

# ON-FARM EVALUATION OF VARIETIES CONTAINING THE Wz GENETICS FOR BLACK SHANK RESISTANCE, YIELD AND GRADE



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#### **ABSTRACT:**

Variety selection has long been recognized as a valuable part of a black shank management program. Considering the limitations of FL 301 genetics and the collapse of the *Ph* gene there is a constant need for new sources of resistance to black shank. One new source is the *Wz* genetics derived from *Nicotiana rustica*. Breeding lines and ultimately varieties incorporating this resistance have been field tested in Georgia. A test of Breeding lines in 2013 had seven entries including NC 1071 (a breeding line souhigh resistance to black shank in farm trials. Block trials (4-5 acres) grown at multiple locations have found both NC 1226 and NC 1960 are capable of producing tobacco with high yields and good grades. rce of the *Ph* gene), K 326, NC 71, and NC 196 that developed greater than 80% Black Shank. Twelve Entries incorporating the *Wz* genetics developed less than 10% Black Shank. The first variety released containing this resistance, NC 1226, was field tested in 5 locations across Georgia in 2017 and showed 92% control of black shank relative to K 326. NC 1226 and a second *Wz* variety, NC 1960 not yet released, have consistently shown

#### **METHODS:**

2013 BREEDING LINE TRIAL: This trial consisted of flue-cured and burly tobacco breeding lines including NC 1071, (a common source of the *Ph* gene with no FL 301 resistance), released flue-cured varieties including K 326, NC 71 and NC 196, and 12 breeding lines incorporating *Wz* genetics. The trial was laid out as a randomized complete block with four reps. Each rep was a single row of 44-45 plants. The plot was set in a field corner where black shank has caused a total loss of NC 71 two years prior to our trial. No chemical treatments were applied. Tobacco was evaluated visually for black shank (Figure 1.) every three weeks beginning three weeks after transplant and to continuing until termination at 15 weeks after transplant.

2017 TRIALS EVALUATING VARIETIES FOR BLACK SHANK RESISTANCE: Five trials were set out on farms with a recent black shank history. All trials were a randomized complete block with four reps. Each rep was a single row of tobacco (180-205 plants). Varieties tested included K 326 as a low FL 301 resistance standard, K 346 as a high FL301 resistance standard and six test varieties including the newly developed NC 1226. Tobacco was evaluated visually (Figure 1.) every three weeks beginning three weeks after transplant and continuing to 12 weeks after transplant when mechanical harvest partially destroyed reps with significant black shank.

2018 AND 2019 BLOCK TRIALS: In 2018, 4-5 acre blocks of NC 1226 were planted at four locations. These trials were grown, harvested, cured and sold by growers who have history of coping with black shank. The purpose was to measure yield, grade and sale price for NC 1226. In 2019 similar block trials were conducted with NC-1960.

#### **RESULTS:**

2013 BREEDING LINE TRIAL: The total loss of NC 1071 prior to layby indicated a high and uniform population of *Phytophthora nicotiana* race 1. The released flue cured varieties (K-326, NC-71 and NC-196) all developed >80% black shank. All 13 of the Wz breeding lines developed <10% black shank.

2017 TRIALS EVALUATING VARIETIES FOR BLACK SHANK RESISTANCE: The mean results of the trial (Table 1) showed PVH 600 to have mid level resistance and the five recommended FL-301 varieties met our criteria of being significantly better than K 326 and as good as K 346 (*p=0.05*). Newly tested NC 1226 showed superior resistance to all varieties except K-346. Trials in 2018 (data not shown) that included NC 1226 and newly developed NC 1960 showed both *Wz* varieties provided superior reduction of black shank.

2018 AND 2019 BLOCK TRIALS: The 2018 block trials with NC-1226 (Table 3, Figure 3.) showed both varieties capable of producing high yield and grade

#### tobacco.

Table 1. Results of the 2017 Trial	
Variety	% Control
K-326	00.0 a
PVH-1600	44.0 b
CC-143	60.8 bc
NC-938	61.4 bc
GL-395	61.5 bc
CC-1063	68.1 c
K-346	78.9 cd
NC-1226	92.2 d





#### **CONCLUSION:**

The new Wz varieties, NC 1226 and NC 1960, provide superior black shank control and good yield and grade. The results for NC 1226 and NC 1960 should not be compared

Table 2. Echols Co., GA - NC 1226 Block Trial > 4.3 acres

- > 1<sup>st</sup> Harvest: 774 *lbs*.; Grade X2L @ \$1.23/*lb*.
- 2<sup>nd</sup> Harvest: None; (Rain)
- > 3<sup>rd</sup> Harvest: 10,360 *lbs.*; Grade B1 @ \$2.26/*lb*.
- Total Yield = 2,552 lbs./acre
- Total Value = \$5,661/acre





Table 3. Echols Co., GA - NC 1960 Block Trial
6.1 acres
1<sup>st</sup> Harvest: 1,500 *lbs.*; Grade X2 @ \$1.50/*lb.*2<sup>nd</sup> Harvest: 2,235 *lbs.*; Grade C1-2 @ \$1.80/*lb.*3<sup>rd</sup> Harvest: 16,390 *lbs.*; Grade B1 @ \$2.00/*lb.*

### Figure 3. NC 1960



#### directly. The 2018 season saw heavy rain before and during harvest which may have

#### compromised yield. 2019 was by far a better environmental season.



**>** Total Value = \$6,402/acre

