

Evaluation of Flue-Cured Tobacco Breeding Material 1963



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Research Report 86

August 1964

Virginia Agricultural Experiment Station
Virginia Polytechnic Institute
Blacksburg, Virginia

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Chatham, Virginia

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INTRODUCTION

The tobacco breeding program conducted by the Virginia Agricultural Experiment Station, Chatham, Virginia, has been in progress for about 2 decades. The purpose of this work is to incorporate into breeding lines factors for resistance to tobacco diseases commonly found on Virginia farms; and to evaluate these lines for level of resistance, potential yield, and physical and chemical qualities. The information obtained serves as a guide in selecting breeding lines for more advanced tests in which the V.P.I. Agronomy Department, commercial tobacco companies, growers, and agencies in Virginia, North Carolina, South Carolina, Georgia, and Florida cooperate.

This program consists of (1) crossing selected parents, (2) growing the F_1 generation in the greenhouse during fall and winter, (3) growing F_2 plants in field plots and selecting for desirable plant type, (4) screening the F_3 selections for disease resistance factors in the greenhouse and growth rooms, and (5) checking the F_3 and later progeny in field plots for plant type, uniformity, potential yield, and quality. Studies were initiated in 1962 in the use of F_1 hybrids to give improved disease-resistant combinations, high yield, and quality.

The data from these tests are assembled and evaluated prior to the spring seeding period. Selections for field plot entries are made on the basis of over-all performance the preceding year. Promising material in

the F_5 and later generations is considered for advanced testing. The best lines of earlier generation material are continued in later screening programs.

MATERIALS AND METHODS

Field plot testing was done at 3 locations: 2 off-station and 1 at the Tobacco Disease Research Station. The off-station locations were on the Charlie Meadows and Ben Betterton farms, 7 miles northeast of the station. On the Meadows farm, 100 entries were tested with 4 replications in 1/400 acre plots. The entries (Table 1) were head selections, except for check varieties and composited seed lots serving as checks. At the Betterton location, there were 86 entries consisting primarily of F_1 hybrids and parents (Table 2). The plot size was 1/400 acre, and the number of replicates varied from 1 to 8 according to the number of seedlings available per entry.

Seedlings for the Meadows and Betterton tests were produced in station seedbeds and set in the field in 2-1/4" peat pots. A 3-9-9 fertilizer was used at the rate of 1600 lbs. per acre. The crops were irrigated at both locations.

Field notes were made at flowering stage on plant type, leaf size and shape, leaf internode length, and plant uniformity (apparent homozygosity). On the basis of these data, certain breeding lines were selected for curing and further study.

All entries tested at the Meadows location were also set in randomized plots on black shank-infested soil at the station farm. A lattice design

was used, and the plot size was 1/400 acre. The purpose of this test was to obtain data on black shank field losses and to obtain seed of the lines selected for curing at the Meadows location.

Six F₂ breeding lines (Table 3) were set in disease-free field plots at the station, using approximately 250 plants of each entry. Twenty plants of each line were selected on the basis of plant type and bagged for seed production. The selected plants which carried tobacco mosaic (TMV) resistance were inoculated with the virus to further check their resistance.

The percentage of farm grades, yields, and physical quality ratings on entries selected for harvest at the Meadows and Betterton locations are given in Tables 4 and 6. Certain lines were later selected for chemical analyses (Table 5). Samples for analysis were taken on a weighted basis from all grades in each priming. These samples were ground in a Wiley Mill and analyzed through the courtesy of The American Tobacco Company for nicotine, nor-nicotine, and reducing sugars.

The black shank data from the infested field plots at the Disease Research Station are given in Table 5. A disease score was obtained by using time as a factor of disease expression. Four-stand counts were made at 30-day intervals beginning June 15. Plants lost at each of the 3 successive counts were given scores of 90, 60, and 30, respectively. The total score for the 3 counts was then divided by the original number of plants in the plot to give an average plot score. A score of 90 (the number of days the test was in progress) would show that all plants in the plot were dead by July 15; a score of zero would indicate that all plants were living at the end of the test on September 15. The percentage of black shank

kill was obtained by dividing the total number of plants killed on September 15 by the number of plants on June 15. The adjusted figures are from statistical treatments of the original score and percentage kill data.

The disease indexing data presented in Tables 8 through 15 were from tests conducted in the greenhouse and growth rooms under controlled conditions. These entries were individual seedhead selections of the most promising lines selected from the grading, physical, chemical, and the black shank field loss data.

In screening for black shank resistance, a modification of the method of Troutman, et al, (1) was used. Test entries consisted of 3 replicates of 4 plants each. After the susceptible check plants (Va. Gold) had begun to die, usually 4 days after inoculation, readings on disease incidence were recorded for 4 consecutive days. A total score was obtained by giving a score of 10 for each plant diseased at the first reading, followed by a score of 8, 6, and 4 for each plant killed on successive days. An average plot score of 40 would mean that all plants of an entry were dead at the first reading; a score of zero would show that all plants survived the 4-day test period. The lower score indicates higher resistance.

The black shank rating of high, moderate, low, or susceptible was assigned on the basis of relative scores obtained on check varieties, Va. Gold, Vesta 5, and N.C. 95, assuming that the checks were susceptible, moderate, and high, respectively, in black shank resistance.

The black root rot indexing method reported by Troutman (2) was used in screening for resistance to this disease. Entries consisted of 2 replicates of 4 plants each set in randomized blocks. The seedlings were taken

from the growth medium and rated for disease resistance by comparing the plant size or green weight in grams with the check varieties, Va. Gold and N.C. 95. These checks were considered resistant and susceptible, respectively, to black root rot. Lines producing all plants of approximately uniform size and weight comparable with Va. Gold were considered resistant (R). Segregating lines (R-) produced both large and small plants similar in size and weight to the resistant and non-resistant checks. Lines rated susceptible (S) produced small plants only, comparable in size and weight to the non-resistant check, N.C. 95.

Reaction to inoculation with potato virus Y was used as an indication of root knot (RK) resistance (3). Readings were obtained from 10 seedlings per entry set in 2" clay pots filled with fertilized vermiculite. After 2 weeks growth, the virus was applied to 2 leaves per plant by using a gauze pad and carborundum. Ten days later, the reaction was observed and recorded. Checks for this test were Va. Gold and N.C. 95. A systemic reaction in which no necrosis of the midribs of inoculated leaves was observed, as with Va. Gold, indicated RK susceptibility (S). Plants showing leaf midrib necrosis (midrib darkening) as with N.C. 95 were considered RK resistant (R). Entries showing both types of reaction in different plants were considered to be segregating (R-) for resistance (4).

The technique of indexing for TMV resistance was the same as described for root knot, except that inoculations were made with TMV instead of the potato virus Y. Lines showing necrotic flecking on all plants were considered homozygous for resistance (NN) while segregating lines (Nn) showed both necrotic and non-necrotic plants.

Breeding lines showing best results in the indexing tests (Tables 8 through 15) were carefully considered for 1964 field-plot testing. Emphasis was placed on making selections from the indexed material, since these lines already showed promise in the grading and physical-chemical quality tests.

PRESENTATION OF RESULTS

Entry numbers, variety or breeding line, generation, pedigree, and factors for disease resistance are shown in Tables 1, 2, and 3. It should be noted that, except for check varieties, the resistance factors listed were incorporated into the breeding material and homozygosity for all factors is not necessarily present.

Table 4 shows the grading, yield, and physical quality data on breeding lines and check varieties selected and harvested from the Meadows location. Approximately 1/2 the lines graded (Table 4) were considered to be inferior to the checks and were discarded at this point. The chemical analysis and black shank field loss data on lines showing best results in the grading room evaluations (Table 4) are shown in Table 5.

Performance of certain F_1 hybrids and parents tested on the Betterton location is shown in Table 6. Table 7 shows the rainfall recorded at the station by years and months, 1950-1963.

The disease indexing data on individual seedhead selections from the most promising breeding lines are given in Tables 8 through 15.

REFERENCES

1. TROUTMAN, J. L., R. G. Henderson, and J. L. LaPrade. 1962. Indexing tobacco for black shank resistance. Tobacco Science 6: 107-109.
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3. HENDERSON, R. G. and J. L. Troutman. 1963. A severe virus disease of tobacco in Montgomery County, Virginia. Plant Disease Reporter 47: 187-189.
4. CREWS, J. W., R. G. Henderson, and J. L. Troutman. 1964. Association between resistance to root knot nematode and susceptibility to a strain of potato virus 'Y'. Unpublished paper presented at Nineteenth Tobacco Workers' Conference at Columbus, Ohio, January, 1964.

Table 1. Entry number and pedigree of material tested in 1963, Meadows and Disease Research Station entries.

1963 No.	Variety	Generation	Pedigree	Disease Resistance ^{d/}
63	N.C. Hicks	Rel. 1945	Check Variety	----
64	Va. 187 (Reg. Comp.)	F-9	109, 111, 115; Hicks x C. 139	BS
65	Va. 187 (Co. Test Comp.)	F-9	111, 115 less A3, 4, 5	BS
66	Va. 187	F-9	115 Selections, less A3, 4, 5	BS
67	Va. Gold	Rel. 1949	Yellow Spec. x Cash	BRR
68	Va. 1104 (Co. Test Comp.) ^{a/}	F-7	(Vesta 46 x C. 139) x C. 139) x Va. Gold	BS, BRR
69	2104-A1	F-7	Va. 1104 Selection	BS, BRR
70	2104-A2	F-7	Va. 1104 Selection	BS, BRR
71	N.C. Hicks	Rel. 1945	Check Variety	----
72	2104-B2	F-7	Va. 1104 Selection	BS, BRR
73	2121-B1	F-7	Va. 1104 Selection	BS, BRR
74	2121-B2	F-7	Va. 1104 Selection	BS, BRR
75	Va. Gold	---	Check Variety	BRR
76	2121-B3	F-7	Selection of 1104	BS, BRR
77	2121-B4	F-7	Selection of 1104 x Va. 724	BS, BRR
78	Va. 2176 (Co. Test Comp.) ^{b/}	F-6	(Va. 724 x Vam. 48) BC2	BS, BRR, TMV
79	Va. Gold	---	Check Variety	BRR
80	2176-A2	F-6	Selection of 2176	BS, BRR, TMV
81	2176-1	F-6	Selection of 2176	BS, BRR, TMV
82	2176-2	F-6	Selection of 2176	BS, BRR, TMV
83	N.C. Hicks	Rel. 1945	Check Variety	----
84	2175-B4	F-6	(Va. 724 x Vam. 48) x Va. 724 BC2	BS, BRR, TMV
85	2175-B5	F-6	(Va. 724 x Vam. 48) x Va. 724 BC2	BS, BRR, TMV
86	2192-A4	F-4	MR3 x Vesta 5 ^{c/}	BS, BRR, TMV
87	N.C. 95	Rel. 1961	(C. 139 x Bel. 4-30) x C. 139) x Hicks	BS, RK, GW, FW
88	2192-B5	F-4	MR3 x Vesta 5	BS, BRR, TMV
89	2192-A7	F-4	MR3 x Vesta 5	BS, BRR, TMV
90	2195-1	F-4	MR3 x (Va. 724 x C. 156)	BS, BRR, TMV
91	N.C. Hicks	Rel. 1945	Check Variety	----
92	2195-2	F-4	MR3 x (Va. 724 x C. 156)	BS, BRR, TMV

Table 1, Continued. Material tested, 1963, Meadows and Disease Research Station entries.

1963 No.	Variety	Generation	Pedigree	Disease Resistance <u>d/</u>
93	2195-A1	F-4	MR3 x (Va. 724 x C. 156)	BS, BRR, TMV
94	2195-A5	F-4	MR3 x Vesta 5	BS, BRR, TMV
95	Va. 724-9A7R	---	(Vesta 30 x Va. Gold) x C. 139	BS, BRR
96	2190-A6	F-4	(Hicks x Va. 45) x Hicks	TMV
97	N.C. 3064	F-4	(2031-1-3) 383 x N.C. 95	BS, RK, GW, FW
98	Tr. #3	F-4	Va. 724 x Fla. 22	BS, BRR
99	N.C. 95	Rel. 1945	Check Variety	BS, RK, GW, FW
100	Va. 2219 Comp. (Co. Test) <u>e/</u>	F-4	215E (RK) x Va. 724	BS, BRR, RK
101	2219E	F-4	Selection of Va. 2219	BS, BRR, RK
102	2219F	F-4	Selection of Va. 2219	BS, BRR, RK
103	Vesta 5	Rel. 1952	Check Variety	BS
104	2219-B5	F-4	Selection of Va. 2219	BS, BRR, RK
105	2219-B6	F-4	Selection of Va. 2219	BS, BRR, RK
106	2219-2	F-4	Selection of Va. 2219	BS, BRR, RK
107	Va. 724-61-185	---	(Vesta 30 x Va. Gold) x C. 139	----
108	Va. 2163 Comp. <u>f/</u>	F-5	211C (RK) x Va. 724	BS, BRR, RK
109	2163A	F-5	Selection of Va. 2163	BS, BRR, RK
110	2163B	F-5	Selection of Va. 2163	BS, BRR, RK
111	N.C. Hicks	Rel. 1945	Check Variety	----
112	2163C	F-5	Selection of Va. 2163	BS, BRR, RK
113	2163-A1	F-5	Selection of Va. 2163	BS, BRR, RK
114	2163-A2	F-5	Selection of Va. 2163	BS, BRR, RK
115	Va. 724-61-185	---	Selection of Va. 724-58	----
116	2163-A3	F-5	Selection of Va. 2163	BS, BRR, RK
117	2163-B1	F-5	Selection of Va. 2163	BS, BRR, RK
118	2163-B3	F-5	Selection of Va. 2163	BS, BRR, RK
119	N.C. 95	Rel. 1961	Check Variety	BS, RK, GW, FW
120	Matthews 611	Rel. 1963	(Va. 724 x C. 156)	BS, BRR
121	2211-B1	F-4	214B (RK) x Va. 724	BS, BRR, RK
122	2218-B2	F-4	215E (RK) x Va. 724	BS, BRR, RK

Table 1, Continued. Material tested, 1963, Meadows and Disease Research Station entries.

1963 No.	Variety	Generation	Pedigree	Disease Resistance <u>d/</u>
123	N.C. Hicks	Rel. 1945	Check Variety	----
124	Va. 187	F-9	Sel. 111-7, 111-A3, 111-A4	BS
125	Va. 187	F-9	Sel. 111s + 115s, less A3, 4, 5	BS
126	Va. 187	F-9	Sel. 115s, less A3, 4, 5	BS
127	Va. Gold	---	Check Variety	BRR
128	2252-B1	F-4	Va. 187 x Hicks	BS
129	2252B	F-4	Va. 187 x Hicks	BS
130	2252-A1	F-4	Va. 187 x Hicks	BS
131	N.C. Hicks	Rel. 1945	Check Variety	----
132	2252-A2	F-4	Va. 187 x Hicks	BS
133	2252-A3	F-4	Va. 187 x Hicks	BS
134	2252-1	F-4	Va. 187 x Hicks	BS
135	Vesta 5	---	Check Variety	BS
136	2252-2	F-4	Va. 187 x Hicks	BS
137	2252-3	F-4	Va. 187 x Hicks	BS
138	2252-5	F-4	Va. 187 x Hicks	BS
139	N.C. Hicks	Rel. 1945	Check Variety	----
140	N.C. 672	F-4	Golden Wilt x N.C. 383-1	BS, GW, FW
141	N.C. 673	F-4	Golden Wilt x N.C. 383-1	BS, GW, FW
142	Tr. #3G	F-4	Va. 724 x Fla. 22	BS, BRR
143	Va. 724-179-3	---	Selection of Va. 724-'58	----
144	Tr. 104	F-4	Va. 724 x Fla. 22	BS, BRR
145	Tr. 96	F-4	Va. 724 x Fla. 22	BS, BRR
146	B.S.I. #1	F-3	Fla. 22 x Va. 187	BS, RK
147	Fla. 22	Rel. 1962	Root Knot Mat'l. 402-401	RK
148	B.S.I. #8	F-3	Fla. 22 x Va. 187	BS, RK
149	'62 F2, 3-2	F-3	Fla. 22 x Va. 187	BS, RK
150	'62 F2, 3-9	F-3	Fla. 22 x Va. 187	BS, RK
151	Va. 187	F-9	Sel. 115, less A3, 4, 5	BS
152	'62 F2, 3-12	F-3	Fla. 22 x Va. 187	BS, RK

Table 1, Continued. Material tested, 1963, Meadows and Disease Research Station entries.

1963 No.	Variety	Generation	Pedigree	Disease Resistance <u>d/</u>
153	C. 319	Rel. 1963	C. 139 x Hicks	BS, GW, FW
154	Speight G-5	Rel. 1963	C. 139 x Hicks	BS, FW
155	Va. 724-9A7R	---	Selection of Va. 724-'58	BS, BRR
156	2148-A1	F-6	Va. 724 x C. 187 - Hicks	BS, BRR
157	Bel. 59-1	---	Debneyi x Hicks	BRR
158	Kutsuga-51	---	Rhodesian Line	----
159	N.C. 95	Rel. 1961	Check Variety	BS, RK, GW, FW
160	2207-1	F-4	MR3 x (Va. Gold x Va. 45)	BS, BRR, TMV
161	Tr. 114-D9	F-4	Va. 724 x Fla. 22	BS, BRR
162	2207-3	F-4	MR3 x (Va. Gold x Va. 45)	BS, BRR, TMV

a/ Composite of 2104-A1, A2, B2, 2121-B1, B2, B3, B4.

b/ Composite of 2176-A2, 1, 2.

c/ MR3 = (Va. 724 x Vam. 48) x Va. 724 BC2.

d/ Bred for resistant factors: BS, black shank; BRR, black root rot; TMV, tobacco mosaic virus; RK, root knot; GW, Granville wilt; FW, Fusarium wilt.

e/ 219E, F, B5, B6, 2. (Co. Test Entry).

f/ 2-163 A, B, C, A1, A3, B1, B3. (Composite).

Table 2. Entry numbers and pedigree of Betterton farm test entries, 1963.

Betterton No.	Line Variety	(F) Generation	Pedigree	Disease Resistance <u>c/</u>
1	162A x 192-B5	F-1	----	BS, RK, TMV
2	162A	F-5	211C (RK) x Va. 724	BS, BRR, RK
3	192-B5	F-4	MR3 x Vesta 5 <u>a/</u>	BS, BRR, TMV
4	163A x 178AX	F-1	----	BS, RK, TMV
5	163A	F-5	211C x Va. 724	BS, BRR, RK
6	178AX	F-6	(Va. 724 x Vam. 48) x 724 BC2	BS, BRR, TMV
7	Tr. 38H x Speight G-19	F-1	----	BS
8	Tr. 38H	F-4	Va. 724 x Fla. 22	BS, BRR
9	Speight G-19	Rel. 1963	C. 187 x Speight 31 <u>b/</u>	BS
10	Va. 724 x C. 187-Hicks	F-1	----	BS
11	Va. 724-58	---	(Vesta 30 x Va. Gold) x C. 139	BS, BRR
12	C. 187-Hicks	---	C. 187 x C. 156	BS, GW, FW
13	Va. 724 (9A7R) x Fla. 22	F-1	----	BS, RK
14	Fla. 22	---	401 & 402 x 37, 70, 40	RK
15	Va. 724-9A7R	---	Selection of Va. 724	BS, BRR
16	Va. 724 (61-185) x Fla. 22	F-1	----	BS, RK
17	Va. 724 (61-185)	---	Selection of Va. 724	BS, BRR
18	Fla. 22	Rel. 1962	Check Variety	RK
19	Va. Gold x C. 139	F-1	----	----
20	Va. Gold	Rel. 1947	Yellow Spec. x Cash	BRR
21	C. 139	Rel. 1955	(G. wilt x D.B. 101) x G. cure x Oxf. 1-181)	BS, GW
22	Va. 187-3 x Va. Gold	F-1	----	----
23	Va. 187-3	F-9	(115-A8) Hicks x C. 139	BS
24	Va. Gold	Rel. 1947	Check Variety	BRR
25	'62 G.H. Cross #16	F-3	(Fla. 22 x Va. 187) x Va. Gold	BS, BRR, RK
26	'62 G.H. Cross #7	F-3	Va. 187 x Va. Gold	BS, BRR
27	'62 G.H. Cross #16	F-3	(Fla. 22 x Va. 187) x Va. Gold	BS, BRR, RK
28	'62 G.H. Cross #7	F-3	Va. 187 x Va. Gold	BS, BRR
29	'62 G.H. Cross #19	F-3	(T.I. 245 x 724) x (Va. 724 x Fla. 22)	BS, BRR
30	'62 G.H. Cross #19	F-3	(T.I. 245 x 724) x (Va. 724 x Fla. 22)	BS, BRR

Table 2, Continued. Entry numbers and pedigree of Betterton farm test entries, 1963.

Betterton No.	Line Variety	(F) Generation	Pedigree	Disease Resistance <u>o/</u>
31	'62 G.H. Cross #19	F-3	(T.I. 245 x 724) x (Va. 724 x Fla. 22)	BS, BRR
32	'62 G.H. Cross #17	F-3	(Va. 724 x Fla. 22) x Va. 187	BS, RK
33	'62 G.H. Cross #17	F-3	(Va. 724 x Fla. 22) x Va. 187	BS, RK
34	Fla. 22	Rel. 1962	Check Variety	RK
35	'62 G.H. Cross #16	F-3	(Fla. 22 x Va. 187) x Va. Gold	BS, BRR, RK
36	'62 G.H. Cross #8	F-3	Va. 187 x Va. 21	BS, BRR
37	'62 G.H. Cross #7	F-3	Va. 187 x Va. Gold	BS, BRR
38	'62 G.H. Cross #6	F-3	Va. 187 x Va. 21	BS, BRR
39	'59 G.H. Cross #44	F-3	Va. Gold x (P.D. 17-18 x Va. 724)	BS, BRR
40	Va. 187-115-A8	F-9	Selection of Va. 187	BS
41	'62 G.H. Cross #17	F-3	(Va. 724 x Fla. 22) x Va. 187	BS, BRR, RK
42	'62 G.H. Cross #15	F-3	Va. Gold x (Hicks* x Va. 187)	BS, BRR
43	'62 G.H. Cross #15	F-3	Va. Gold x (Hicks* x Va. 187)	BS, BRR
44	Va. Gold	Rel. 1947	Check Variety	BRR
45		F-4	Fla. 22 x Va. 187 (53-1)	BS, RK
46		F-4	Fla. 22 x Va. 187 (53-2)	BS, RK
47		F-4	Fla. 22 x Va. 187 (53-1)	BS, RK
48		F-4	Fla. 22 x Va. 187 (31-1)	BS, RK
49		F-4	Fla. 22 x Va. 187 (32-1)	BS, RK
50	Hicks	Rel. 1945	Check Variety	----
51	2207-1C	F-5	MR3 x (Va. Gold x Va. 45)	BS, BRR, TMV
52	2192-A3-3	F-5	MR3 x Vesta 5	BS, BRR, TMV
53	2252-A3	F-5	Hicks x Va. 187	BS
54	2192-B5 x M.S. Hicks	F-1	----	TMV
55	2192-B5	F-5	MR3 x Vesta 5	BS, TMV
56	M.S. Hicks	---	Check	----
57	2252-B1 x M.S. Hicks	F-1	----	----
58	2252-B1 (x28)	F-5	Hicks x Va. 187	BS
59	M.S. Hicks	---	Check	----
60	Bel. 59-1 x M.S. Hicks	F-1	----	----

*Mammoth type, selected by a farmer

Table 2, Continued. Entry numbers and pedigree of Betterton farm test entries, 1963.

Betterton No.	Line Variety	(F) Generation	Pedigree	Disease Resistance ^{c/}
61	Bel. 59-1	---	Debneyi x Hicks	BRR
62	M.S. Hicks	---	Check	----
63	N.C. 95 x M.S. Hicks	F-1	----	RK
64	N.C. 95	Rel. 1961	Check Variety	BS, RK, GW, FW
65	M.S. Hicks	---	Check	----
66	Fla. 22 x M.S. Hicks	F-1	----	RK
67	Fla. 22	Rel. 1962	Check Variety	RK
68	M.S. Hicks	---	Check	----
69	2252-B2 x M.S. Hicks	F-1	----	----
70	2252-B2	F-5	Hicks x Va. 187	BS
71	M.S. Hicks	---	Check	----
72	2218-B2 x M.S. Hicks	F-1	----	RK
73	2218-B2	F-4	215E x Va. 724	BS, BRR, RK
74	M.S. Hicks	---	Check	----
75	Va. Gold x M.S. Hicks	F-1	----	----
76	Va. Gold	Rel. 1945	Check Variety	BRR
77	M.S. Hicks	---	Check	----
78	2252-B1 x M.S. 187	F-1	----	BS
79	2252-B1	F-5	Hicks x Va. 187	BS
80	M.S. - C. 187	---	----	BS
81	2219-E x M.S. 187	F-1	----	BS, RK
82	2219-E	F-4	215E x Va. 724	BS, BRR, RK
83	M.S. - C. 187	---	----	BS
84	Bel. 59-1 x M.S. 187	F-1	----	----
85	Bel. 59-1	---	Debneyi x Hicks	BRR
86	M.S. - C. 187	---	----	BS

a/ MR 3 = (Va. 724 x Vam. 48) x Va. 724-BC2.

b/ Speight 31 = Oxf. 1-181 x Va. Gold) x C. 139.

c/ Bred for resistant factors: BS, black shank; BRR, black root rot; RK, root knot; TMV, tobacco mosaic virus; GW, Granville wilt; FW, Fusarium wilt.

Table 3. F-2 Breeding lines in field plots - Disease Research Station, 1963.

F-2 No.	Line No.	Pedigree	Disease Resistance <u>a/</u>
1	'62 Field Cross #2	2162-E x 2192-B5	BS, BRR, RK, TMV
2	'62 Field Cross #6	2163-A x 178-AX	BS, BRR, RK, TMV
9	'62 Field Cross #48	(Fla. 22 x Va. 724) x 2175-B6	BS, BRR, RK, TMV
14	'62 G.H. Cross #16	(Fla. 22 x Va. 187) x Va. Gold	BS, BRR, RK
18	'63 G.H. Cross #1	(Va. 187 x Va. 21) x (Va. 187 x N.C. 95)	BS, BRR, RK
19	'63 G.H. Cross #2	(Va. 187 x Va. Gold) x (Va. 187 x N.C. 95)	BS, BRR, RK

a/ Bred for resistant factors: BS, black shank; BRR, black root rot; RK, root knot; TMV, tobacco mosaic virus.

Table 4. Grading and physical quality data on Meadows breeding lines.

1963 No.	Line Variety	(F) Generation	Farm Grades				Yield per acre (lbs.)	Physical Quality Rating ^{a/}
			Per cent of Best	Trash	Total Weights Green	Red		
68	Va. 1104 - Comp.	7	65	18	9	8	2440	5
69	2104-A1	7	85	8	7	--	2290	2
70	2104-A2	7	73	18	9	--	2325	3
72	2104-B2	7	69	19	11	1	2235	4
74	2121-B2	7	63	19	5	13	2040	5
75	Va. Gold	-	87	5	8	--	2140	5
83	Hicks, N.C.	-	97	3	--	--	2190	1
78	Va. 2176 - Comp.	6	89	11	--	--	2020	1
79	Va. 724	-	85	13	2	--	2295	1
81	2176-1	6	90	7	1	2	2020	4
82	2176-2	6	89	11	--	--	2255	5
85	2175-B5	6	69	27	3	1	2595	13
86	2192-A4	4	85	15	--	--	1995	6
87	N.C. 95	-	92	3	5	--	2265	3
88	2192-B5	4	--	--	--	--	--	8
91	N.C. Hicks	-	93	7	--	--	2130	2
92	2195-2	4	74	20	6	--	2160	13
93	2195-A1	4	77	23	--	--	2090	11
94	2195-A5	4	97	3	--	--	1840	10
103	Vesta 5	-	84	7	9	--	1990	9
160	2207-1	4	99	1	--	--	2300	12
162	2207-3	4	94	4	2	--	2440	7
98	Tr. 3	4	85	15	--	--	2435	6
99	N.C. 95	-	83	3	12	--	2515	4
100	2219 - Comp.	4	88	10	2	--	2540	3
101	2219-E	4	83	14	3	--	2315	10
102	2219-F	4	82	18	--	--	2165	10
108	2163 - Comp.	5	78	18	2	2	2045	14
110	2163-B	5	75	19	6	1	1725	17
118	2163-B3	5	86	11	3	--	1850	12

Table 4, Continued. Grading and physical quality data on Meadows breeding lines.

1963 No.	Line Variety	(F) Generation	Farm Grades				Yield per acre (lbs.)	Physical Quality Rating <u>a/</u>
			Per cent of Best	Total Trash	Weights Green	Red		
119	N.C. 95	-	82	8	10	--	2245	8
120	Math. 611	7	82	5	13	--	1980	9
121	2211-B1	4	75	19	6	--	2055	11
122	2218-B2	4	57	3	40	--	2495	1
139	N.C. Hicks	-	96	4	--	--	2550	2
140	N.C. 672	4	66	2	27	5	2560	7
142	Tr. 3G	4	97	3	--	--	2100	5
143	Va. 724	-	77	1	22	--	2650	13
144	Tr. 104	4	89	12	--	--	2535	1
123	N.C. Hicks	-	95	3	2	--	1965	2
124	Va. 187-111	9	81	3	16	--	2060	13
125	Va. 187 - Co. Test	9	76	1	23	--	2135	4
126	Va. 187-115	9	77	3	20	--	2215	3
127	Va. Gold	-	82	7	11	--	2130	9
128	2252-B2	4	94	3	3	--	2275	7
129	2252-B	4	90	9	1	--	2120	6
131	N.C. Hicks	-	97	3	--	--	2040	10
133	2252-A3	4	93	4	3	--	2110	15
135	Vesta 5	-	93	3	3	1	2480	14
136	2252-2	4	89	2	9	--	2510	1
148	Va. 187 x Fla. 22	3	51	7	42	--	2360	15
149	Va. 187 x Fla. 22	3	71	2	27	--	2110	12
150	Va. 187 x Fla. 22	3	57	9	34	--	1940	17
151	Va. 187-115	9	88	3	9	--	2045	11
153	C. 319	-	86	6	8	--	2005	5
154	Speight G-5	-	86	3	11	--	2320	18
156	2148-A1	6	82	2	16	--	2275	8
157	Bel. 59-1	7	98	2	--	--	1795	10
158	Kutsuga	-	83	2	15	--	1740	19
159	N.C. 95	-	64	14	22	--	2060	16

a/ Rated by station personnel; lowest figures, best quality.

Table 5. Chemical data and black shank field losses on Meadows lines.

1963 No.	Line Variety	% Nic.	% Nor. Nic.	% Red Sugars	Black Shank Field Data			
					Score		Per cent	
					Ave.	Adj. <u>b/</u>	Kill	Adj. Kill <u>c/</u>
69	2104-A1	3.15	.14	19.8	26	23	50	41
70	2104-A2	3.39	.15	19.3	11	11	23	28
74	2121-B2	2.94	.53	15.4	22	27	38	46
75	Va. Gold	3.32	.08	19.4	84	61	95	65
78	Va. 2176 - Comp.	3.05	.15	25.6	15	21	33	39
79	Va. 724 and Va. Gold <u>a/</u>	1.72	.10	26.0	85	85	100	90
81	2176-1	2.32	.17	22.7	12	4	28	14
82	2176-2	2.62	.19	19.7	9	7	9	21
83	N.C. Hicks	2.92	.09	25.0	48	28	76	42
86	2192-A4	2.13	.12	22.6	17	17	25	30
87	N.C. 95	2.53	.11	26.0	15	32	28	49
88	2192-B5	2.76	.13	24.9	22	22	29	25
91	N.C. Hicks	3.25	.20	22.1	49	46	71	64
98	Tr. 3	2.60	.05	25.7	11	19	30	40
99	N.C. 95	2.96	.09	20.9	20	19	40	41
100	2219 - Comp.	2.67	.09	22.3	17	24	33	41
101	2219-E	2.57	.07	18.5	0	25	0	32
118	2163-B3	2.34	.11	21.6	17	17	36	32
120	Math. 611	1.98	.07	21.1	11	11	19	23
122	2218-B2	2.80	.11	21.4	5	6	12	18
123	N.C. Hicks	2.91	.11	24.6	49	47	67	65
124	Va. 187-111	3.40	.19	21.1	11	25	25	49
125	Va. 187 - Co. Test	2.95	.17	21.3	23	44	41	58
127	Va. Gold	4.02	.14	18.4	82	82	100	95
129	2252-B	3.42	.16	19.8	7	7	16	18
135	Vesta 5	2.89	.17	27.2	31	32	53	53
136	2252-2	2.64	.14	25.8	9	9	28	17
139	N.C. Hicks	2.82	.11	24.3	50	51	69	57
149	Va. 187 x Fla. 22	3.32	.14	19.7	3	3	7	15
153	C. 319	2.54	.14	22.2	3	3	7	15

Table 5, Continued. Chemical data and black shank field losses on Meadows lines.

1963 No.	Line Variety	% Nic.	% Nor. Nic.	% Red Sugars	Black Shank Field Data			
					Score		Per cent	
					Ave.	Adj. <u>b/</u>	Kill	Adj. Kill <u>c/</u>
154	Speight G-5	2.77	.16	23.2	10	10	13	21
156	2148-A1	1.88	.12	23.9	3	3	4	8
159	N.C. 95	2.95	.13	22.3	4	4	7	11
160	2207-1	2.23	.07	23.0	0	0	0	0
162	2207-3	1.86	.06	20.6	12	12	24	22

a/ Va. 724 at Meadows - chemical data figures. Va. Gold at Station - black shank loss figures.

b/ Transformation from original scores.

c/ Transformation from per cent killed.

The chemical analysis figures presented are through the courtesy of the American Tobacco Company, Research Laboratory, Richmond, Virginia.

Table 6. Performance of certain F₁ hybrids and parents on Betterton farm, 1963.

Plot No.	Line Variety	(F) Gen.	Yield Per A.	Physical Quality			% Nic.	% Red Sugars	Disease Resistance ^{d/}
				Score (Station) ^{a/}	% Accepted (Tob. Comp.) ^{b/}	Score (Tob. Comp.) ^{c/}			
1	162A x 192-B5	1	2328	61	-	-	2.97	14.6	BS, BRR, RK, TMV
2	162A	4	2292	45	-	-	2.44	18.5	BS, BRR, RK
3	192-B5	4	2140	49	-	-	3.71	14.6	BS, BRR, TMV
4	163A x 178-AX	1	2312	62	-	-	2.60	23.7	BS, BRR, RK, TMV
5	163A	4	2544	53	-	-	2.78	21.5	BS, BRR, RK
6	178A	4	2344	71	10	4	2.93	17.8	BS, BRR, TMV
19	Va. Gold x C. 139	1	2916	74	28	4	2.70	20.2	----
20	Va. Gold	-	2720	56	5	4	3.56	16.2	BRR
21	C. 139	-	3244	41	13	4	2.59	13.5	BS
22	Va. 187 (115) x Va. Gold	1	2852	67	-	-	3.65	19.4	----
23	Va. 187 (115)	9	3064	61	-	-	3.04	21.6	BS
24	Va. Gold	-	2276	50	-	-	3.67	15.0	BRR
54	192-B5 x MS Hicks	1	3024	70	8	4	3.83	16.6	TMV
55	192-B5	5	2508	59	10	4	3.66	13.2	BS, BRR, TMV
56	MS Hicks	-	2752	58	-	-	3.26	20.4	----
57	252-B1 x MS Hicks	1	2504	68	7	4	4.69	11.9	----
58	252-B1	5	2848	68	7	4	3.57	17.9	BS
60	Bel. 59-1X MS Hicks	-	2336	76	18	4	2.67	20.3	BRR
61	Bel. 59-1	-	2264	79	17	4	1.91	19.2	BRR
62	MS Hicks	-	2464	73	12	4	2.41	25.9	----
63	N.C. 95 x MS Hicks	1	2428	76	13	4	2.53	24.3	RK
64	N.C. 95	-	2660	73	17	4	2.18	22.4	BS, RK, GW, FW
65	MS Hicks	-	2244	69	-	-	2.91	23.6	----
69	252-B2 x MS Hicks	1	2648	77	5	4	3.22	20.5	----
70	252-B2	5	2624	76	10	4	3.39	17.2	BS
71	MS Hicks	-	2308	71	-	-	3.64	17.7	----
72	218-B2 x MS Hicks	1	2912	46	-	-	3.78	16.5	RK
73	218-B2	4	3108	50	-	-	3.06	18.6	BS, BRR, RK
78	252-B1 x MS 187	1	2240	66	-	-	3.85	16.4	BS
79	252-B1	5	2396	56	-	-	3.80	18.7	BS

Table 6, Continued. Performance of certain F₁ hybrids and parents on Betterton farm, 1963.

Plot No.	Line Variety	(F) Gen.	Yield Per A.	Physical Quality			% Nic.	% Red Sugars	Disease Resistance ^{d/}
				Score (Station) ^{a/}	% Accepted (Tob. Comp.) ^{b/}	Score (Tob. Comp.) ^{c/}			
80	MS 187	-	2028	45	-	-	3.01	17.1	BS
34	Fla. 22	-	2728	49	-	-	3.71	20.6	RK
35	(Fla. 22 x 187) x Va. Gold	3	2764	50	-	-	3.57	17.2	BS, BRR, RK
40	Va. 187-115-A8	9	2528	63	-	-	2.55	22.6	BS
44	Va. Gold	-	2536	71	-	-	2.06	18.2	BRR
46	Fla. 22 x Va. 187	4	3024	70	-	-	3.12	22.8	BS, RK
46	Fla. 22 x Va. 187	4	2848	53	-	-	3.28	19.4	BS, RK
50	N.C. Hicks	-	2536	48	-	-	3.78	16.2	----
51	MR 3 x (Va. Gold x Va. 45)	5	2752	60	-	-	1.97	18.1	BS, BRR, TMV

^{a/} Scored by station personnel on the basis of color, body, and texture. Highest score means best quality.

^{b/} Per cent accepted by 5 participating tobacco companies.

^{c/} Scored by 5 participating tobacco companies.

^{d/} Bred for resistant factors: BS, black shank; BRR, black root rot; RK, root knot; TMV, tobacco mosaic virus; GW, Granville wilt; FW, Fusarium wilt.

Table 7. Total rainfall (inches) by months and years, 1950-1963.

Month	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	Monthly Average
January	2.87	1.24	3.42	4.35	6.81	0.87	1.11	3.79	4.92	1.79	3.36	2.10	5.14	1.85	3.12
February	1.88	2.43	3.12	3.92	1.97	5.82	5.21	5.03	2.63	1.89	5.20	5.45	3.81	2.52	3.36
March	2.84	3.64	5.91	5.69	3.61	3.90	3.82	3.07	4.69	3.50	3.86	7.19	4.17	6.60	4.47
April	1.56	4.52	5.29	3.88	2.87	4.53	4.87	4.61	5.42	5.62	3.27	2.93	3.33	1.15	3.38
May	6.01	1.99	2.50	1.37	6.09	4.95	3.00	2.59	3.90	3.00	4.55	3.16	1.33	1.89	3.31
June	2.28	5.34	2.56	5.64	6.47	2.59	3.53	5.77	4.21	2.18	2.57	8.16	4.07	2.52	4.13
July	2.71	3.65	5.43	4.36	8.06	5.26	5.13	1.04	2.03	6.16	3.23	3.31	4.87	2.14	4.10
August	2.92	1.74	5.86	1.79	1.44	9.51	4.37	4.75	4.49	3.51	7.06	7.19	2.92	2.09	4.26
September	8.35	1.00	5.03	1.81	0.77	2.67	5.79	8.95	3.20	4.90	4.18	2.28	5.43	4.05	4.17
October	2.68	1.24	1.07	1.40	*8.58	1.69	7.06	1.56	2.27	5.79	2.81	1.66	1.01	0.50	2.81
November	2.69	3.93	3.87	1.08	4.07	2.29	2.56	6.95	1.98	1.81	0.56	2.50	6.82	5.36	3.32
December	5.40	5.11	3.47	5.07	3.46	0.96	3.68	3.30	6.00	2.82	2.72	5.83	3.47	2.44	3.84
TOTALS	42.19	35.83	47.53	40.36	54.20	45.04	50.13	51.41	45.74	42.97	43.37	51.76	46.37	33.11	45.00

* Hazel

Growing Period Rainfall

May	6.01	1.99	2.50	1.37	6.09	4.95	3.00	2.59	3.90	3.00	4.55	3.16	1.33	1.89	3.31
June	2.28	5.34	2.56	5.64	6.47	2.59	3.53	5.77	4.21	2.18	2.57	8.16	4.07	2.52	4.13
July	2.71	3.65	5.43	4.36	8.06	5.26	5.13	1.04	2.03	6.16	3.23	3.31	4.87	2.14	4.10
August	2.92	1.74	5.86	1.79	1.44	9.51	4.37	4.75	4.49	3.51	7.06	7.19	2.92	2.09	4.26
	13.92	12.72	16.35	13.16	22.06	22.31	16.03	14.15	14.63	14.85	17.41	21.82	13.21	8.64	15.80

Table 8. Black shank and black root rot resistance data in indexing test 1 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing					Black Root Rot	
				Scores/Rep.			Ave. Score	B.S. Rating ^{a/}	Wt./Rep. Grams	Res. Level ^{b/}
				A	B	C				
26	144-A1	Tr. 104	5	32	34	20	29	L	22	R-
1	(26 x 12)	----	1	32	20	24	25	L	56	R
12	162-A6	2207-3	5	24	12	34	23	L	61	R
26	144-A1	Tr. 104	5	16	24	32	24	L	24	R-
2	(26 x 3)	----	1	6	16	12	11	M	45	R
3	128-C5	2252-B1	5	8	12	12	11	M	18	S
26	144-A1	Tr. 104	5	30	40	30	33	S	26	R-
3	(26 x 4)	----	1	26	18	28	24	L	49	R
4	94-A5	2192-A5	5	4	8	22	11	M	37	R
26	144-A1	Tr. 104	5	24	22	28	25	L	28	R-
4	(26 x 15)	----	1	16	18	26	20	L	54	R
15	92-A6	2195-2	5	4	16	28	16	L	44	R
26	144-A1	Tr. 104	5	32	24	26	27	L	24	R-
5	(26 x 16)	----	1	18	16	18	17	L	57	R
16	86-C2	192-A4	5	12	20	16	16	L	48	R
26	144-A1	Tr. 104	5	24	26	4	18	L	32	R-
6	(26 x 17)	----	1	8	18	12	19	L	53	R
17	72-B1	1104 Selection	8	4	20	0	8	M	50	R
25	57-D2	2192-A4	5	32	20	4	19	L	34	R-
7	(25 x 18)	----	1	16	0	4	7	M	48	R
18	54-A 5	2218-B2	5	0	4	0	1	H	47	R
25	57-D2	2192-A4	5	30	16	20	22	L	40	R
8	(25 x 19)	----	1	4	4	8	5	H	51	R
19	53-A4	2211-B1	5	14	12	12	13	L	47	R
29	Va. Gold	(Check)	-	40	36	36	37	S	48	R

Table 8, Continued. Black shank and black root rot resistance data in indexing test 1 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing					Black Root Rot	
				Scores/Rep.			Ave. Score	B.S. Rating ^{a/}	Wt./Rep. Grams	Res. Level ^{b/}
				A	B	C				
9	----	128-A3 x (Bel. 59-1 x Hicks)	1	24	8	14	15	L	30	R-
20	128-A3	2252-E1	5	16	0	18	11	M	17	S
27	Vesta 5	(Check)	-	12	0	16	9	M	17	S
10	----	(P.D. 121 x 86-B2)	1	14	0	8	7	M	23	R-
21	86-B2	192-A4	5	0	0	20	7	M	38	R
29	N.C. 95	(Check)	-	4	0	8	4	H	19	S
11	----	(P.D. 121 x 59-C3)	1	0	4	0	1	H	19	S
22	59-C3	2252-B1	5	0	0	8	3	H	30	R-
23	54-B2	2218-B2	5	0	8	8	5	H	43	R
28	Va. Gold	(Check)	-	34	36	40	37	S	38	R
29	N.C. 95	(Check)	-	0	4	8	4	H	10	S

^{a/} Estimated on basis of check varieties; H = High; M = Moderate; L = Low; S = Susceptible.

^{b/} Root rot resistance level based on resistance level of Va. Gold (resistance check) and Vesta 5 and N.C. 95 (susceptible checks); R = Resistant; R- = Moderate or Segregating; S = Susceptible.

Table 9. Black shank and black root rot resistance data on indexing test 2 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing					Black Root Rot	
				Scores/Rep.			Ave. Score	B.S. Rating	Wt./Rep. Grams	Res. Level
				A	B	C				
30	----	Va. 187 x M.S. Hicks	1	0	4	10	5	H	24	S
34	----	M.S. Hicks	-	22	32	40	31	S	20	S
56	----	N.C. 95	-	0	6	4	3	H	45	S
31	----	(2218-B2 x M.S. Hicks) x 2218-B2	1	20	0	4	8	M	54	R-
36	----	2218-B2 x M.S. Hicks	1	4	26	20	17	M	47	S
38	54-D3	2218-B2	5	0	0	6	2	H	63	R
32	----	2218-B2 x M.S. 187	1	28	0	20	16	M	43	S
40	54-B3	2218-B2	5	24	0	38	21	M	62	R
55	----	Va. Gold	-	40	40	40	40	S	82	R
33	----	128B x M.S. Hicks	1	40	28	0	33	S	10	S
42	128-C1	2252-B1	5	0	20	0	7	M	21	S
53	129-C2	2252-B	5	0	16	0	5	H	12	S
35		129-A1 x M.S. Hicks	1	40	40	10	30	S	11	S
45	129-A1	2252-B	5	32	38	0	23	M	23	S
46	129-A2	2252-B	5	10	38	0	16	M	18	S
37	149-A6	(Fla. 22 x Va. 187)	4	40	0	0	13	M	45	S
39	55-2 BB	2192-B5	6	38	0	0	13	M	75	R
54		Vesta 5	-	40	0	20	20	M	7	S
43	128-C3	2252-B1	5	30	0	32	21	M	16	S
44	128-C4	2252-B1	5	10	0	28	13	M	23	S
46	129-A2	2252-B	5	20	0	20	13	M	19	S
47	129-A3	2252-B	5	0	0	20	7	M	31	S
48	129-B1	2252-B	5	0	4	0	1	H	27	S
49	129-B2	2252-B	5	0	8	14	7	M	19	S
50	129-B4	2252-B	5	4	0	10	5	H	24	S
51	129-C1	2252-B	5	8	0	4	4	H	24	S
52	129-C2	2252-B	5	4	0	26	10	M	20	S

Table 10. Black shank, black root rot, root knot, and TMV resistance data on indexing test 3 entries - Fall 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank		Black Root Rot		Root Knot Reading	TMV Reading
				Ave. Rep. Score	Index Rating	Wt./Rep. Grams	Res. Level		
57	70-B1	Va. 1104 Selection	8	11	M	13	R-	-	-
58	70-B2	Va. 1104 Selection	8	13	M	12	R-	-	-
59	70-B3	Va. 1104 Selection	8	10	M	12	R-	-	-
60	70-B4	Va. 1104 Selection	8	19	L	22	R	-	-
61	70-B5	Va. 1104 Selection	8	10	M	17	R	-	-
62	69-A1	Va. 1104 Selection	8	11	M	22	R	-	-
63	69-A3	Va. 1104 Selection	8	6	M	15	R-	-	-
64	69-A4	Va. 1104 Selection	8	4	H	17	R	-	-
65	69-B1	Va. 1104 Selection	8	9	M	21	R-	-	-
66	69-B2	Va. 1104 Selection	8	11	M	20	R	-	-
67	98-B1	Tr. 3	5	2	H	20	R	S	-
68	98-B2	Tr. 3	5	2	H	25	R	S	-
69	98-B3	Tr. 3	5	12	M	19	R	R-	-
70	98-B4	Tr. 3	5	3	H	21	R	S	-
71	98-B5	Tr. 3	5	7	M	29	R	S	-
72	142-A1	Tr. 3G	5	2	H	13	R-	S	-
73	142-A2	Tr. 3G	5	7	M	15	R-	S	-
74	142-A3	Tr. 3G	5	13	M	19	R	S	-
75	156-A1	2148-A1	7	5	H	21	R	-	-
76	156-A2	2148-A1	7	10	M	20	R	-	-
77	156-A3	2148-A1	7	5	H	17	R	-	-
78	156-A4	2148-A1	7	9	M	16	R-	-	-
79	156-A5	2148-A1	7	10	M	19	R	-	-
80	157-A2	Bel. 59-1	8	9	M	22	R	-	-
81	81-A2	2176-1	7	11	M	16	R	-	-
82	81-A2	2176-1	7	13	M	21	R	-	NN
83	81-A3	2176-1	7	0	H	19	R	-	NN
84	82-A2	2176-2	7	6	M	16	R-	-	NN
85	86-C1	2192-A4	5	17	L	21	R	-	NN
86	86-C1-CM	2192-A4	5	7	M	30	R	-	NN

Table 10, Continued. Black shank, black root rot, root knot, and TMV resistance data on indexing test 3 entries - Fall 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank		Black Root Rot		Root Knot Reading	TMV Reading
				Ave. Rep. Score	Index Rating	Wt./Rep. Grams	Res. Level		
87	86-C2	2192-A4	5	19	L	22	R	-	NN
88	86-B1	2192-A4	5	13	M	21	R	-	NN
89	94-A3	2192-A5	5	10	M	17	R-	-	Nn
90	94-B2	2192-A5	5	7	M	17	R-	-	Nn
91	94-B3	2192-A5	5	10	M	20	R	-	Nn
92	94-B3	2192-A5	5	20	S	17	R	-	Nn
93	94-B4	2192-A5	5	22	S	17	R-	-	Nn
94	55-1 (+)	2192-B5	6	20	S	20	R	-	NN
95	55-3	2192-B5	6	11	M	21	R	-	NN
96	55-4	2192-B5	6	14	L	25	R	-	NN
97	55-5	2192-B5	6	11	M	23	R	-	NN
98	55-6	2192-B5	6	13	M	20	R	-	NN
99	160-A1	2207-1	5	11	M	34	R	-	NN
100	160-A3	2207-1	5	4	H	22	R-	-	NN
101	160-A4	2207-1	5	6	M	22	R-	-	Nn
102	160-B1	2207-1	5	13	M	22	R-	-	Nn
103	160-B3	2207-1	5	6	M	18	R-	-	Nn
104	162-A4	2207-3	5	20	S	12	R-	-	NN
105	162-A6	2207-3	5	23	S	17	R-	-	Nn
106	162-A7	2207-3	5	29	S	15	R-	-	Nn
107	162-C1	2207-3	5	23	S	25	R-	-	Nn
108	162-C2	2207-3	5	29	S	17	R-	-	Nn
109	51-1	2207-1	6	10	M	20	R	-	NN
110	57-2	2207-1	6	25	S	21	R	-	NN
111	51-3	2207-1	6	15	L	22	R	-	NN
112	51-4	2207-1	6	17	L	19	R	-	NN
113	51-5	2207-1	6	19	L	26	R	-	NN
114	6-1	2178-AX	7	5	H	26	R	-	NN
115	6-2	2178-AX	7	3	H	11	R-	-	NN
116	40-G2	(Fla. 22 x 724)	4	7	M	20	R	R-	-

Table 10, Continued. Black shank, black root rot, root knot, and TMV resistance data on indexing test 3 entries - Fall 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank		Black Root Rot		Root Knot Reading	TMV Reading
				Ave. Rep. Score	Index Rating	Wt./Rep. Grams	Res. Level		
117	40-G3	(Fla. 22 x 724)	4	22	S	11	R-	S	-
118	40-G11	(Fla. 22 x 724)	4	9	M	16	R	S	-
119	36-4	(Va. 187 x Va. 21)	4	9	M	17	R	-	-
120	36-2	(Va. 187 x Va. 21)	4	11	M	23	R	-	-
121	37-1	(Va. 187 x Va. Gold)	4	7	M	15	R-	-	-
122	37-3	(Va. 187 x Va. Gold)	4	7	M	24	R	-	-
123	42-1	'62 G.H. Cross #17	4	3	H	20	R	-	-
124	42-2	'62 G.H. Cross #17	4	4	H	19	R-	-	-
125	26-2	(Va. 187 x Va. Gold)	4	4	H	21	R	-	-
126	Check	Va. Gold	-	28	S	19	R	-	-
127	Check	Vesta 5	-	8	M	3	S	-	-
128	Check	N.C. 95	-	5	H	4	S	-	-

(+) Hyphened lines (as 55-1) seed harvested at Betterton's.

Table 11. Black shank, black root rot, and root knot resistance data on indexing test 4 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Black Root Rot		Root Knot Reading		
				Scores/Rep.			Ave. Score	B.S. Rating		Wt./Rep. Grams	Res. Level
129	49-111-1	Va. 187	10	16	36	34	29	L	9	S	-
130	49-111-2	Va. 187	10	8	8	8	8	H	10	S	-
131	51-115-1	Va. 187	10	6	24	8	13	H	11	S	-
132	51-115-2	Va. 187	10	6	14	28	16	H	9	S	-
133	69-B3	Va. 1104	8	24	6	30	20	M	21	R-	-
134	69-C1	Va. 1104	8	16	0	32	16	H	32	R	-
135	69-C4	Va. 1104	8	22	8	22	17	M	26	R	-
136	69-C5	Va. 1104	8	24	22	30	25	M	22	R-	-
137	69-C6	Va. 1104	8	8	0	32	13	H	28	R-	-
138	69-C7	Va. 1104	8	34	26	36	32	S	18	S	-
139	70-B6	Va. 1104	8	22	22	34	26	L	33	R	-
140	70-B7	Va. 1104	8	8	16	34	19	M	34	R-	-
141	70-C1	Va. 1104	8	8	36	30	25	M	24	R-	-
142	70-C2	Va. 1104	8	10	24	30	21	M	27	R-	-
143	70-B1	Va. 1104	8	14	32	10	19	M	29	R	-
144	70-B2	Va. 1104	8	16	16	16	16	H	35	R	-
145	70-C1-CM	Va. 1104	8	26	20	0	15	H	37	R	-
146	70-C2-CM	Va. 1104	8	10	32	28	23	M	25	R-	-
147	70-C3	Va. 1104	8	0	22	0	7	H	33	R-	-
148	70-B3	Va. 1104	8	8	34	0	14	H	29	R	-
149	36-3	Va. 187 x Va. 21	4	24	0	0	8	H	38	R-	-
150	36-4	Va. 187 x Va. 21	4	12	38	28	26	L	29	R-	-
151	37-4	Va. 187 x Va. Gold	4	18	40	34	31	S	36	R-	-
152	37-5	Va. 187 x Va. Gold	4	16	26	8	17	M	37	R-	-
153	42-3	'62 G.H. Cross #15	4	22	36	38	32	S	32	R-	-
154	42-4	'62 G.H. Cross #15	4	22	32	26	27	L	27	R-	-
155	42-5	'62 G.H. Cross #15	4	8	8	8	8	H	54	R	-
156	42-6	'62 G.H. Cross #15	4	24	34	30	33	S	37	R	-
157	43-1	'62 G.H. Cross #15	4	30	32	26	29	L	26	R-	-
158	43-2	'62 G.H. Cross #15	4	26	34	24	28	L	49	R	-

Table 11, Continued. Black shank, black root rot, and root knot resistance data on indexing test 4 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Black Root Rot		Root Knot Reading		
				Scores/Rep.			Ave. Score	B.S. Rating		Wt./Rep. Grams	Res. Level
159	43-3	'62 G.H. Cross #15	4	38	34	30	34	S	58	R	-
160	43-4	'62 G.H. Cross #15	4	38	28	34	33	S	60	R	-
161	26-3	'62 G.H. Cross #7	4	18	14	28	20	M	26	R-	-
162	26-5	'62 G.H. Cross #7	4	26	14	18	19	M	33	R-	-
163	26-6	'62 G.H. Cross #7	4	24	10	14	16	H	33	R-	-
164	121-A1	2211-B1	5	30	24	18	24	M	39	R	R
165	121-A2	2211-B1	5	26	18	10	18	M	25	R-	R
166	121-A4	2211-B1	5	36	8	24	23	M	32	R	R
167	121-B1	2211-B1	5	36	10	10	19	M	35	R	R
168	121-C1	2211-B1	5	30	26	36	31	S	41	R	R
169	121-C3	2211-B1	5	24	8	24	19	M	34	R-	R
170	121-C7	2211-B1	5	16	10	0	9	H	37	R	R
171	121-B1-CM	2211-B1	5	16	26	18	20	M	36	R-	R
172	121-B2-CM	2211-B1	5	24	16	10	17	M	27	R-	R
173	121-B3-CM	2211-B1	5	14	26	26	22	M	31	R-	R
174	121-C1-CM	2211-B1	5	18	20	28	22	M	35	R-	R
175	121-C2-CM	2211-B1	5	32	26	10	23	M	33	R	R
176	121-C3-CM	2211-B1	5	10	20	8	13	H	44	R-	R
177	27-1	'62 G.H. Cross #16	5	36	36	18	30	L	10	S	-
178	27-2	'62 G.H. Cross #16	5	28	38	22	29	L	6	S	-
179	27-3	'62 G.H. Cross #16	4	24	38	6	23	M	7	S	-
180	27-4	'62 G.H. Cross #16	4	38	26	34	33	S	7	S	-
181	27-5	'62 G.H. Cross #16	4	32	36	36	34	S	19	S	-
182	35-1	'62 G.H. Cross #16	4	0	0	26	9	H	17	R-	-
183	35-2	'62 G.H. Cross #16	4	0	8	16	8	H	39	R-	S
184	35-3	'62 G.H. Cross #16	4	26	26	18	23	M	42	R	R-
185	35-4	'62 G.H. Cross #16	4	32	20	26	26	L	10	S	R
186	35-5	'62 G.H. Cross #16	4	24	0	8	11	H	14	S	S
187	35-6	'62 G.H. Cross #16	4	26	0	18	15	H	39	R-	S
188	142-C1	Tr. 3G	5	0	18	36	18	M	38	R-	-

Table 11, Continued. Black shank, black root rot, and root knot resistance data on indexing test 4 entries -
Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot		Root Knot Reading
				Scores/Rep.					Wt./Rep. Grams	Res. Level	
				A	B	C					
189	142-C2	Tr. 3G	5	0	8	10	6	H	21	R-	-
190	149-A1	'61 G.H. Cross #9	4	24	0	26	17	M	9	S	R-
191	149-A2	'61 G.H. Cross #9	4	16	18	36	23	M	11	S	R
192	149-A3	'61 G.H. Cross #9	4	28	14	26	23	M	14	S	R
193	149-A4	'61 G.H. Cross #9	4	18	12	24	15	H	11	S	R
194	149-A5	'61 G.H. Cross #9	4	0	16	32	16	H	15	S	R
195	149-A6	'61 G.H. Cross #9	4	8	8	26	14	H	16	S	-
196	160-B4	2207-1	5	18	0	4	7	H	29	R-	-
197	160-B5	2207-1	5	24	8	14	15	H	45	R	-
198	160-B7	2207-1	5	16	32	30	26	L	33	R-	-
199	160-C1	2207-1	5	14	4	0	6	H	46	R	-
200	160-C2	2207-1	5	10	24	28	21	M	41	R	-
201	160-C3	2207-1	5	12	4	14	42	S	41	R	-
202	Vesta 5	Check	-	14	12	22	16	H	5	S	-
203	Va. Gold	Check	-	38	36	36	27	S	49	R	S
204	N.C. 95	Check	-	18	24	30	24	M	5	S	R
---	----	Beinhart 100-1	-	0	4	0	1	H	4	S	-
J.C. 7	----	Va. Gold x T.I. 245	4	24	20	6	17	M	11	S	-
J.C. 8	----	Va. Gold x T.I. 245	4	18	8	0	9	H	9	R-	-
---	---	(Bel. 59-1 x N.C. 95) x N.C. 95	1	0	18	8	9	H	27	R-	-

Table 12. Black shank, black root rot, root knot, and TMV resistance data on indexing test 5 entries - Fall, 1963.

Seed Lot No.	Plot Selection No.	Entry Line Variety	(F) Generation	Black Shank Indexing					Black Root Rot Reading	Root Knot Reading	TMV Reading
				Scores/Rep.			Ave. Score	B.S. Rating			
				A	B	C					
205	157-A3	Bel. 59-1	8	34	24	28	29	L	R	-	-
206	158-A1	Kutsuga	-	--	--	--	--	-	S	-	-
207	158-A2	Kutsuga	-	--	--	--	--	-	S	-	-
208	158-A3	Kutsuga	-	--	--	--	--	-	S	-	-
209	36-5	(Va. 187 x Va. 21)	4	22	8	20	17	H	R-	-	-
210	36-6	(Va. 187 x Va. 21)	4	22	8	14	15	H	R-	-	-
211	43-6	Va. Gold x (H. Hicks x Va. 187)	4	6	30	24	20	M	R-	-	-
212	43	Va. Gold x (H. Hicks x Va. 187)	4	0	12	22	8	H	R-	-	-
213	81-A4	2176-1	7	0	0	0	0	H	R-	-	NN
214	81-A5-1	2176-1	7	16	34	14	21	M	R-	-	NN
215	81-A5-2	2176-1	7	0	30	0	10	H	R-	-	NN
216	81-A6	2176-1	7	0	22	12	11	H	R-	-	NN
217	81-A7	2176-1	7	18	14	22	18	H	R-	-	NN
218	82-A3	2176-2	7	6	10	32	16	H	R-	-	NN
219	82-A4	2176-2	7	12	18	16	15	H	R-	-	Nn
220	82-A5	2176-2	7	8	32	16	19	M	R-	-	NN
221	82-B1	2176-2	7	18	34	8	20	M	S	-	NN
222	82-B2	2176-2	7	18	28	10	19	M	R-	-	NN
223	94-B1	2192-A5	5	6	22	26	18	H	R	-	NN
224	94-B2	2192-A5	5	12	34	34	27	S	R	-	Nn
225	94-B3	2192-A5	5	8	24	28	20	M	R-	-	Nn
226	94-C2	2192-A5	5	--	--	--	--	-	R-	-	Nn
227	94-C3	2192-A5	5	--	--	--	--	-	R-	-	NN
228	94-C1	2192-A5	5	--	--	--	--	-	R-	-	NN
229	55-7	(MR 3 x Vesta 5)	6	30	22	20	24	L	R	-	NN

Table 12, Continued. Black shank, black root rot, root knot, and TMV resistance data on indexing test 5 entries - Fall, 1963.

Seed Lot No.	Plot Selection No.	Entry Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot Reading	Root Knot Reading	TMV Reading
				Scores/Rep. A	B	C					
230	55-8	2192-B5	6	26	14	22	21	M	R	-	NN
231	55-9	2192-B5	6	30	6	0	12	H	R-	-	NN
232	55-10	2192-B5	6	6	22	18	15	H	R-	-	NN
233	55-11	2192-B5	6	8	28	12	16	H	R	-	NN
234	51-6	2207-1C	6	0	24	6	10	H	R-	-	NN
235	51-7	2207-1C	6	14	32	26	24	L	R	-	NN
236	51-8	2207-1C	6	18	18	16	17	H	R	-	NN
237	51-9	2207-1C	6	18	14	34	22	M	R-	-	NN
238	6-3	MR 3	7	16	30	16	21	M	S	-	NN
239	6-4	MR 3	7	16	30	14	20	M	S	-	Nn
240	6-5	MR 3	7	0	18	18	12	H	S	-	NN
241	148-A2	'61 G.H. Cross #9	4	26	6	38	23	L	-	R	-
242	148-A3	'61 G.H. Cross #9	4	16	16	34	22	M	-	R	-
243	148-A4	'61 G.H. Cross #9	4	26	18	34	26	S	-	R	-
244	148-A5	'61 G.H. Cross #9	4	8	30	34	24	L	-	R	-
245	148-A6	'61 G.H. Cross #9	4	12	16	34	21	L	-	R	-
246	149-B1	'61 G.H. Cross #9	4	16	14	34	21	L	-	R	-
247	149-B1-CM	'61 G.H. Cross #9	4	10	34	34	26	S	-	R	-
248	149-B2	'61 G.H. Cross #9	4	8	30	30	23	L	-	R	-
249	149-B3-CM	'61 G.H. Cross #9	4	18	20	32	23	L	-	R	-
250	149-B3	'61 G.H. Cross #9	4	0	14	6	7	H	-	R	-
251	149-B4	'61 G.H. Cross #9	4	0	34	6	13	H	-	R	-
252	149-B2-CM	'61 G.H. Cross #9	4	0	14	14	9	H	-	R	-
253	45-2	----	5	24	32	26	31	S	-	S	-
254	45-3	----	5	8	22	16	15	H	-	S	-
255	45-4	----	5	10	10	22	14	H	-	S	-
256	45-5	----	5	18	24	36	26	S	-	S	-
257	46-3	----	5	16	8	40	21	M	-	S	-
258	46-5	----	5	18	18	22	19	M	-	S	-
259	46-7	----	5	34	28	32	31	S	-	S	-

Table 12, Continued. Black shank, black root rot, root knot, and TMV resistance data on indexing test 5 entries - Fall, 1963.

Seed Lot No.	Plot Selection No.	Entry Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot Reading	Root Knot Reading	TMV Reading
				Scores/Rep. A	B	C					
260	47-1	----	5	24	8	28	20	M	-	S	-
261	47-2	----	5	24	28	36	29	S	-	S	-
262	47-3	----	5	28	24	32	28	S	-	S	-
263	47-4	----	5	14	14	26	18	M	-	S	-
264	47-5	----	5	32	0	14	15	H	-	S	-
265	129-A1	2252-B	5	36	22	30	29	S	-	-	-
266	129-A2	2252-B	5	30	14	34	26	S	-	-	-
267	129-A3	2252-B	5	34	16	34	28	S	-	-	-
268	129-B1	2252-B	5	0	34	32	22	M	-	-	-
269	129-B	2252-B	5	0	36	22	19	M	-	-	-
270	136-B1	2252-2	5	0	16	22	13	H	-	-	-
271	136-B2	2252-2	5	16	22	34	24	L	-	-	-
272	136-B3	2252-2	5	22	22	36	27	S	-	-	-
273	136-C1	2252-2	5	24	22	34	21	M	-	-	-
274	136-C2	2252-2	5	24	12	6	14	H	-	-	-
275	136-C3	2252-2	5	14	20	14	16	H	-	-	-
276	49-111-3	Va. 187 Selection	-	14	14	22	17	H	-	-	-
277	49-111-4	Va. 187 Selection	-	6	30	38	25	L	-	-	-
278	51-115-3	Va. 187 Selection	-	28	28	26	27	S	-	-	-
279	51-115-4	Va. 187 Selection	-	14	26	22	21	M	-	-	-
280	Check	Vesta 5	-	30	24	6	20	M	S	-	-
281	Check	Va. Gold	-	38	26	26	30	S	R	S	-
282	Check	N.C. 95	-	32	6	14	17	H	S	S	-

Table 13. Black shank indexing scores on test 6 - Va. 187 lines.

Line	Number of Plants Diseased															Final % Diseased	Ave. 3 Rep. Score
	Dates Read Rep. A				Score Rep. A	Dates Read Rep. B				Score Rep. B	Dates Read Rep. C				Score Rep. C		
	1/2	1/3	1/4	1/5		1/2	1/3	1/4	1/5		1/2	1/3	1/4	1/5			
51-3	1	3	3	4	20	-	-	1	3	14	1	1	2	3	20	83	18
51-4	-	1	1	1	8	1	1	1	1	10	-	1	1	1	8	25	9
51-5	-	-	-	3	12	-	1	2	2	14	-	-	1	1	6	50	11
51-6	-	2	3	4	26	-	1	1	1	8	-	1	1	3	16	67	17
51-7	-	2	3	3	22	-	1	2	3	18	-	3	3	3	24	75	21
51-8	-	1	2	2	14	-	-	-	-	0	-	-	1	3	14	42	9
51-9	1	2	4	4	30	-	1	2	3	18	-	-	3	3	18	83	22
51-10	-	2	2	3	20	1	1	3	3	22	-	-	1	3	14	75	19
51-11	-	1	1	2	12	-	1	1	3	16	-	-	1	2	10	58	13
51-12	1	2	4	4	30	1	1	3	3	22	1	1	2	2	16	75	23
51-13	-	1	1	1	8	-	1	2	3	18	-	-	-	1	4	42	10
51-14	-	-	1	1	6	-	-	-	2	8	-	2	2	3	20	50	11
51-15	-	2	2	2	16	-	1	3	4	24	-	-	-	-	0	50	13
51-16	-	3	3	3	24	1	1	1	1	10	-	-	1	2	10	50	15
51-17	-	1	1	2	12	-	-	1	2	10	-	-	2	2	12	50	11
51-18	-	-	1	1	6	-	-	3	3	18	-	1	2	3	18	58	14
51-19	-	1	2	3	18	-	-	1	2	10	-	-	2	3	16	67	15
51-20	1	3	3	3	26	-	-	-	2	8	-	1	1	1	8	50	14
51-21	-	-	3	4	22	-	-	4	4	24	-	1	1	2	12	83	19
51-22	-	1	2	4	22	-	-	2	3	16	-	1	1	1	8	67	15
51-23	-	1	1	3	16	-	-	-	1	4	-	-	1	1	6	42	9
51-24	-	1	2	3	18	-	1	2	2	14	-	3	3	3	24	67	19
51-25	-	1	3	3	20	-	2	2	3	20	-	-	1	1	6	58	15
51-26	-	-	-	2	8	-	1	1	2	12	-	2	2	2	16	50	12
51-27	-	-	-	1	4	-	2	3	3	22	-	-	-	-	0	33	9
51-28	-	-	2	2	12	-	-	2	4	20	-	1	1	3	16	75	16
51-29	1	1	2	2	16	-	-	2	3	16	-	-	1	3	14	67	14
51-30	1	3	3	4	30	-	2	2	2	16	-	1	1	2	12	67	19
51-31	-	-	1	2	10	-	1	2	2	14	-	1	1	1	8	42	11
51-32	-	1	1	1	8	-	-	-	-	0	2	2	3	3	26	33	11

Table 13, Continued. Black shank indexing scores on test 6 - Va. 187 lines.

Line	Number of Plants Diseased															Final % Diseased	Ave. 3 Rep. Score
	Dates Read				Score	Dates Read				Score	Dates Read				Score		
	Rep. A					Rep. B					Rep. C						
1/2	1/3	1/4	1/5	1/2	1/3	1/4	1/5	1/2	1/3	1/4	1/5	1/2	1/3	1/4	1/5		
51-33	-	-	1	1	6	-	1	1	2	12	-	-	-	-	0	25	6
51-34	-	-	-	2	8	-	-	1	3	14	-	-	1	1	6	50	9
51-35	-	-	-	1	4	-	-	1	2	10	1	1	2	2	16	42	16
51-36	-	1	2	4	22	-	-	-	1	4	-	-	3	3	18	67	15
51-37	-	-	-	2	8	-	-	1	1	6	1	1	2	3	20	50	11
51-38	-	-	-	-	0	-	-	1	1	6	1	3	3	4	30	42	12
51-39	-	1	4	4	26	1	3	3	3	26	-	1	1	2	12	75	21
51-40	-	-	1	1	6	1	2	3	4	28	-	-	-	2	8	58	14
51-41	-	-	2	3	16	1	2	2	2	18	-	1	3	3	20	50	18
51-42	3	3	3	4	34	3	3	3	3	30	-	-	1	1	6	67	23
51-43	1	3	4	4	32	1	2	3	4	30	-	1	2	2	14	83	25
51-44	1	1	4	4	28	1	3	3	4	30	-	1	1	2	12	83	23
51-45	-	2	4	4	28	1	1	1	1	10	-	-	-	-	0	42	13
51-46	1	2	3	3	24	-	1	1	1	8	-	-	-	1	4	42	12
51-47	1	2	3	3	24	-	-	1	3	14	-	1	2	2	14	67	17
51-48	-	1	3	3	20	-	-	1	1	6	-	-	1	3	14	58	13
51-49	-	-	2	2	12	-	-	-	1	4	-	2	3	4	26	58	14
51-50	-	-	2	2	12	1	1	2	3	20	-	1	4	4	26	75	19
51-51	2	2	4	4	32	-	1	1	2	12	1	1	1	3	18	75	21
51-52	-	-	2	2	12	-	1	1	1	10	-	1	2	3	18	50	13
51-53	-	1	2	2	14	-	-	-	-	0	1	3	3	3	26	42	13
51-54	-	1	2	3	18	-	2	3	4	26	-	-	1	2	10	75	18
51-55	1	1	2	3	20	-	-	-	3	12	-	-	1	2	10	67	14
51-56	-	-	1	1	6	-	1	1	3	16	-	-	1	2	10	50	11
115-A8	-	2	3	4	26	-	-	1	2	10	-	1	2	3	18	75	18
3-115-A8	1	2	2	3	22	-	-	-	-	0	-	1	1	3	16	50	13
49-3	1	1	2	2	16	-	-	1	1	6	1	3	3	3	26	50	16
Va. Gold	4	4	4	4	40	-	-	3	4	22	1	3	3	4	32	100	31
Vesta 5	2	2	3	4	30	-	-	1	2	10	1	4	4	4	34	83	25
N.C. 95	2	2	3	4	30	-	1	1	1	8	-	-	-	-	0	42	13

Table 13, Continued. Black shank indexing scores on test 6 - Va. 187 lines.

Line	Number of Plants Diseased															Final % Diseased	Ave. 3 Rep. Score
	Dates Read				Score Rep. A	Dates Read				Score Rep. B	Dates Read				Score Rep. C		
	Rep. A					Rep. B					Rep. C						
1/2	1/3	1/4	1/5	1/2	1/3	1/4	1/5	1/2	1/3	1/4	1/5	1/2	1/3	1/4	1/5		
49-4	-	1	2	2	16	-	1	1	3	16	-	-	1	4	14	75	15
49-5	-	2	2	2	16	1	1	1	2	14	1	3	3	4	30	67	20
49-6	-	-	-	-	0	-	1	3	3	20	1	2	3	3	24	50	15
49-7	1	1	2	3	20	-	2	3	3	22	-	3	3	3	24	75	23
49-8	-	1	2	2	14	1	2	3	4	28	-	2	3	3	22	75	21
49-9	-	2	2	2	16	-	-	-	2	8	-	2	4	4	28	67	17
49-10	1	1	1	1	10	-	-	1	2	10	-	1	3	4	24	58	15
49-11	-	-	-	-	0	1	1	1	1	10	-	1	3	3	20	33	10
49-12	-	-	-	1	4	-	-	2	2	12	-	-	2	2	12	42	9
49-13	-	2	2	3	20	-	-	1	1	8	-	1	2	3	18	58	15
49-14	1	2	4	4	30	-	-	-	1	4	-	-	2	2	12	58	15
49-15	1	2	3	4	28	-	-	-	1	4	-	-	2	3	16	67	16

Plants set - 12-16-63.

Plants inoculated - 12-28-63.

Table 14. Black shank, black root rot, and root knot resistance data on indexing test 7 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot	Root Knot
				Scores/Rep.					Resistance Level	Reading
				A	B	C				
283	118-B2	2163	6	14	30	14	19	M	R	R-
284	118-B3	2163	6	14	24	4	14	H	R	R
285	118-B4	2163	6	4	22	14	13	H	R-	R
286	118-B5	2163	6	6	20	16	14	H	R	R
287	118-B6	2163	6	12	14	18	15	H	R	R-
288	118-B7	2163	6	6	8	8	7	H	R	R
289	118-B8	2163	6	16	28	28	24	M	R	R-
290	118-C1	2163	6	18	32	14	21	M	R	R
291	118-C2	2163	6	4	8	4	5	H	R	R
292	----	2163 Composite	6	20	8	4	11	H	-	-
293	48-1	(Fla. 22 x Va. 187)	5	14	24	20	19	M	-	R
294	48-2	(Fla. 22 x Va. 187)	5	6	10	8	8	H	-	R
295	48-3	(Fla. 22 x Va. 187)	5	10	6	6	7	H	-	R
296	Check	C. 139	-	16	24	12	17	H	-	-
297	59-B2	2252-B1	5	8	4	22	11	H	-	-
298	59-B3	2252-B1	5	32	28	28	29	L	-	-
299	59-B4	2252-B1	5	28	16	22	22	M	-	-
300	59-C1	2252-B1	5	28	22	18	23	M	-	-
301	59-C2	2252-B1	5	26	16	14	19	M	-	-
302	59-C4	2252-B1	5	8	18	28	18	H	-	-
303	51-115-5	Va. 187	10	24	10	4	13	H	-	-
304	79-1	2252-B1	6	30	22	10	21	M	-	-
305	79-3	2252-B1	6	36	26	24	29	L	-	-
306	79-4	2252-B1	6	16	16	26	19	M	-	-
307	79-6	2252-B1	6	26	22	0	16	H	-	-
308	79-7	2252-B1	6	28	24	4	19	M	-	-
309	79-8	2252-B1	6	12	12	12	12	H	-	-
310	79-9	2252-B1	6	26	20	8	18	H	-	-
311	79-10	2252-B1	6	12	18	8	13	H	-	-
312	79-11	2252-B1	6	14	0	12	9	H	-	-

Table 14, Continued. Black shank, black root rot, and root knot resistance data on indexing test 7 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot	Root Knot Reading
				Scores/Rep.					Resistance Level	
				A	B	C				
313	58-2	2252-B1	6	26	12	8	15	H	-	-
314	58-1	2252-B1	6	12	16	22	17	H	-	-
315	58-3	2252-B1	6	18	16	4	13	H	-	-
316	58-4	2252-B1	6	28	26	16	23	M	-	-
317	58-5	2252-B1	6	22	22	22	22	M	-	-
318	58-6	2252-B1	6	28	14	18	20	M	-	-
319	58-7	2252-B1	6	12	18	8	13	H	-	-
320	58-8	2252-B1	6	28	18	20	22	M	-	-
321	58-9	2252-B1	6	16	26	8	17	H	-	-
322	58-10	2252-B1	6	34	20	30	28	M	-	-
323	58-11	2252-B1	6	32	20	20	24	M	-	-
324	58-13	2252-B1	6	24	18	20	21	M	-	-
356	Check	Vesta 5	-	38	16	28	27	M	-	-
357	Check	Va. Gold	-	38	30	34	34	S	-	-
358	Check	N.C. 95	-	26	6	20	17	H	-	-
325	79-14	2252-B1	6	24	10	30	21	M	-	-
326	133-A1	2252	5	30	18	30	26	M	-	-
327	133-A2	2252	5	16	0	18	11	H	-	-
328	133-A3	2252	5	28	8	22	16	H	-	-
329	133-B1	2252	5	20	10	20	17	H	-	-
330	133-B2	2252-A3	5	20	4	22	15	H	-	-
331	133-B3	2252-A3	5	14	8	22	15	H	-	-
332	133-C1	2252-A3	5	4	18	14	12	H	-	-
333	133-C2	2252-A3	5	22	8	20	17	H	-	-
334	133-C3	2252-A3	5	28	14	12	18	H	-	-
335	144-C4	2252-A3	5	14	14	14	14	H	-	-
336	128-A1	2252-B1	5	26	20	12	19	M	-	-
337	128-A3	2252-B1	5	10	22	12	15	H	-	-
338	128-C1	2252-B1	5	4	24	10	13	H	-	-
339	128-C3	2252-B1	5	16	16	24	19	M	-	-

Table 14, Continued. Black shank, black root rot, and root knot resistance data on indexing test 7 entries -
Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot	Root Knot Reading
				Scores/Rep.					Resistance Level	
				A	B	C				
340	128-C4	2252-B1	5	20	26	32	26	M	-	-
341	128-B1-CM	2252-B1	5	4	24	26	18	H	-	-
342	128-B2-CM	2252-B1	5	0	22	30	17	H	-	-
343	128-B3-CM	2252-B1	5	4	22	26	17	H	-	-
344	153-B1	C. 319	-	4	32	16	17	H	-	-
347	129-B1	2252-B	5	10	16	20	15	H	-	-
348	129-B2	2252-B	5	12	22	12	15	H	-	-
349	129-B3	2252-B	5	12	34	14	20	M	-	-
350	55-2	2192-B5	6	12	24	20	19	M	-	-
351	143-A1	Va. 724 Selection	-	32	16	24	24	M	-	-
352	143-A2	Va. 724 Selection	-	20	10	26	19	M	-	-
353	79-C1	Va. 724 - '58	-	0	10	26	12	H	-	-

Table 15. Black shank, black root rot, root knot, and tobacco mosaic resistance data on indexing test 8 entries - Fall, 1963.

Seed Lot No.	Plot Selection No.	Entry Line Variety	(F) Generation	Black Shank Indexing			Ave. B.S. Score	B.S. Rating	Black Root Rot		TMV Reading
				Scores/Rep.					Resistance Level	Root Knot Reading	
				A	B	C					
359	1-2	F2-1	3	30	26	6	21	M	R	S	Nn
360	1-4	F2-1	3	26	20	34	27	S	R	S	Nn
361	1-5	F2-1	3	18	18	14	17	M	R	R-	NN
362	1-6	F2-1	3	14	6	20	13	M	R	S	Nn
363	1-7	F2-1	3	0	20	18	13	M	R	R-	NN
364	1-8	F2-1	3	14	4	20	13	M	R-	S	NN
365	1-9	F2-1	3	20	12	34	22	M	R	R-	NN
366	1-12	F2-1	3	18	6	32	19	M	R-	R-	Nn
367	1-13	F2-1	3	14	0	20	11	H	R-	R-	Nn
368	1-16	F2-1	3	20	0	24	15	M	R	R-	Nn
369	1-18	F2-1	3	4	10	22	12	M	R	R-	Nn
370	1-19	F2-1	3	0	6	32	13	M	R	R-	Nn
374	2-3	F2-2	3	12	0	10	7	H	R	R-	NN
375	2-5	F2-2	3	6	0	10	5	H	R	S	Nn
376	2-7	F2-2	3	0	4	24	9	H	R	R-	NN
377	2-8	F2-2	3	0	0	6	6	H	R	R-	Nn
378	2-9	F2-2	3	0	0	12	12	M	R	R-	Nn
379	2-10	F2-2	3	6	0	8	14	M	R	S	NN
380	2-11	F2-2	3	0	0	34	11	H	R-	R-	Nn
381	2-12	F2-2	3	0	4	24	9	H	R	S	Nn
382	2-13	F2-2	3	0	12	22	11	H	R-	R	NN
383	2-14	F2-2	3	0	0	14	5	H	R	R-	Nn
384	2-15	F2-2	3	0	0	4	1	H	R	R	Nn
385	2-16	F2-2	3	0	0	0	0	H	R	R	NN
386	2-17	F2-2	3	6	10	20	12	M	R-	S	NN
387	2-19	F2-2	3	16	6	20	14	M	R	R-	NN
388	9-1	F2-9	3	18	8	24	17	M	S	S	Nn
389	9-4	F2-9	3	6	0	26	11	H	S	R-	Nn
390	9-5	F2-9	3	22	10	22	18	M	R-	R-	NN
391	9-7	F2-9	3	6	16	24	15	M	R-	S	NN

Table 15, Continued. Black shank, black root rot, root knot, and tobacco mosaic resistance data on indexing test 8 entries - Fall, 1963.

Seed Lot No.	Plot Entry		(F) Generation	Black Shank Indexing			Black Root Rot		Root Knot Reading	TMV Reading	
	Selection No.	Line Variety		Scores/Rep.			Ave. Score	B.S. Rating			Resistance Level
392	9-10	F2-9	3	12	0	16	9	H	S	R-	NN
393	9-11	F2-9	3	16	16	4	10	H	R-	R	NN
394	9-12	F2-9	3	6	6	10	7	H	R	R	Nn
395	9-13	F2-9	3	10	0	12	7	H	R-	R-	NN
396	9-14	F2-9	3	10	0	14	8	H	S	S	Nn
397	9-15	F2-9	3	20	0	30	17	M	R-	R-	NN
398	9-18	F2-9	3	0	10	24	11	H	R-	R	Nn
399	9-20	F2-9	3	6	4	26	12	M	S	R	Nn
400	9-3	F2-9	3	0	6	36	14	M	S	S	S
401	14-1	F2-14	3	24	14	14	17	M	R	S	-
402	14-2	F2-14	3	12	10	22	15	M	S	S	-
403	14-3	F2-14	3	6	8	20	11	H	R-	S	-
404	14-4	F2-14	3	28	4	22	18	M	S	S	-
405	14-5	F2-14	3	0	4	4	3	H	S	S	-
406	14-6	F2-14	3	26	10	20	19	M	S	R	-
407	14-7	F2-14	3	26	6	10	14	M	R-	S	-
408	14-8	F2-14	3	12	12	6	10	H	R-	R-	-
409	14-9	F2-14	3	30	16	34	27	S	S	R-	-
410	14-10	F2-14	3	30	20	24	25	L	S	S	-
411	14-11	F2-14	3	30	18	24	24	L	R	R-	-
412	14-12	F2-14	3	18	32	34	28	S	S	S	-
413	14-13	F2-14	3	36	10	34	27	S	S	R-	-
414	14-14	F2-14	3	28	0	0	9	H	R-	R-	-
415	14-15	F2-14	3	18	0	28	15	M	S	R-	-
416	14-16	F2-14	3	40	24	28	31	S	R-	R-	-
417	14-17	F2-14	3	12	12	14	13	M	R	S	-
418	14-18	F2-14	3	4	18	12	11	H	R	S	-
419	14-19	F2-14	3	24	20	22	22	M	R-	S	-
420	14-20	F2-14	3	30	34	28	31	S	R	R-	-
421	Check	Vesta 5	-	28	14	14	19	M	S	-	-

Table 15, Continued. Black shank, black root rot, root knot, and tobacco mosaic resistance data on indexing test 8 entries - Fall, 1963.

Seed Lot No.	Plot Entry Selection No.	Line Variety	(F) Generation	Black Shank Indexing			Ave. Score	B.S. Rating	Black Root Rot		TMV Reading
				Scores/Rep.					Resistance Level	Root Knot Reading	
422	Check	Va. Gold	-	34	28	28	30	S	R	S	-
423	Check	N.C. 95	-	10	0	0	3	H	S	R	-
424	18-1	F1-18	3	26	8	26	20	M	S	S	-
425	18-2	F1-18	3	28	8	22	19	M	R-	S	-
426	18-3	F1-18	3	22	10	20	17	M	S	R-	-
427	18-4	F1-18	3	28	14	18	20	M	S	R-	-
428	18-5	F1-18	3	4	22	24	17	M	S	R-	-
429	19-1	F1-19	3	10	12	22	15	M	S	S	-
430	19-2	F1-19	3	0	12	12	8	H	S	S	-
431	19-3	F1-19	3	0	0	14	5	H	R	S	-
432	19-4	F1-19	3	10	4	10	8	H	R-	S	-
433	19-5	F1-19	3	12	4	12	9	H	R	S	-