



2-1982

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University of Tennessee Agricultural Experiment Station; West, D. R.; McLaughlin, M. R.; and Kincer, H. C., "Reaction of Corn Genotypes to the Corn Virus Disease in Tennessee" (1982). *Research Reports*. https://trace.tennessee.edu/utk_agresreport/16

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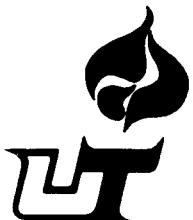
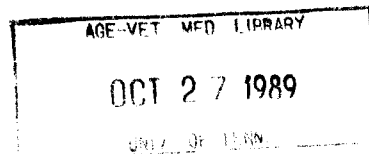
University of Tennessee Agricultural Experiment Station

REACTION OF CORN GENOTYPES TO THE CORN VIRUS DISEASE IN TENNESSEE

RR No. 82-03

February 1982

D. R. West, M. R. McLaughlin
and H. C. Kincer



DEPARTMENT OF PLANT
AND SOIL SCIENCE

Reaction of Corn Genotypes to the Corn Virus
Disease Complex in Tennessee in 1981

D. R. West, M. R. McLaughlin and H. C. Kincer^{1/}

The University of Tennessee corn virus project conducts virus rating experiments each year with two primary objectives: 1) to evaluate susceptibility of commercial hybrids for variety recommendations and; 2) to evaluate breeding stocks in research to broaden the germplasm base of virus tolerance.

Experimental Procedure

Corn genotypes were grown in an area of high natural levels of virus disease near Waverly, Tennessee. The area is heavily infested with johnson-grass, an alternate and overseasoning host for maize dwarf mosaic virus-strain A (MDMV-A) and maize chlorotic dwarf virus (MCDV).

Standard agronomic practices for corn yield trials were followed. Fertilizer was applied at recommended rates and herbicides were used to control weeds. Planting was delayed until June 15 due to wet conditions at the test site. Experiments designed for virus ratings only consisted of one row plots replicated two or three times. Plots were 19 feet long with 38 inches between rows. Thirty seeds were planted per plot providing a density of 22,000 plants per acre if all seeds produced plants.

^{1/}Respectively, Assistant Professors of Plant and Soil Science, Entomology and Plant Pathology, and Plant and Soil Science, University of Tennessee, Knoxville.

One experiment, designed for yield evaluation, was grown in two row plots with four replications. These plots were overplanted and thinned to 22,000 plants per acre.

Plants were rated for virus disease on September 15 and 16, four to five weeks after flowering for most genotypes. Ratings were on a scale of 1 to 9 with 1 indicating no virus symptoms and 9 indicating dead plants. Individual plant ratings were made and these data converted to a plot mean for summary.

The yield experiment was hand harvested on November 4 and field weights were converted to bushels of shelled corn at 15.5% moisture. In the following tables four variables are shown for virus ratings. Number of plants is the total number of plants rated in all replications of an experiment. Percent virus is the mean percentage of plants with virus disease symptoms. Virus severity is the average rating of diseased plants only. Virus index was determined from the ratings of all plants in a plot and incorporates plants with no virus symptoms into the index.

Discussion

Virus disease ratings in 1981 were not as high as in some previous years. The effects of the disease complex were not severe enough to provide a good differentiation between the yields of susceptible and tolerant hybrids. The experiments were planted two to three weeks later than desired and were heavily infested with foliar feeding insects prior to flowering. This infestation necessitated the use of insecticides which may have reduced the populations of insect vectors of MDMV and MCDV. A higher incidence of the virus diseases was expected following delayed planting, but this effect was not apparent in 1981.

At the time virus ratings were made, 37 leaf samples were collected for virus testing by enzyme-linked immunosorbent assay (ELISA). Using this technique, samples were tested for the presence of MDMV (strains A and B), MCDV, maize chlorotic mottle virus (MCMV), maize white line mosaic virus (MWLMV), and wheat streak mosaic virus (WSMV). Only MDMV-A and MCDV were detected in the 37 samples assayed. Seventeen samples had MDMV-A only, thirteen had MCDV only, three had both viruses, and four samples had no viruses.

We wish to express our appreciation to Terry Colbert and Funk Seeds International of Union City, Tennessee, for providing assistance in the form of land area, planting, and culture of the 1981 corn virus test plots.

Table 1. Corn: Yield and mean virus reaction of selected hybrids grown in Humphreys County, under virus conditions in 1981.^{1/}

Hybrid	Yield Bu/A	Erect plants %	Percent virus diseased plants	Virus severity	Virus index
Pioneer brand 3160	97	86	67	4.0	3.1
FFR 955C	95	92	80	3.9	3.3
Pioneer brand 3147	89	81	58	4.2	2.8
Watson 572	86	91	73	4.1	3.3
Funk G-4740	86	91	88	3.8	3.5
Funk G-4525A	85	91	73	3.6	2.9
McCurdy 7978	78	92	73	4.3	3.5
Pioneer brand 519	78	67	84	4.4	3.9
Tenn. TR2051W	77	80	98	4.1	4.1
Pioneer brand 3328	76	93	83	4.1	3.5
FFR 717C	76	89	57	4.5	3.0
DeKalb XL394	74	74	67	4.3	3.3
T.E. 6945	72	85	77	4.3	3.5
Pioneer brand 3369A	72	87	73	4.5	3.6
Funk G-4848-2	71	84	93	4.4	4.2
Princeton SX910	68	81	88	4.5	4.0
Golden Harvest H-2660W	68	89	88	4.3	3.9
DeKalb XL72B	68	96	57	4.1	2.8
DeKalb XL72BB	66	94	59	4.8	3.3
Funk G-4747-1	64	90	86	4.3	3.8
RA 2602W	64	90	77	4.3	3.6
FFR 929W	58	87	80	4.5	3.9
Pioneer brand 3382	57	81	72	5.4	4.2
Tenn. TR2045W	55	81	100	4.6	4.6
DeKalb XL72AA	51	74	90	5.0	4.7
L.S.D. (.05)	14.0	-	-	-	-
C.V. %	13.5	-	-	-	-
Avg.	73.3	-	-	-	-

^{1/} Data obtained in cooperation with C. R. Graves.

Table 2 . Virus rating of full season hybrids in the state corn variety testing project (2 replications)

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
Pioneer brand 3147	47	59.6	3.5	2.5
DeKalb XL 394	46	71.7	3.7	2.9
Princeton SX910	45	75.6	4.5	3.2
Golden Harvest H-2660W	43	83.7	3.3	3.0
Zimmerman Z-11W	40	77.5	3.2	2.8
RA 2602W	44	68.2	2.7	2.2
FFR 929W	41	80.5	3.3	2.9
Pioneer brand 3179	43	86.0	3.4	3.0
Northrup King PX723	46	78.3	3.8	3.2
Princeton SP936	41	53.7	3.6	2.5
Zimmerman Z-52W	44	59.1	3.3	2.5
DeKalb XL72AA	46	73.9	4.7	3.8
Funk G-4740	44	77.3	3.3	2.9
T.E. 6995A	45	75.6	3.2	2.6
FFR 955C	41	56.1	3.4	2.4
Funk G-4787W	45	73.3	3.1	2.7
Funk G-4848-2	54	92.6	4.0	3.8
Funk G-4747-1	43	69.8	3.5	2.8
Pioneer brand 3160	53	75.5	3.9	3.2
Pioneer brand 519	59	79.7	3.8	3.4
RA 3605W	46	69.6	3.5	2.9
McCurdy 3230	49	75.5	4.0	3.2
USS 2020	45	64.8	3.8	2.8
Golden Harvest H-2745	45	73.3	4.1	3.2
Zimmerman Z-14W	43	88.4	3.7	3.4
Trojan T1230	42	76.2	4.3	3.5
DeKalb 19030	44	72.7	3.6	2.9
DeKalb 19010	48	64.6	3.2	2.5
Super Crost 7801	37	67.6	4.7	3.7
Super Crost 81602	50	68.0	5.5	4.5
Super Crost 81509	58	75.9	3.9	3.2
Gold Kist 925	37	81.1	4.1	3.5
Gold Kist 915	47	93.6	5.4	5.1
FFR Exp 3011	39	76.9	4.1	3.4
Mean	-	73.7	3.8	3.1
C.V. %	-	21.7	14.2	19.4
L.S.D. (.05)	-	N.S.	1.1	1.2

Table 3. Virus ratings of medium season hybrids in the state corn variety testing project (2 replications).

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
Pioneer brand 3184	52	86.5	4.5	4.0
Pioneer brand 3320	42	71.4	5.3	4.0
DeKalb XL74A	44	65.9	5.2	4.0
Aztec SX640	37	70.3	5.3	4.1
Golden Harvest H-2686	29	86.2	4.9	4.4
Golden Harvest H-2680	40	70.0	4.7	3.7
Zimmerman Z-24Y	42	76.2	5.1	4.0
Funk G-4733	46	76.1	4.8	4.1
Coker 19A	42	90.5	5.7	5.3
Coker 21	43	83.7	5.1	4.6
P.A.G. SX351	45	91.1	5.2	4.8
Pioneer brand X7509	55	89.1	3.2	3.0
T-R 2013W	40	97.5	5.8	5.7
DeKalb EX7979	27	92.6	6.5	6.3
Aztec SX544	32	90.1	7.2	6.6
O's Gold 2680W	45	80.0	3.8	3.2
DeKalb XL72AA	32	68.8	6.8	5.1
Pioneer brand 3147	41	70.7	4.6	3.3
DeKalb XL72B	46	89.1	3.9	3.6
DeKalb XL72BB	44	77.3	4.0	3.6
McCurdy 7978	48	85.4	4.2	3.7
Asgrow RX962W	42	88.1	4.4	4.0
DeKalb XL390B	49	83.7	4.5	4.1
Funk G-4525A	43	76.7	2.7	2.3
DeKalb XL72AA	32	93.8	6.0	5.6
McCurdy 8150	40	90.0	5.6	5.1
P.A.G. SX373	43	88.4	4.6	4.2
RA 1504	39	100.0	5.4	5.4
RA 1604	45	66.7	5.3	3.9
Pioneer brand 3328	45	77.8	3.6	3.1
Mean	-	82.5	4.9	4.3
C.V. %	-	15.5	13.5	17.7
L.S.D. (.05)	-	26.1	1.4	1.5

Table 4. Virus ratings of early hybrids in the state corn variety testing project (2 replications).

Hybrid	No. of plants	Percent virus	Virus severity	Severity index
FFR 717C	43	90.7	4.1	3.8
McCurdy 7440	45	95.6	5.7	5.4
DeKalb XL70	38	97.4	5.0	4.9
DeKalb XL373	42	83.3	5.0	4.4
Funk G-4522	37	91.9	5.7	5.4
Pioneer 3382	42	88.1	6.1	5.5
FFR 799C	43	100.0	5.7	5.7
Migro HP-470	38	94.7	5.9	5.4
FFR 744C	36	97.2	5.7	5.6
O's Gold 3344	42	90.5	4.2	4.0
Trojan T1100	35	91.4	5.6	5.1
DeKalb 18018	40	80.0	4.9	3.4
FFR EX.12523	32	90.1	5.3	4.9
O's Gold 6882	38	94.7	5.2	5.0
Mean	--	92.1	5.2	4.9
C.V. %	--	6.7	17.1	20.0
L.S.D. (.05)	--	13.4	N.S.	2.1

Table 5. Virus ratings of extra hybrids in the state corn variety testing project (2 replications).

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
B73HtxR2040	37	83.8	5.0	4.6
Becks 79X	57	96.5	4.9	4.8
Becks 88X	41	80.5	3.9	3.4
O's Gold 5291	50	88.0	4.0	3.7
O's Gold 25701	46	73.9	4.0	3.2
T.E. 6945	42	81.0	3.3	2.9
Cargill 967	46	89.1	4.5	4.1
Cargill 949	42	81.0	4.8	4.2
DeKalb XL72AA	40	82.5	5.1	4.3
Cargill 979	37	91.9	4.6	4.3
Cargill 951	47	63.8	3.9	2.8
Super Crost 4337	33	93.9	4.1	4.0
Watson 572	43	60.5	3.6	2.6
Gold Kist 748	40	95.0	4.6	4.4
Gold Kist EXP1505	46	54.3	3.4	2.3
Migro M-0707	35	85.7	4.6	4.1
Migro HP-87	42	83.3	4.8	4.2
Gold Kist 695	35	91.4	5.1	4.6
McCurdy 7787	36	66.7	5.2	3.8
McCurdy 80-221	38	94.7	4.9	4.7
McCurdy 8225	38	52.6	3.2	2.1
McCurdy 70	35	77.1	4.0	3.4
USS 1516	37	86.5	5.2	4.6
Pioneer brand 3147	45	62.2	3.8	2.7
FFR EXP.14510	36	75.0	4.4	3.8
Hunt HT 11Y	30	96.7	6.0	5.8
Hunt HT 12Y	35	82.9	4.8	3.9
Mean	--	80.2	4.4	3.8
C.V.%	--	16.1	16.7	22.4
L.S.D. (.05)	--	26.6	1.4	1.7

Table 6. Virus ratings of hybrids grown in the cooperative white maize variety test (3 replications).

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
Acco UC1800	69	96	3.7	3.5
Acco U398W	60	78	3.4	2.9
Asgrow RX962W	63	81	3.7	3.2
Funk G-4747W-1	56	84	3.6	3.2
Funk G-4768W	65	100	4.4	4.4
Funk G-4787W	63	75	3.2	2.6
Funk EXP 29276	28	89	4.9	4.4
Funk EXP 29313	60	83	3.8	3.3
Golden Harvest H-2644W	41	100	4.0	4.0
Golden Harvest H-2660W	60	77	3.1	2.6
IFSI-1	57	98	4.3	4.3
IFSI-2	64	100	5.8	5.8
IFSI-3	61	92	3.7	3.5
IFSI-4	60	97	5.1	5.0
IFSI-5	70	93	4.0	3.7
IFSI-6	59	80	3.7	3.2
IFSI-7	68	79	3.9	3.3
IFSI-8	70	89	4.2	3.8
IFSI-9	65	100	4.8	4.8
IFSI-10	59	78	3.9	3.4
IFSI-11	61	75	3.9	3.2
IFSI-12	62	97	4.5	4.3
IFSI-13	72	100	5.4	5.4
Jaques 200W	59	98	4.4	4.3
Lynks SC-WLA	65	74	3.4	2.8
Lynks SC-WM	65	94	4.9	4.7
Meachams MV58	62	61	4.0	2.7
Meachams MV68	56	77	4.1	3.3
Meachams MV78	60	80	3.5	3.0
Meachams MV88	70	77	4.0	3.3
Meachams MX50	55	91	4.9	4.5
MFA C4W	62	85	4.5	3.9
Northrup King X233F6	51	90	3.0	2.8
O's Gold 25501W	59	80	4.6	3.9
O's Gold 25601W	55	93	3.8	3.6
O's Gold 26201W	62	74	4.7	3.8
O's Gold 26301W	58	100	4.8	4.8
O's Gold 26501W	62	74	4.0	3.0
O's Gold 26801W	58	84	3.6	3.2
Pioneer Brand 519	68	97	4.2	4.1

Continued

Table 6. Continued.

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
Princeton SX910	56	93	3.4	3.2
Princeton SX936	62	85	3.6	3.2
Sturdy Grow SG908W	64	94	4.1	4.0
Sturdy Grow SG921W	57	96	4.6	4.5
Sturdy Grow SG935W	58	84	3.8	3.4
Sturdy Grow EXP 0641	61	80	4.2	3.6
Sturdy Grow EXP 0668	42	98	5.2	5.1
Sturdy Grow EXP 0695	61	87	4.6	4.1
Sturdy Grow EXP 9649	50	90	4.7	4.4
T1105 (T159xT161)x(Ga209xMp339)	69	87	4.1	3.8
T1108 (K55xC.I.66)x(T153xT155)	67	94	3.8	3.6
Whisnand 71W	57	95	4.6	4.4
Whisnand 75W	56	93	4.5	4.2
Whisnand 77W	58	90	4.5	4.2
Whisnand 79W	56	77	4.4	3.6
Whisnand 91W	66	79	3.2	2.8
Whisnand EXP 2W	62	97	5.2	5.1
Whisnand EXP 77-2W	56	87	5.5	5.0
Whisnand EXP 77-3W	53	91	4.3	4.0
Zimmerman Z14	59	93	3.9	3.7
Zimmerman Z54	58	90	4.7	4.4
B73xMol7	52	90	5.2	4.8
Mol7xN28	59	97	4.5	4.3
Pioneer Brand 3320	64	94	3.9	3.8
US 13	58	93	4.7	4.4
Mean	--	88	4.2	3.9
C.V. %	--	12.9	13.5	16.2
L.S.D. (.05)	--	18.3	0.9	1.0

Table 7. Virus ratings of hybrids grown in the cooperative white maize topcross test. (3 replications)

Hybrid	No. of Plants	Percent virus	Virus severity	Virus index
FR805WxMp339	70	94	3.1	3.0
(C. I. 66xFR802W)xMP339	65	75	3.1	2.6
(K55xC. I. 66)x33-16	68	98	4.7	4.7
(K55xC. I. 66)xMolW	68	91	3.7	3.5
(K55xC. I. 66)xT111	61	98	4.9	4.8
(K55xC. I. 66)xT79:2006	67	72	4.1	3.3
" xT79:2010	64	89	4.6	4.3
" xT79:2013	60	95	4.2	4.0
" xT79:2015	65	91	3.8	3.4
" xT79:2018	68	90	3.3	3.1
(K55xC. I. 66)xT79:2027	59	100	4.7	4.7
" xT79:2034	62	94	3.4	3.2
" xT79:2035	65	95	3.3	3.2
" xT79:2040	63	92	4.2	3.9
" xT79:2045	65	91	3.6	3.3
(K55xC. I. 66)xT79:2051	61	93	3.4	3.2
" xT79:2052	52	94	3.4	3.2
" xT80:3006	63	100	4.3	4.3
" xT80:3027	60	77	4.7	3.9
WSTx33-16	59	83	4.5	3.9
WSTxMolW	67	94	4.0	3.8
WSTxT111	54	87	4.2	3.8
WSTxE3C053-2-1	39	59	3.8	2.5
" xE3C053-2-2	49	84	3.6	3.2
" xE3C053-3	57	86	4.2	3.7
WSTxE3C053-7-1	58	76	4.0	3.2
" xE3C053-7-2	49	65	3.5	2.6
" xE3C053-7-3	67	79	3.7	3.2
" xE3C053-7-4	45	84	4.3	3.9
" xE3C053-48	57	95	4.6	4.3
WSTxE3C053-71-1	51	84	3.3	3.0
" xE3C053-71-2	56	89	4.0	3.7
" xE3C053-71-3	46	96	3.5	3.4
" xE3C053-77-1	55	87	4.1	3.7
" xE3C053-77-6-1	61	97	4.9	4.8
WSTxE3X053-77-6-2	59	81	4.1	3.5
" xE3C053-77-6-3	55	91	4.3	3.9
" xE3C053-77-6-5	56	95	5.2	4.9
" xE3C053-77-6-6	57	93	5.0	4.8
" xE3C053-77-7	58	95	4.3	4.1

Continued

Table 7. (continued)

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
WSTxE3C053-77-8	53	89	4.7	4.3
" xE3C053-106-1	46	83	3.9	3.4
" xE3C053-106-2	49	92	4.4	4.1
" xE3C053-172	52	77	3.9	3.2
" xSR52F	45	76	4.2	3.3
Mean	--	87	4.1	3.7
C.V. %	--	13.7	14.1	16.7
L.S.D. (.05)	--	19	0.9	1.0

Table 8. Virus ratings of experimental white hybrids from selections of yellow x white lines and the corresponding yellow hybrid.(2 replications)

Hybrid	Grain color	No. of plants	Percent virus	Virus severity	Virus index
79:1114-1x79:1154-1	W	40	97	4.3	4.3
Mol7xB37	Y	45	84	3.8	3.5
79:1114-1x79:1177-1	W	40	95	3.6	3.5
Mol7xB73	Y	32	69	4.2	3.1
80:1071-1x80:1108-2	W	48	69	4.0	3.1
Mol7xB73	Y	45	73	4.8	3.8
80:1042-1x80:1072-1	W	47	89	3.4	3.1
T232xMol7	Y	35	69	3.3	2.7
80:1044-1x80:1101-1	W	46	80	4.0	3.4
T232xB37	Y	43	91	4.1	3.9
80:1053-1x80:1108-1	W	40	90	3.3	3.0
T232xB73	Y	38	71	3.9	3.2
80:1044-2x80:1127-1	W	51	88	4.0	3.5
T232xT226	Y	45	82	3.8	3.3
80:1042-2xWST	W	51	76	3.3	2.7
80:1131-1x80:1098-1	W	46	91	4.4	4.1
(K55xC. I. 66)xFR802W	W	45	84	4.2	3.8
Mean	-	--	82	3.9	3.4
C.V. (%)	-	--	13.4	14.7	20.6
L.S.D. (.05)	-	--	23	1.2	N.S.

Table 9. Virus ratings of released inbred lines of yellow corn (2 replications).

Inbred line	No. of plants	Percent virus	Virus severity	Virus index
T218	22	91	8.5	7.9
T248	27	100	5.2	5.2
T250	36	89	3.3	3.0
T252	39	69	3.4	2.7
T254	24	92	4.6	4.4
T256	37	95	4.2	4.1
T258	31	65	4.9	3.7
T260	31	97	5.6	5.5
T262	28	100	4.9	4.9
T264	35	100	6.1	6.1
T266	37	100	7.6	7.6
T268	30	97	5.1	5.0
N132	12	100	5.3	5.3
N139	29	93	5.0	4.6
N152	24	92	5.8	5.5
Oh1EP	17	100	4.7	4.7
Mean		91.2	5.3	5.0
C.V. %		8.2	13.6	14.1
L.S.D. (.05)		16	1.6	1.5

Table 10. Virus rating of released inbred lines of white corn (2 replications).

Inbred Line	No. of plants	Percent virus	Virus severity	Virus index
T13	21	100	8.9	8.9
T145	35	77	3.9	3.2
T147	29	59	4.6	3.1
T149	30	90	3.7	3.4
T151	29	76	4.2	3.5
T153	16	100	6.4	6.4
T155	39	87	4.8	4.4
T157	23	100	6.5	6.5
T157A	10	100	7.4	7.4
T159	39	92	4.0	3.7
T161	37	95	3.7	3.6
Mp339	22	91	3.9	3.8
CI66	37	84	3.2	2.9
Mean		88.6	5.1	4.8
C.V. %		10.0	13.3	13.9
L.S.D. (.05)		19.3	1.5	1.4

Table 11. Virus ratings of inbred lines of sweet corn
(2 replications).

Line	No. of plants	Percent virus	Virus severity	Virus index
80:430-1	9	100	9.0	9.0
80:432-C3	11	100	7.0	7.0
80:433-C3	0	---	---	---
80:434-C6	5	100	9.0	9.0
80:437-C3	24	83	5.7	5.4
80:444-C2	5	100	9.0	9.0
80:445-1 ^{1/}	10	100	8.9	8.9
80:447-1	34	100	8.1	8.1
80:448	11	100	8.8	8.8
80:449-1	31	100	7.7	7.7
80:450-C2	27	100	8.4	8.4
Evergreen 471-V6-81-1-S ₉	30	100	8.3	8.3
T11S	32	100	8.7	8.7
Georgia Special - S ₈	31	81	4.6	3.8
Golden Cross Bantam	30	100	9.0	9.0
Mean	--	98	8.0	7.9

^{1/} Based on one replication only.

Table 12. Virus ratings of sweetcorn hybrids. (2 replications)

Hybrid	No. of plants	Percent virus	Virus severity	Virus index
80:246x247 ^{1/}	13	54	2.9	2.0
80:248x249	0	-	-	-
80:250x251	0	-	-	-
80:252x253 ^{1/}	14	100	3.0	3.0
80:254x255	16	94	5.8	5.5
80:256x257	20	60	3.5	2.5
80:258x259 ^{1/}	14	100	6.5	6.5
80:260x259	26	100	5.9	5.9
80:446xHickory King	35	74	4.1	3.5
Silver Queen x Hickory King	34	74	5.1	4.0
Silver Queen ^{1/}	16	75	4.8	3.9
DKS-80-W	29	97	6.7	6.5
DKS-80-Y	24	100	5.8	5.8
79:315x316	28	36	3.7	2.0
79:318x317	30	70	3.8	3.0
Country Gentleman	27	100	9.0	9.0
Golden Cross Bantam	22	100	9.0	9.0
Mean	--	82	5.5	4.9

^{1/} Based on one replication only.