RENIFORM NEMATODE REPRODUCTION ON SOYBEAN CULTIVARS AND BREEDING LINES IN 2005 TESTS

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During 2005, 209 soybean varieties from the Arkansas variety testing program and 52 breeding lines (24 breeding lines from the Clemson, 15 from the Arkansas, and 13 from the Missouri breeding programs) were tested in the greenhouse to determine their suitability as hosts for the reniform nematode (RN), *Rotylenchulus reniformis*. All treatments were inoculated with 1,056 vermiform RN. The RN resistant varieties Anand, Forrest, and Hartwig, the RN susceptible cultivar Braxton, and fallow RN-infested soil served as controls. In all 2005 tests Forrest was not uniform in RN resistance. The mean number of vermiform nematodes extracted from the soil of each treatment was calculated, as were the reproductive indices (RI = Pf/Pi), and PF/PI of Hartwig (Arkansas test cultivars) or Anand (breeding lines). Arkansas test cultivars with RI's significantly greater than the RI on Hartwig (1.00) were considered suitable hosts for *R. reniformis*. Of the Arkansas test varieties 207 of 209 had more RN reproduction than Hartwig. The following varieties, Ax RR53116 and SO 2-3934RR, were not different than Hartwig. On 38 of the 52 breeding lines RN reproduced more than on Anand. Of the 13 breeding lines from Missouri, seven were not different than Anand (S01-9265, S02-3934, S01-9391, S02-611CR, S019364, S01-8401(HP), S02-20388), of the 24 from Clemson 5 were not different than Anand (SC02-212, SC02-210, SC01-819, SC02-208, SC02-211)and of the 15 breeding lines from Arkansas (R97-1801, R001551) seven were not different than Anand.

Introduction

Robbins, et al.(1994) reported on reproduction of the reniform nematode on 30 soybean cultivars. Robbins & Rakes (1996) reported on 16 soybean cultivars, 45 germplasm lines, 2 cultivars (Hartwig, Cordell) with resistance from PI's 437654 and 90763, respectively, and the differentials used in the soybean cyst nematodes race determination tests. Robbins et al.(1999) reported on 282 soybean lines from the Arkansas and Mississippi Soybean Variety Testing programs and Robbins et al. (2000) reported on 226 cultivars from the Arkansas and Mississippi Soybean Variety Testing programs, and varieties submitted by extension nematologists from Auburn and Louisiana State University. Robbins et al. (2001) reported on 115 cultivars from the Arkansas and Mississippi Soybean Variety Testing programs and three cultivars submitted by a Texas extension nematologist. Robbins et al. (2002) found 137 of 139 lines from Arkansas, Mississippi, and Louisiana reproduced significantly more than Forrest. Robbins et al. (2003) found 58 of 127 lines from the Arkansas, Mississippi, and Louisiana test and 20 of 34 breeding

lines from Clemson test reproduced significantly more than Forrest. Robbins et al. (2004) found 122 of 129 Lines from the Arkansas testing program reproduced more than on Forrest. Robbins et al. (2005) found 183 of 194 Lines from the Arkansas testing program reproduced more than on Forrest. These papers form the basis for reniform nematode reproduction information on the basis for reniform nematode reproduction information on contemporary soybean lines.

The objectives of the 2005 study were to identify new soybean cultivars that are poor hosts for the reniform nematode that would be useful in rotation with cotton or other reniform nematode susceptible crops in reniform nematode infested fields and to identify useful breeding lines for use in selection of new reniform resistant cultivars.

Materials & Methods

The 209 soybean Arkansas test cultivars were from both private and public sources. Seeds of all cultivars were germinated in vermiculite and transplanted into 10-cm-diam. clay pots containing 500 cm^3 of pasteurized fine sandy loam soil (ca. 91% sand, 5% silt, 4 % clay, <1% O.M.). RN inoculum was obtained by washing the soil from the roots of the susceptible cultivar Braxton grown in the greenhouse for at least 10 weeks, suspending the nematodes in water, and pouring the nematode suspension through nested 850- and 38-µm-pore sieves. The material on the 38-µm-pore sieve was placed on a tissue in a Baermann funnel. All vermiform stages of *R. reniformis* were collected after 16 hours.

On the same day (July 7) a total of 1,056 vermiform reniform nematodes were injected with an autopipe into three, 2.5 cm-deep holes made in the soil in each pot containing one seedling in the cotyledon stage. Pots were arranged in a randomized complete block design, with five replications per cultivar. Soybean cultivars Anand, Forrest and Hartwig were included as resistant controls and Braxton as a susceptible control.

After 15 weeks (July 7-October 11, 2005), the number of vermiform reniform nematodes nematodes in the soil of each pot was determined. A reproductive index (RI), defined as the number of eggs + vermiform nematodes at test termination (Pf)/initial inoculation level (Pi), was calculated for each cultivar. In addition, the ratio of the RI of each cultivar to the RI of Hartwig (RH (Arkansas test)) or Anand (RA (Breeding line test) was calculated. The log ratio data [log10 (RH + 1)] or [log10 (RA + 1)] were analyzed as a randomized complete block using analysis of variance. Log ratio transformations were used because of the high degree of variation in nematode counts within a cultivar. All statistical analyses were carried out using SAS version 8 (SAS Institute, Cary, NC).

Results & Discussion

Only two lines, Ax RR53116 and SO 2-3934RR, in the Arkansas Soybean Variety program tested had log ratios not significantly ($P \leq 0.05$) higher than Hartwig (Table 1). This indicates they were not different in supporting reproduction from Hartwig

A total of 14 lines in the test of the Arkansas, Clemson, and Missouri breeding lines were not significantly higher than Anand (Table 2). Of the 14 two were Arkansas lines (R97-1801, R001551), five were Clemson lines (SC02-212, SC02-210, SC01-819, SC02-208, SC02-211), and seven were Missouri lines (S01-9265, S02-3934, S01-9391, S02-611CR, S019364, S01-

8401(HP), S02-20388). This indicates these 14 were not different in supporting reproduction from Anand.

The main objective of these tests was to identify soybean varieties and breeding lines with low reniform nematode reproductive indices. The varieties with low reniform nematode reproductive indices may be important to use in rotation with cotton in fields with large numbers of the reniform nematode.

Literature Cited

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Table 1. Rotylenchulus reniformis reproduction on 209 selected soybean cultivars and lines from the Arkansas Soybean Variety Testing Program in 2005 tests.

Cultivar Soil / Pot	Reniform of Hartwig	Log 10 + 1	Grouping of Hartwig	Pf/Pi %
Fallow	***396***	***0.0458***	(2)K	0.1111
Ax RR53116	***3300***	***0.2712***	(2)JK	0.8672
Hartwig	***3540***	***0.3578***		1.0000
Anand	***5856***	***0.4039***	(2)I-K	1.5343
S02-3934RR	***8484***	***0.4086***	(2)H-K	1.5621
R00-1551	12428	0.6144	(2)G-J	3.1154
DB01-5463	13340	0.6325	(2)F-J	3.2906
Deltapine 5634RR	16848	0.6726	(2)E-J	3.7057
Armor ARX C53104	13716	0.6799	(2)D-I	3.7847
Forrest	23604	0.6825	(2)C-I	3.8139
NK Brand S54-G9	15668	0.7162	(2)B-I	4.2020
Delta King XTJ601	37700	0.7275	(2)A-I	4.3397
Delta King XTJ652	15900	0.7282	(2)A-I	4.3481
Armor GP 555	34484	0.7360	Z(2)A-I	4.4454
Delta King XTJ650	18220	0.7540	YZ(2)A-I	4.6758
Progeny 4910	17448	0.7584	X-Z(2)A-I	4.7339
Delta King 4763	19972	0.7653	W-Z(2)A-I	4.8248
Delta King 5967	18776	0.7753	V-Z(2)A-I	4.9609
Terral TVX43R51	18596	0.7755	V-Z(2)A-I	4.9638
Morsoy RT4485N	18788	0.7762	V-Z(2)A-I	4.9732
ES XVT-518RR	28124	0.7841	V-Z(2)A-I	5.0823
Dyna Gro 36Y48	21764	0.7895	U-Z(2)A-I	5.1592
Delta King 4967	20284	0.7979	T-Z(2)A-I	5.2786
S03-380RR	19288	0.7985	T-Z(2)A-I	5.2880
Armor GP470	19100	0.8024	S-Z(2)A-I	5.3452
Delta King 5161	32936	0.8039	S-Z(2)A-I	5.3663

Dyna Gro 3562NRR	21000	0.8059	S-Z(2)A-I	5.3956
Armor GP 513	21600	0.8109	R-Z(2)A-H	5.4694
Deltapine DPX1908RR	23928	0.8120	R-Z(2)A-H	5.4868
Morsoy RT4480N	25924	0.8126	R-Z(2)A-H	5.4960
USG 7475RR	33632	0.8130	R-Z(2)A-H	5.5015
Armor ARXB41204	22168	0.8161	Q-Z(2)A-G	5.5482
Delta King 5567	22060	0.8197	Q-Z(2)A-G	5.6017
R01-3263	20500	0.8198	Q-Z(2)A-G	5.6038
Boggs RR	24412	0.8324	P-Z(2)A-G	5.7980
PGY 4405	26368	0.8340	P-Z(2)A-G	5.8230
Delta King 4366	22120	0.8403	P-Z(2)A-G	5.9237
R00-1194F	21400	0.8418	O-Z(2)A-G	5.9467
Armor 42-B2	23220	0.8425	O-Z(2)A-G	5.9589
Dyna Gro 3535NRR	28660	0.8513	N-Z(2)A-G	6.1010
Delta King XTJ648	23000	0.8570	N-Z(2)A-G	6.1941
DB01-080	28232	0.8591	N-Z(2)A-G	6.2288
Terral TV52R14	32200	0.8631	N-Z(2)A-G	6.2971
Fastart F-50H3RR	22600	0.8641	N-Z(2)A-G	6.3123
Delta King XTJ6G510	24200	0.8653	N-Z(2)A-G	6.3340
Croplan RC4655	25176	0.8673	M-Z(2)A-G	6.3667
PGY 3805	23400	0.8748	L-Z(2)A-G	6.4956
Delta King XTJ6D42	30964	0.8749	L-Z(2)A-G	6.4973
PGY 4315	26368	0.8797	K-Z(2)A-G	6.5804
Armor ARX F47105	37164	0.8853	J-Z(2)A-G	6.6794
Delta Grow 4840RR	27836	0.8862	J-Z(2)A-G	6.6948
Armor GP474	25708	0.8887	I-Z(2)A-G	6.7384
Delta Grow 5160RR	25032	0.8915	I-Z(2)A-G	6.7894
USG 7505nRR	45964	0.8996	I-Z(2)A-G	6.9367
Ax RR53057	27540	0.9009	I-Z(2)A-G	6.9597
Delta Pine DP3861RR	29724	0.9010	I-Z(2)A-G	6.9618
Delta King 4461	33512	0.9027	I-Z(2)A-G	6.9926

Southern States RT4981N	38592	0.9036	I-Z(2)A-G	7.0096
TN05-548RR	28100	0.9049	I-Z(2)A-G	7.0339
Delta King XTJ604	26200	0.9050	I-Z(2)A-G	7.0355
R01-4834	26600	0.9061	I-Z(2)A-G	7.0553
S02-2238RR	29420	0.9076	I-Z(2)A-G	7.0827
Terral TVX51R50	27920	0.9100	I-Z(2)A-G	7.1287
Asgrow AG5501	41900	0.9103	I-Z(2)A--G	7.1343
Fastart F-48H5RR	27800	0.9105	I-Z(2)A-G	7.1386
Terral TV45R14	26600	0.9113	I-Z(2)A-G	7.1530
Ax RR53776	26000	0.9120	I-Z(2)A-G	7.1658
Delta King XTJ6G51	30452	0.9122	I-Z(2)A-G	7.1695
Morsoy RT4914N	26100	0.9138	I-Z(2)A-G	7.2000
S03-007RR	30920	0.9144	I-Z(2)A-G	7.2105
Terral TV56R45	27500	0.9242	H-Z(2)A-G	7.3992
PGY 4205	28300	0.9345	H-Z(2)A-G	7.6002
Delta King XTJ6501	30600	0.9363	H-Z(2)A-G	7.6358
Armor ARXF47205	33924	0.9380	G-Z(2)A-G	7.6689
Garst 3960RR/N	28980	0.9389	F-Z(2)A-G	7.6866
Progeny 4804	39856	0.9393	F-Z(2)A-G	7.6947
Terral TVX46R203	29900	0.9436	E-Z(2)A-G	7.7830
586 RC	39904	0.9446	E-Z(2)A-G	7.8025
Delta King 4866	39844	0.9465	E-Z(2)A-G	7.8407
Armor GPX3930	47072	0.9468	E-Z(2)A-G	7.8472
Stine S5142-4	75352	0.9470	E-Z(2)A-G	7.8510
Armor ARXB45105	41412	0.9495	D-Z(2)A-G	7.9033
Asgrow AG4801	48272	0.9511	D-Z(2)A-G	7.9361
Delta Grow 5560RR	32980	0.9515	D-Z(2)A-G	7.9441
Southern States RT 5951N	44824	0.9561	D-Z(2)A-G	8.0394
Armor ARX C56105	54608	0.9592	C-Z(2)A-G	8.1031
Dyna Gro 37A44	46540	0.9635	C-Z(2)A-G	8.1945
Pioneer 94M30	31900	0.9655	C-Z(2)A-G	8.2374

Delta King XTJ6K54	43116	0.9669	C--Z(2)A-G	8.2652
USG 747R6	36788	0.9683	C--Z(2)A-G	8.2961
Delta King 3968	45396	0.9748	C--Z(2)A-G	8.4354
RJ00-100	52944	0.9755	C--Z(2)A-G	8.4523
Dyna Gro 36N57	35600	0.9772	C-Z(2)A-G	8.4894
Delta King 5466	49160	0.9777	C-Z(2)A-G	8.4986
Md 96-5722	35100	0.9778	C-Z(2)A-G	8.5018
Croplan RC4955	64860	0.9808	C-Z(2)A-G	8.5674
R01-375	52804	0.9812	C-Z(2)A-G	8.5757
PGY 4615	36524	0.9847	B-Z(2)A--G	8.6547
Asgrow AG4703	62708	0.9853	B-Z(2)A-G	8.6669
Asgrow AG4403	43100	0.9871	B-Z(2)A-G	8.7069
Delta King 5066	62800	0.9878	B-Z(2)A-G	8.7223
Deltapine DPX4919RR	45580	0.9878	B-Z(2)A-G	8.7232
R01-379	37232	0.9902	B-Z(2)A-G	8.7780
Terral TV55R15	48560	0.9931	A-Z(2)A-G	8.8423
Delta King 3968XTJ6D38	46044	0.9932	A-Z(2)A-G	8.8457
Dyna Gro 35Z49	37220	0.9950	A-Z(2)A-G	8.8855
495RC	43352	0.9955	A-Z(2)A-G	8.8965
Dyna Gro 3392NRR	55580	0.9975	A-Z(2)A-G	8.9421
Stine S4842-4	32800	0.9983	A-Z(2)A-G	8.9605
Delta Grow 4150RR	33400	1.0004	A-Z(2)A-G	9.0099
S03-058RR	61364	1.0036	A-Z(2)A-G	9.0821
ESXT-480	36004	1.0061	A-Z(2)A-G	9.1415
476RC	50196	1.0065	A-Z(2)A-G	9.1512
R00-1940	40280	1.0069	A-Z(2)A-G	9.1593
Armor ARX C55105	51388	1.0109	A-Z(2)A-G	9.2541
Garst 4999RR/N	41460	1.0133	A-Z(2)A-G	9.3118
TN05-547RR	52536	1.0152	A-Z(2)A-G	9.3568
Delta King XTJ602	45280	1.0157	A-Z(2)A-G	9.3682
Deltapine 5915RR	61860	1.0170	A-Z(2)A-G	9.3981

Progeny 4401	42976	1.0214	A-Z(2)A-F	9.5050
Delta King 55T6	60100	1.0301	A-Z(2)A-F	9.7166
HBK R5525	40600	1.0309	A-Z(2)A-F	9.7365
Terral TVX46R223	50300	1.0310	A-Z(2)A-F	9.7395
Delta King 4868	45148	1.0339	A-Z(2)A-F	9.8114
USG 5601T	50648	1.0359	A-Z(2)A-F	9.8612
Asgrow AG4503	66500	1.0377	A-Z(2)A-F	9.9056
HBK C5025	53296	1.0378	A-Z(2)A-F	9.9083
UA 4805	56300	1.0379	A-Z(2)A-F	9.9115
Delta King 5366	46760	1.0429	A-Z(2)A-E	10.0382
FFR 4705RR	55500	1.0447	A-Z(2)A-E	10.0836
USG 7455nRR	69676	1.0473	A-Z(2)A-E	10.1494
USG 7515nRR	55500	1.0531	A-Z(2)A-E	10.2997
Deltapine 5808RR	64752	1.0539	A-Z(2)A-E	10.3205
S03-393RR	62800	1.0549	A-Z(2)A-E	10.3471
R01-1017	56864	1.0565	A-Z(2)A-E	10.3899
Terral TV48R43	50984	1.0591	A-Z(2)A-E	10.4585
Progeny 5250	44700	1.0643	A-Z(2)A-E	10.5971
MorSoy RT3883N	55556	1.0648	A-Z(2)A-E	10.6100
Delta Grow 4460RR	59600	1.0680	A-Z(2)A-E	10.6951
RJ00-090	58292	1.0693	A-Z(2)A-E	10.7305
Morsoy RT4665N	61380	1.0738	A-Z(2)A-E	10.8536
PGY 3905	53720	1.0783	A-Z(2)A-D	10.9745
Terral TV48R14	74300	1.0804	A-Z(2)A-D	11.0347
ES XVT-110RR	50600	1.0825	A-Z(2)A-D	11.0914
R01-1018	58000	1.0874	A-Z(2)A-C	11.2293
Armor ARX B57104	64128	1.0876	A-Z(2)A-C	11.2361
Dyna Gro 33X55	62980	1.0892	A-Z(2)AB	11.2808
Teejay	60700	1.0932	A-Z(2)AB	11.3929
Croplan RC4455	52300	1.0943	A-Z(2)AB	11.4254
Progeny 5770	60520	1.0963	A-Z(2)AB	11.4816

Terral TVX46R213	50360	1.0984	A-Z(2)AB	11.5426
PGY 5115	60100	1.1004	A-Z(2)AB	11.5998
RJ00-277	63364	1.1072	A-Z(2)AB	11.8011
FFR 4925RR	58600	1.1109	A-Z(2)AB	11.9104
Delta Grow 5630RR	64040	1.1119	A-Z(2)AB	11.9388
FFR 4545RR	53380	1.1135	A-Z(2)AB	11.9876
Delta King XTJ6L49	54660	1.1144	A-Z(2)AB	12.0126
Delta King XTJ640	70300	1.1182	A-Z(2)AB	12.1273
Delta Grow 4660RR	72540	1.1193	A-Z(2)AB	12.1625
Ax RR53386	70412	1.1241	A-Z(2)A	12.3063
Garst 4612RR/N	54440	1.1242	A-Z(2)A	12.3098
Pioneer 94M80	68000	1.1245	A-Z(2)A	12.3206
Deltapine DPX5115	83000	1.1269	A-Z(2)A	12.3943
Delta King 4766	88300	1.1327	A-Z(2)A	12.5753
Progeny 5622	52900	1.1329	A-Z(2)A	12.5798
Southern States RT 5540N	61580	1.1347	A-Z	12.6379
RJ00-261	46840	1.1380	A-Z	12.7411
Progeny 5660	71260	1.1419	A-Y	12.8657
NK Brand S35-F9	75472	1.1440	A-Y	12.9307
Dyna Gro 33A37	58940	1.1475	A-Y	13.0445
Armor ARXF47105	73128	1.1491	A-Y	13.0960
Delta Grow 3950RR	74700	1.1494	A-Y	13.1059
Armor 54-03	53600	1.1534	A-Y	13.2362
PGY 4805	58040	1.1550	A-Y	13.2881
Southern States RT4651N	58120	1.1551	A-Y	13.2927
Fastart F-48H8RR	52300	1.1567	A-Y	13.3443
Delta King XTJ646	65040	1.1617	A-X	13.5116
Pioneer 94M50	73624	1.1630	A-X	13.5553
Dyna Gro 37F46	69400	1.1706	A-W	13.8126
HBK R5825	62460	1.1709	A-V	13.8227
Pioneer 95M50	76660	1.1723	A-V	13.8695

Pioneer 95M80	95700	1.1744	A-V	13.9432
USG 7466nRR	69420	1.1804	A-V	14.1502
Morsoy RTS4955N	71800	1.1916	A-U	14.5449
Delta King XTJ6025	91380	1.1923	A-U	14.5712
Asgrow AG4404	70920	1.1943	A-U	14.6424
Delta King XTJ638	80500	1.1959	A-T	14.6995
R98-1821	57660	1.1963	A-T	14.7138
Delta King 4661	102056	1.1963	A-T	14.7142
Terral TVX41R50	72700	1.1985	A-T	14.7929
Armor ARXD49104	69460	1.1997	A-T	14.8367
Terral TVX49R50	84700	1.2025	A-T	14.9408
Delta King 5870	85500	1.2049	A-S	15.0276
Progeny 4805	91700	1.2146	A-R	15.3901
HBK R3824	66600	1.2193	A-Q	15.5707
Delta Grow 4250RR	66840	1.2207	A-Q	15.6223
Dyna Gro 3463NRR	97620	1.2346	A-P	16.1614
R01-4752	77540	1.2461	A-O	16.6227
R01-4804	75160	1.2537	A-N	16.9339
DB01-4249	86440	1.2538	A-N	16.9382
Progeny 4405	82960	1.2558	A-N	17.0233
Garst 5212RR/N	114300	1.2715	A-M	17.6862
Delta King XTJ635	87360	1.2741	A-L	17.7972
Delta King 5995	97320	1.2808	A-K	18.0919
Deltapine DPX4818RR	89220	1.2879	A-J	18.4061
ES XVT-501RR	83740	1.2937	A-I	18.6662
Delta King XTJ6D44	88020	1.3231	A-H	20.0415
Ax RR53976	91400	1.3260	A--H	20.1846
USG 5002T	93620	1.3436	A-G	21.0575
PGY 5005	120900	1.3444	A-F	21.0996
Delta King XTJ603	103700	1.3487	A-E	21.3195
Armor ARX A50104	105000	1.3534	A-D	21.5607

Armor GP422	97260	1.3628	A-C	22.0593
Dyna Gro 35B40	96600	1.3884	AB	23.4584
Braxton	95500	1.3963	A	23.9037

LSD = 0.40564

Table 2. Rotylenchulus reniformis reproduction on 24 Clemson, 13 Missouri, and 14 Arkansas breeding lines in 2005 tests.

Cultivar	Reniform in soil / Pot soil	Log ratio + 1 of Anand	Grouping	Pf/Pi % of Anand
Fallow	*444*	*0.0398*	(2)B	0.10
S01-9265	*1356*	*0.1126*	(2)AB	0.30
S02-3934	*2336*	*0.1692*	Z(2)AB	0.51
S01-9391	*2436*	*0.1799*	YZ(2)AB	0.53
Anand	*4560*	*0.1910*		1.00
S02-611CR	*5196*	*0.3169*	X-Z(2)AB	1.14
S019364	*6180*	*0.3434*	W-Z(2)A	1.35
S01-8401(HP)	*6336*	*0.3632*	V-Z(2)A	1.39
SC02-212	*8248*	*0.3917*	U-Z(2)A	1.81
SC02-210	*7056*	*0.3975*	T-YZ(2)A	1.55
S02-20388	*8956*	*0.4086*	S-Z	1.96
SC01-819	*8144*	*0.4187*	R-Z	1.78
SC02-208	*8604*	*0.4360*	Q-Z	1.89
R97-1801	*9760*	*0.4478*	P-Z	2.14
R001551	*9656*	*0.4627*	O-Y	2.12
SC02-211	*9380*	*0.4733*	N--X	2.06
R01-1017	10732	0.4960	M--X	2.35
R01-1018	11688	0.5148	L-X	2.56
SC03-9093	12064	0.5171	K-X	2.64
SC02-059	12460	0.5320	J-X	2.73
Santee	11864	0.5359	I-X	2.60
S02-6812	13324	0.5604	H-X	2.92
SC01-809	15060	0.5757	G-X	3.30
Motte	14940	0.5790	F-X	3.28
SC02-046	18056	0.5917	F-X	3.96
Forrest	17968	0.6169	E-W	3.94

R99-1888	18988	0.6234	E-W	4.16
R00-1194F	18452	0.6340	E-W	4.04
V00-3650	17772	0.6354	E-W	3.90
SC01-805	17732	0.6422	E-V	3.89
SC03-9091	20768	0.6585	D-U	4.55
SC02-020	17088	0.6607	C-U	3.75
SC02-163	24034	0.6760	B-U	5.27
SC02-053	23248	0.6771	B-U	5.10
R98-209	19624	0.6786	B-U	4.30
R00-1940	18836	0.6865	B-T	4.13
SC02-054	27836	0.6998	B-S	6.10
SC01-803	21120	0.7042	B-R	4.63
R96-1559	20200	0.7162	B-Q	4.43
R98-1817	23920	0.7258	B-Q	5.24
SC02-147	22656	0.7365	B-P	4.97
R00-684	22540	0.7411	B-O	4.94
R02-2827	25340	0.7439	B-O	5.56
R01-976	26904	0.7578	A-N	5.90
SC02-176	22400	0.7594	A-N	4.91
Braxton	25796	0.7687	A-M	5.66
R99-541	27596	0.7755	A-M	6.05
R01-1092	31404	0.7937	A-L	6.88
R01-375	25080	0.7996	A-L	5.50
R01-4752	29420	0.8022	A-L	6.45
SC02-011	41936	0.8088	A-JK	9.19
S00-9980-22(HP)	36240	0.8210	A-J	7.94
S02-22494	39384	0.8285	A-I	8.63
SC02135	37024	0.8506	A-H	8.12
R01-330	31376	0.8550	A-G	6.88
R98-1821	35112	0.8617	A-G	7.70
SC02-134	35200	0.8684	A-G	7.72

S02-529-3	33816	0.8701	A-F	7.41
R00-1178F	32500	0.8852	A-E	7.13
S02-529-2	39600	0.9451	A-D	8.68
SC02-123	59184	0.9530	A-C	12.97
S02-529-4	38600	0.9589	AB	8.46
Ozark	48300	1.0464	A	10.59
LSD 0.29305				