

2019 Flue-Cured Tobacco Production Guide

Disease Resistance Tables

Table 3. Survival of selected flue-cured tobacco varieties in 2018 on-farm tests in black shank-infested fields in Virginia.

Variety	<i>Ph_p</i> Gene	% Healthy Plants				Black Shank Yield Index ¹
		Mecklenburg	Brunswick	Mecklenburg-1	Average	
PVH	+	87	98	100		97
1452					95	
CC 33	-	90	93	99	94	99
CC 1063	-	93	89	98	93	94
CC 143	-	95	81	97	91	97
PVH	+	77	88	98		95
1600					88	
CC 37	+	75	90	99	88	79
K 346	-	74	94	93	87	88
GL 395	-	74	87	100	87	85
NC 925	-	69	92	99	87	78
NC 196	+	77	84	96	86	83
NC 938	-	74	84	96	85	86
GF 318	+	67	90	97	85	90
PVH	+	3	55	96		48
2275					51	

¹ Yield indexes for Black Shank (race 1) = yield index without black shank (from the 2018 Virginia OVT test at the Southern Piedmont AREC, Blackstone) multiplied by the average proportional survival from the three on-farm black shank resistance tests conducted in Virginia in 2018.



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Table 4. Flue-cured tobacco variety reactions to Black Shank.

Varieties with the <i>Php</i> gene ¹ :	% Survival (Race 1) ²	Relative Yield Index ³	
		Black Shank (Race 1)	No Black Shank
SP 225	88	77	.
NC 196	67	70	104
PVH 1452	69	68	98
CC 67	63	59	93
CC 700	58	58	100
PVH 1600 ⁴	58	59	101
CC 37	53	51	96
NC 71	47	50	106
GF 318	45	47	103
NC 299	44	44	101
NC 72	38	40	101
NC 297	35	36	103
CC 27	34	36	105
PVH 2310	25	25	102
PVH 2275	11	11	98
<u>Varieties without the <i>Php</i> gene¹</u>			
NC 938	89	90	102
NC 925	83	83	99
CC 1063	84	83	99
CC 143	79	82	104
K 346	82	77	94
NC 606	69	68	98
CC 33	66	66	100
GL 395	64	61	95
CC 13	48	50	104
PVH 2254	48	47	98
GL 26H	44	47	108
PVH 2110	43	46	108
CC 35	40	45	112
K 326	32	34	107

¹ Varieties with the *Php* gene possess very high resistance to race 0 of the black shank pathogen. Resistance to race 0 in varieties without the *Php* gene is similar to or higher than that to race 1.

² Average % Survival near 2nd harvest without a soil fungicide. Results are averages from 10 field experiments conducted in 2010-2015 and 2017 by Clemson and by North Carolina State Universities as part of the Regional Flue-Cured Tobacco Variety Evaluation Program.

³ Relative Yield Index = yield of each cultivar relative to the yield of all other cultivars in the experiment(s). Yield indexes for "No Black Shank" = average relative yield from the 2010-2018 Virginia OVT tests conducted at the Southern Piedmont AREC, Blackstone. Yield indexes for "Black Shank (race 1)" = yield index without black shank multiplied by the average proportional survival near 2nd harvest.

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Table 5. Performance of selected flue-cured tobacco varieties in 2018 Virginia Tech on-farm tests for resistance to Granville Wilt.

Variety	% Healthy Plants					Granville Wilt Yield Index 1
	Baskerville-1	Alberta	Dolphin	Baskerville-2	4-test Average	
PVH 1600	89	94	93	81	89	96
PVH 1452	84	93	94	84	89	90
GL 939	78	94	94	.	89	.
PVH 1063	84	93	89	86	88	89
CC 27	82	79	92	91	86	95
NC 606	75	89	90	84	85	82
GL 395	77	89	85	81	83	81
CC 37	78	91	89	74	83	75
NC 938	73	76	91	93	83	84
CC 143	63	84	87	89	81	86
NC 299	60	88	86	84	80	70
NC 196	61	81	88	87	79	77
CC 33	55	82	90	83	78	81
NC 925	42	91	86	77	74	66
CC 35	3	16	55	71	36	44

¹ Yield Index with Granville Wilt = proportion of plants surviving for each variety multiplied by the relative yield for that cultivar in the 2018 Virginia OVT test at the Southern Piedmont AREC, Blackstone.

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Table 6. Reactions of flue-cured tobacco varieties to Granville Wilt.

Varieties with the <i>Php</i> gene ¹ :	% Survival ² 2010,2012-2017	Relative Yield Index ³	
		With Granville Wilt	No Granville Wilt
CC 37	80	77	96
CC 27	74	77	105
CC 67	78	72	93
PVH 1452	68	67	98
PVH 2275 ⁴	57	56	98
NC 297	55	56	103
NC 196	54	56	104
GF 318	53	54	103
NC 72	52	53	101
NC 299	50	51	101
CC 700	48	48	100
PVH 1600	47	47	101
PVH 1118	45	45	100
NC 71	36	38	106
PVH 2310	36	37	102
<u>Varieties without the <i>Php</i> gene¹</u>			
NC 606	74	73	98
CC 1063	70	70	99
K 346	70	65	94
GL 939	69	65	95
CC 143	61	63	104
CC 33	62	62	100
NC 938	56	57	102
GL 395	58	56	95
CC 13	53	56	104
PVH 2110	52	56	108
GL 26H ⁴	52	55	108
PVH 2254 ⁴	54	53	98
NC 925 ⁴	47	47	99
K 326	37	39	107
CC 35	19	22	112

¹ Varieties with the *Php* gene possess very high resistance to race 0 of the black shank pathogen. Resistance to race 0 in varieties without the *Php* gene is similar to or higher than that to race 1.

² Average % Survival near 2nd harvest without soil fumigation. Results are averages from 5 field experiments conducted in 2010 and 2012-2017 by Clemson University as part of the Regional Flue-Cured Tobacco Variety Evaluation Program.

³ Relative Yield Index = yield of each cultivar relative to the yield of all other cultivars in the experiment(s). Yield indexes for "No Granville Wilt" = average relative yield from the 2010-2018 Virginia OVT tests at the Southern Piedmont AREC, Blackstone. Yield indexes for "with Granville Wilt" = yield index without Granville wilt multiplied by average % Survival.

⁴ Ratings based on limited data available.

Table 8. Tobacco disease resistance in selected flue-cured tobacco varieties available in 2018.

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Variety	Resistance Rating ¹			Nematodes			Tobacco Mosaic Virus
	Black Shank		Granville Wilt	Root-Knot		Tobacco Cyst	
	<i>Ph</i> gene (race 0 only) ²	Race 1		<i>M. incognita</i>	Other species ³		
CC 13	-	48	53	+	+	-	-
CC 27	+	34	74	+	-	+	+
CC 33	-	66	62	+	+	-	-
CC 35	-	40	19	+	+	-	-
CC 37	+	53	80	+	+	+	+
CC 67	+	63	78	+	-	+	+
CC 143	-	79	61	+	-	-	-
CC 700	+	58	48	+	-	+	-
CC 1063	-	84	70	+	-	-	-
GF 318	+	45	53	+	-	+	-
GL 26H	-	44	52	+	-	-	+
GL 395	-	64	58	+	-	-	-
K 326	-	32	37	+	-	-	-
K 346	-	82	70	+	-	-	-
NC 71	+	47	36				
NC 72	+	38	52	+	-	+	-
NC 196	+	67	54	+	-	+	-
NC 297	+	35	55	+	-	+	+
NC 299	+	44	50	+	-	+	-
NC 606	-	69	74	+	-	-	-
NC 925	-	83	47	+	-	-	-
NC 938	-	89	56	+	-	-	-
PVH 1118	+	61	45	+	-	+	-
PVH 1452	+	69	68	+	-	+	-
PVH 1600	+	58	47	+	-	+	-
PVH 2110	-	43	52	+	-	-	-
PVH 2254	-	48	54	+	-	-	+
PVH 2275	+	11	57	+	+	+	+
PVH 2310	+	25	36	+	-	-	+

¹ Resistance rating = average % plants still alive near 2nd harvest, without a soil fungicide or fumigant. See Tables 3 and 4 for more detailed information.

² Varieties with the *Php* gene are almost immune to race 0 of the black shank pathogen; resistance to race 0 without the *Php* gene is at least as high as resistance to race 1.

³ "Other species" of root-knot nematode include *Meloidogyne arenaria* (peanut root-knot nematode) or *M. javanica* (Javanese root-knot nematode). These other species are now common in Virginia.

⁴ Ratings based on limited data available.