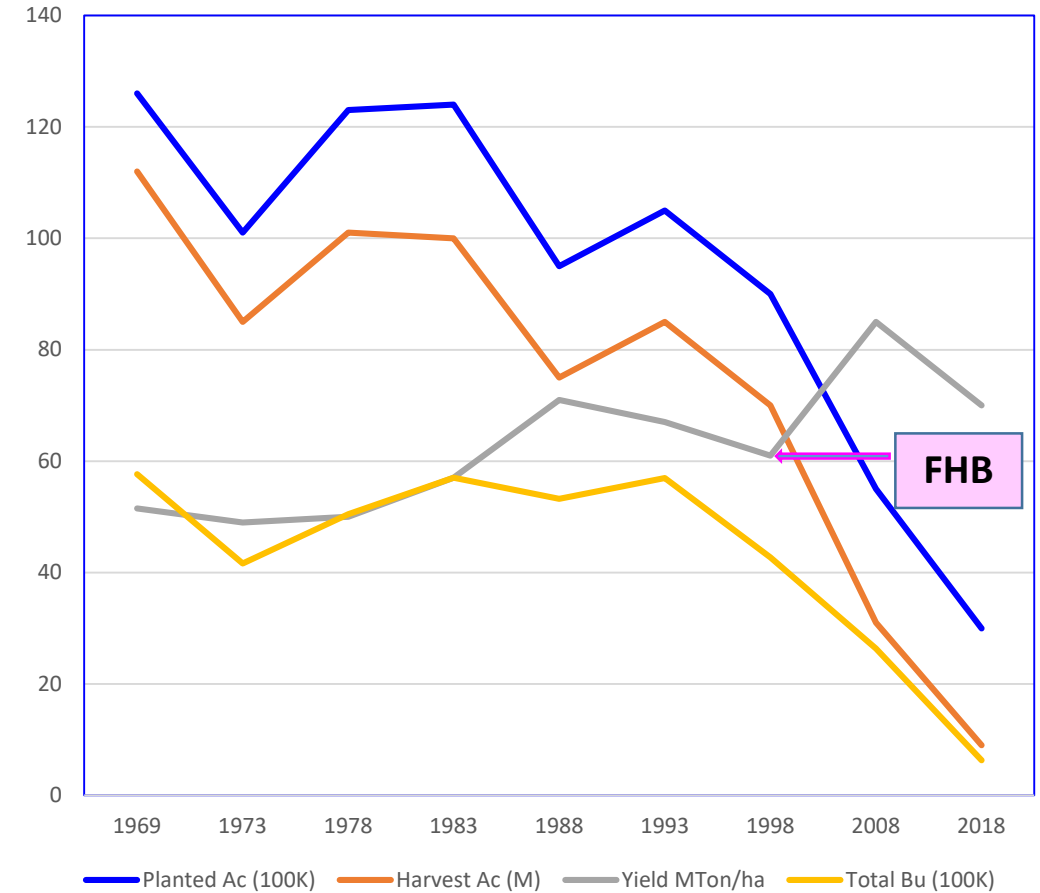
School of Plant and Environmental Sciences, Virginia Tech, Blacksburg VA 24061

# Barley Production Trends over the past 50 years

NASS Barley Data and Trends: U.S. 1968 - 2018



VA Barley Acres, Yield, Production: 1969-2018





# Disease Resistant Varieties: Ensure High Yields and Quality; Minimize Input Costs



Powdery Mildew Resistance  
(Wysor, gene *mlo*)



Leaf Rust Resistance  
(VA92-42-46, Doyce, Secretariat)



Net Blotch Resistance  
(Nomini & CIho 2291)



*Barley Yellow Dwarf*  
(Resistance gene *yd2*)



VT Barley Varieties with FHB Resistance  
(Nomini, Eve, SB255, VA15H-73, VA16M-84)





# A 30yr journey from awnless 6-row feed to 2-row malt barley





# Hulless and Hulled Winter Barley Varieties Released by VT since 1994





# The “Chicken and Egg” Saga Continues.....

## Intransigent, Limited, and Potentially Expandable Markets for Barley



**Collaborative Research: VT, Perdue**

**Where's the Barley???**

**Joint Research: VT, Smithfield**



**Extensive Ethanol Research with  
USDA Eastern Regional Research Center**



This 60 MMgy ethanol plant was built in 2010 by Osage Bio Energy, which planned to use barley as a feedstock. PHOTO: HOPEWELL NEWS & PATRIOT, KJ BURNELL



# Some Current yet Limited Uses of Hulless Barley



**ALL-NATURAL & VEGETARIAN**  
for all of our hens, all the time



**PURE BEEF in LONE WOLF, OK**



**COTNER  
FARMS**

**Fresh Eggs**



**DANVILLE  
PA**



**NORTH POINT FARM & DAIRY in VA  
VT has Conducted several Feeding Trials**



# Expansion in Craft Malting, Brewing, and Distilling

Need for more locally grown malt barley, but how much???

## Craft Malt Houses in North America 2018





# KENTUCKY CRAFT BEER Festival





# Challenges for Malt Production In the Eastern U.S.

## Limitations

- ▶ Cultivars either lack wide adaptation, high yields, good quality, pre-harvest sprouting tolerance, winter hardiness or resistance to prevalent diseases in eastern regions of North America.

## Solutions

- ▶ New malt barley cultivars grown in the eastern U.S. should be widely adapted and resistant to prevalent diseases.
- ▶ Adherence to integrated crop and pest management protocols is critical to ensure high yields and good quality.





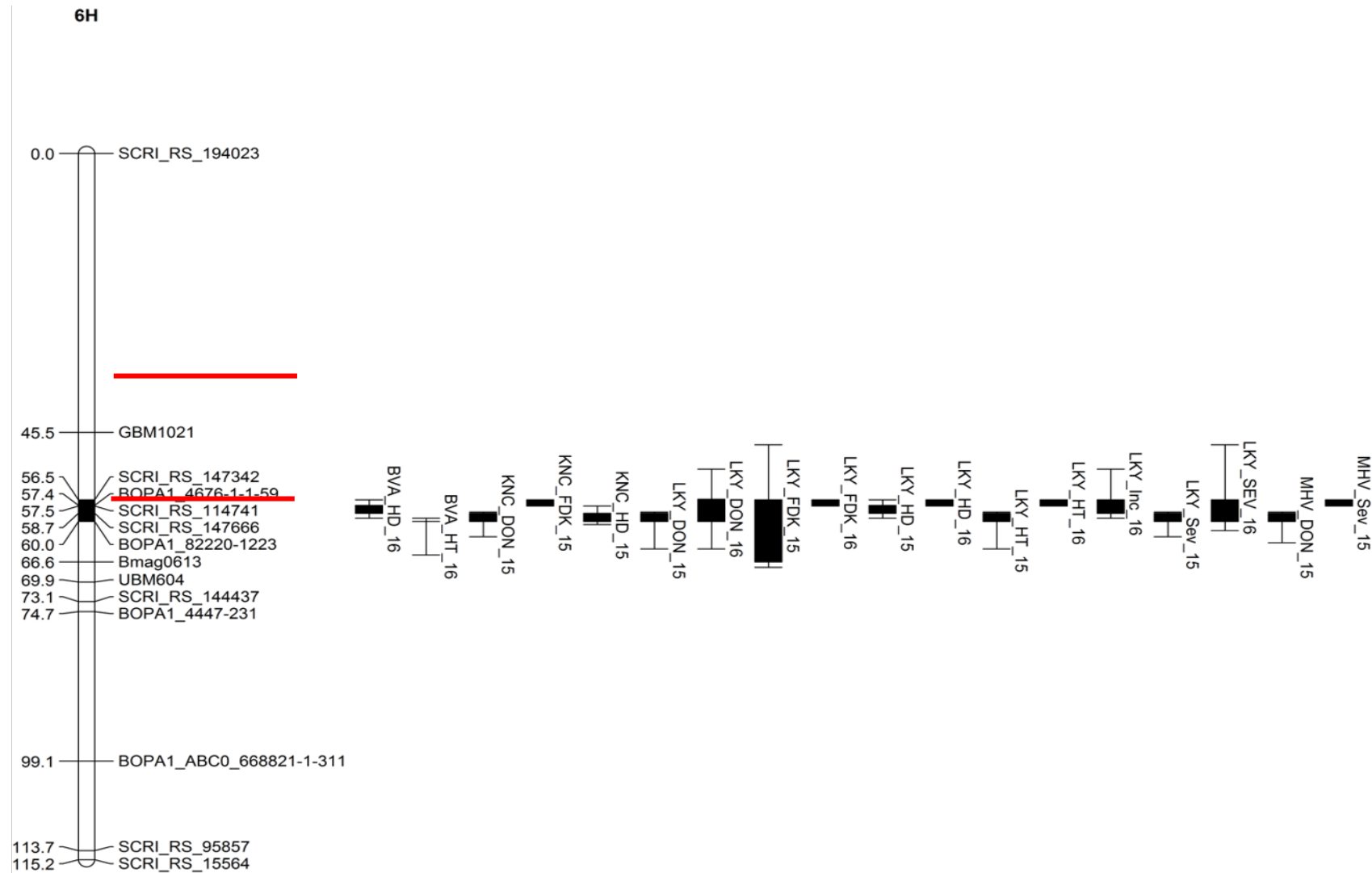
## Performance (Agronomic, FHB and Quality) of Current and Potential Malt Barley Varieties

Line	Yield %	TWT	H.Date	Height	FHB	FDK	DON	Quality Data <sup>†</sup>	
	of mean	lb/bu	Jan1+	Inches	Index	(%)	(ppm)	Protein	Plump
	2yr	2yr	2yr	2 yr	2yr	2yr	2018	%, DB	>6/64" %
VA16M-81 (2R)	101	47.0	118	31	30	13	43	9.0	97
VA16M-84 (2R)	102	49.7+	118	34	15-	8-	20	10.1	98
VA16M-82 (2R)	100	49.4+	116	35	13-	8-	24	10.1	98
VIOLETTA (2R)	106	45.7	117	27	24	9-	34	9.4	97
FLAVIA (2R)	103	44.3-	121	25	30	30+	37	8.3	96
HIRONDELLA	104	42.4-	120	30	42+	23+	28	8.7	94
THOROUGHbred	105	43.8-	116	30	40	28+	39	8.7	83
Mean	100	46.5	118	31	29	15	31	9.9	90
Line	Germinate	Malt	β	Soluble	Soluble	FAN	Diastatic	Alpha	Clarity
	Energy 4mL	Extract	Glucan	Protein	/Total N		Power	Amylase	
	%	%	mg/L	%	%	mg/L	°L	D.U.	
VA16M-81 (2R)	100	83	42	4.3	48	187	148	72	clear
VA16M-84 (2R)	99	83	182	4.4	43	179	129	61	clear
VA16M-82 (2R)	99	82	165	4.1	41	173	120	56	clear
VIOLETTA (2R)	100	82	81	4.7	50	191	156	68	clear
FLAVIA (2R)	99	83	64	3.9	46	160	116	63	clear
HIRONDELLA	97	81	147	3.8	44	151	137	63	clear
THOROUGHbred	99	81	435	3.5	41	128	107	51	clear
Mean	98	82	274	4.5	46	192	119	67	

<sup>†</sup>Quality data provided by Aaron MacLeod, Hartwick College Center for Craft Food & Beverage, Oneonta, NY 13820



# QTL for FHB Resistance in 'Eve' barley on Chromosome 6H (Jordan Ullrich)





**QTL associated with FHB in Nomini winter barley mapping populations:  
(See Poster by Joshua Fitzgerald for Full Results )**

Trait	Population	Chr#	LOD	Variation (%)	Additivity	Position Interval (cM)	Distance Apart (cM)
MHV_19_FDK	Violetta/Nomini	2	3.0	16.5	-4.3	136.5 - 137.5	10
MHV_18_SEV	Violetta/Nomini	2	3.8	7.4	-4.6	144.5 - 147.5	
MHV_18_Row-type	Violetta/Nomini	2	27.2	33.7	-1.7	151.5 - 152.5	5 - 15
MHV_18_DON	Violetta/Nomini	2	8.5	31.8	7.7	151.5 - 152.5	
MHV_18_FD	Violetta/Nomini	2	5.5	14.7	-1.1	163.5 - 165.5	17 - 27
MHV_INC_18	Tbred/Nomini	3	21.4	0.4	-2.0	340.5 - 342.5	
MHV_18_SEV	Violetta/Nomini	4	6.6	13.8	-6.4	39.5 - 40.5	
MHV_18_FDK	Violetta/Nomini	5	2.6	3.6	-2.5	173.5 - 176.5	
MHV_18_SEV	Violetta/Nomini	7	6.4	13.1	-6.3	58.5 - 59.5	29
MHV_18_FDK	Violetta/Nomini	7	4.4	6.1	3.4	84.5 - 88.5	



# Invest in the Leap Forward

## Potential Support Means:

- Need for winter malt barley to be included in NIFA's specialty crops classification to qualify for funding.
- Institute a small "bottle tax" on beer sales, similar to that on wine to generate revenue for public malt barley variety development and research.
- In addition to public malt barley varieties generating royalties, release exclusive varieties with upfront or staggered marketing fees.



FIELD OF VIOLETTA NEAR SCOTTSVILLE, VA