Maturity Group III
Two Year Soybean Variety Trial Report

M.P. Harrison[1], N.W. Buehring[1], T.W. Allen[2], W.L. Solomon[2] and A.R. Taylor[1]
[1]Northeast Branch Experiment Station; North Mississippi Research and Extension Center,
[2]Delta Research and Extension Center

Abstract

Recent research in North Mississippi indicated maturity group III (MG 3) varieties planted in early May matured 10 or 21 days earlier with yields equivalent to MG 4 or MG 5 varieties, respectively. Nineteen and 25 MG 3 varieties planted on a Leeper silty clay loam soil on May 6, 2015 and May 5, 2016 in Verona, MS were evaluated. MG 4 (Asgrow AG4632) and MG 5 (NK brand NK S55-Q3) varieties were included as standards for comparison. Both years NK S55-Q3 had the greatest yield in the study of 76.9 bu/acre (2015) and 66.0 bu/acre (2016), but was statistically not different from the AG4632 yield of 69.0 bu/acre in 2015. In 2016, the NK S55-Q3 yield of 66.0 bu/acre was greater than the AG4632 yield of 56.3 bu/acre and all MG 3 varieties except the Pioneer P41T33R yield of 59.2 bu/acre. In 2015, three of the MG 3 varieties, including Pioneer P39T67R, P93Y92 and NK S39-T3 produced yield equivalent to AG4632. In 2016, the MG 3 varieties Dyna-Gro 32Y39, Mycogen 5N406R2, Mycogen 5N393R2, Mycogen 5N394R2, NK S39-T3, NK S39-C4, Pioneer P41T33R, Pioneer P39T67R, and Pioneer P93Y84 produced yield equivalent to AG4632. The greater yield for NK S55-Q3 is possibly related to the late season growing environments encountered. In both years the NK S55-Q3 reproductive phase was at the mid-pod-fill stage in early August and was able to take advantage of the August rainfall events that totaled 7.36 inches in 2015 and 4.02 inches in 2016. This was in contrast with MG 3 varieties where the pod-fill stage had been completed by August 5th and did not benefit from the August rainfall. Four MG 3 varieties (Dyna-Gro 32Y39, Pioneer P31T11R, Pioneer P39T67R, and Pioneer P93Y92) in 2015 and one (NK S39-T3) in 2016 were evaluated for yield response to seeding rates from 140,000 to 180,000 seed/acre and exhibited no yield response to greater seeding rates.

Materials and Methods

The study was conducted as a randomized complete block on a Leeper silty clay loam soil with four replications. The plot size consisted of two (8-inch wide) twin rows on 38-inch beds × 20 ft. Plots were planted May 6, 2015 and May 5, 2016, respectively. In 2015 (Table 2), Pioneer P31T11R and P39T67R were planted with 140,000, 160,000 and 180,000 seed/acre and Pioneer 93Y92 was planted with 140,000 and 160,000 seed/acre. In 2016, NK S39-T3 was planted with 140,000 and 160,000 seed/acre. The standards AG4632 and NK S55-Q3 were planted at 140,000 seed/acre both years. The other varieties were planted at 160,000 seed/acre. Weeds and insect pests were controlled with appropriate pesticides. No foliar fungicides were applied. Reproductive stages R1 (first flower), R3 (full bloom), R6 (physiological maturity, seeds fully developed) and R8 (95% pods brown) were recorded for each variety. The varieties were rated for foliar diseases including Cercospora blight (late-season Cercospora; *Cercospora kikuchii*) (CLB), frogeye leaf spot (*Cercospora sojina*) (FLS), Septoria brown spot (*Septoria glycines*), and target spot (*Corynespora cassiicola*) (TS). The ratings were recorded prior to the R6.5 reproductive stage. The rating scale used for frogeye leaf spot (FLS) was based on a scale whereby 0 = no disease and 9 = severe disease. CLB was rated based on the presence of disease on leaves (0 to 5), petioles (6), and pods and stems (7 to 9) based on disease intensity as assessed by coloration of plant material (leaves with distinct purple coloration and petioles, pods and main stems with purple to near black coloration). Ratings for Septoria brown spot (SBS) and target spot (TS; only in 2016) were based on a scale whereby 0 = no disease, 5 = disease in the middle of the canopy and 9 = disease in the upper canopy with severe defoliation. Plots were harvested 7 to 10 days after maturity, with a plot combine

equipped with on-board, plot weight, seed test weight and seed moisture content measurement systems. Yields were adjusted to 13% seed moisture.

Results and Discussion

Rainfall during the growing seasons (Table 1) was highly variable with excess soil moisture followed by intermittent dry periods. In 2015, a wet April followed by a 10 day dry period in May; 3 weeks (May 20-June 10) excessive rainfall (6.75 inches); below normal rainfall (1.37 inches) for June 11 through June 30; 5.90 inches July 1-10th; 0.56 inches rainfall from July 10 through July 30, and a wet August (7.36 inches). The saturated soil conditions during late May and early June 2015 may have resulted in reduced root growth and yield potential. In spite of the poor early season growing conditions and the dry period during the pod fill period (mid to late July), most MG 3 yields were in the 50 to 60 bu/acre yield range. There were only three MG 3 varieties which had yield below 50 bu/acre (Table 2). However, three MG 3 varieties (Pioneer P39T67R, P93Y92 and NK S39-T3) had yield equal to the MG 4 (AG4632); and nine additional varieties (Asgrow AG3934, AG3832, AG3735, Dyna-Gro 32Y39, Mycogen 5N393R2, NK S39-U2, Pioneer P93Y84, Terral REV 38R10, and Terral REV 39A35) had yield that ranged from 56.5 to 61.3 bu/acre.

The 2016 growing season (Table 1) rainfall ranged from only slightly above normal for April and August with below normal rainfall for May (16%N), June (59%N) and July (21%N%). However, the May growing season was excellent for good root growth and the early August rainfall resulted in yields that ranged from 37 to 66 bu/acre (Table 3). NK S55-Q3 which reached R6 on August 19th was able to take advantage of the 2.92 inches rainfall that occurred from August 1 to the 20th and resulted in the greatest study yield of 66 bu/acre (Table 3). The Asgrow AG4632 yield of 56.3 bu/acre was significantly lower than NK S55-Q3. Nine varieties, Dyna-Gro 32Y39, Mycogen 5N393R2, Mycogen 5N394R2, Mycogen 5N406R2, NK S39-T3, NK S39-C4, Pioneer P41T33R, Pioneer P39T67R, and Pioneer P93Y84 producing yield of 48.8 to 59.2 bu/acre were equal to AG4632. The Pioneer 41T33R yield of 59.2 bu/acre also was equal to NK S55-Q3.

In 2015 and 2016 the most productive MG 3 varieties matured 10 to 17 days earlier than the MG 4 variety (AG 4632) and 14 to 21 days earlier than the MG 5 variety (NK S55-Q3). Since the MG 5 variety's physiological maturity (R6) was 17 to 21 days later than MG 3, it was able to utilize the 2015 and 2016 good August rainfall amounts and distribution during pod fill while the MG 3 varieties were past physiological maturity.

In 2015 Pioneer P31T11R and P39T67R were evaluated with seeding rates of 140,000, 160,000 and 180,000 seed/acre (Table 3). In 2015, Pioneer 93Y92 and in 2016 NK S39-T3 were evaluated with seeding rates of 140,000 and 160,000. All of these varieties indicated no yield differences in seed rates. Further research with additional varieties need to be evaluated in comparison to a standard MG 4 and 5 varieties at seeding rates of 120,000 to 180,000 seed/acre.

Disease observations in 2015 suggested that several of the planted varieties were tolerant to frogeye leaf spot, an important yield-limiting disease as well as tolerant to Cercospora blight and Septoria brown spot (Table 4). Entries significantly differed in their observed response to the naturally occurring diseases during the two year study period (Table 4, 2015 and Table 5, 2016). A wide range of responses to Cercospora leaf blight were observed between the entries and ranged from a high of 8, where symptoms

were present on leafs, pods, petioles and the main stem, to a low of 4.5, where Cercospora leaf blight symptoms were only observed on leaves. However, differences in the observations of Cercospora leaf blight could be due in part to relative maturity differences in the plant varieties and the specific maturity at the time of rating. Frogeye leaf spot ranged from a high of 5.0 (NK S39-U2) to a low of less than 1 (Asgrow AG4632; a frogeye-resistant variety). On average, across all varieties regardless of planted population, frogeye leaf spot averaged 2.3. Of the 27 treatments, 41% were observed to have more frogeye leaf spot than the average. Septoria brown spot was observed in the plant canopy regardless of variety; however, for the most part, symptoms of the disease were only present from the bottom (a score of 0-3) to the middle of the plant canopy (a score of 4-5).

Table 1. 2015 and 2016 Rainfall for Verona, MS.

Month	Days of Month 1-10		11-20		21-30		Total		% Normal[1]	
	Rainfall (inches)									
	2015	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**
April	2.99	0.15	3.40	1.89	1.24	2.34	7.63	5.30	153	108
May	0.00	0.41	1.86	0.35	4.80	0.14	6.66	0.90	114	16
June	1.15	0.50	0.47	0.53	0.90	1.78	2.52	2.81	58	59
July	5.90	0.59	0.25	0.34	0.31	0.05	6.46	0.98	151	21
August	2.33	2.01	3.22	0.91	1.81	1.10	7.36	4.02	205	105
Sept.	0.00	0.00	0.05	0.13	0.30	0.00	0.35	0.13	8	3
Total	12.37	3.66	9.25	4.15	9.36	5.41	30.98	13.22		
% Total	40	28	30	0.31	30	41				

[1]Based on the historical (1987-2011) monthly average.

Table 2. Maturity group 3 soybean variety response to seeding rates in comparison to maturity group 4 and 5 variety, 2015, Verona, MS.

			------- X 1000 -------		----------Phenology Dates[1]---------			
Brand	**Variety**	**MG**	**Seed/A**	**Plants/A**	**R1**	**R6**	**R8**	**Bu/A**
NK	S55-Q3	5.5	140	123.45	7/03	8/26	9/28	76.9
Asgrow	AG4632	4.6	140	132.74	6/11	8/11	9/24	69.0[2]
Pioneer	P31T11R	3.1	140	122.08	6/10	7/31	8/24	36.3
Pioneer	P31T11R	3.1	160	138.24	6/10	7/31	8/24	42.0
Pioneer	P31T11R	3.1	180	153.37	6/10	7/31	8/24	39.9
Pioneer	P39T67R	3.9	140	113.13	6/11	8/04	9/10	60.6
Pioneer	P39T67R	3.9	160	120.36	6/11	8/04	9/10	62.0
Pioneer	P39T67R	3.9	180	142.36	6/11	8/05	9/10	60.9
Pioneer	P93Y92	3.9	140	124.48	6/10	8/05	9/10	61.8
Pioneer	P93Y92	3.9	160	137.89	6/10	8/05	9/10	59.8
REV	38R10	3.9	160	116.92	6/10	8/04	9/10	59.1
REV	39A35	3.9	160	125.17	6/10	8/09	9/10	57.2
NK Brand	S39-T3	3.9	160	144.08	6/10	8/07	9/14	67.0
NK Brand	S39-U2	3.9	160	136.86	6/10	8/01	9/11	57.5
Dyna-Grow	32Y39	3.9	140	120.01	6/10	8/04	9/10	55.7
Dyna-Grow	32Y39	3.9	160	133.77	6/10	8/04	9/10	57.5
Asgrow	AG3735	3.7	160	133.88	6/10	8/04	9/05	58.1
Asgrow	AG3832	3.8	160	131.36	6/10	8/01	9/10	58.4
Asgrow	AG3934	3.9	160	137.31	6/10	7/31	9/10	56.5
Mycogen	5N393R2	3.9	160	149.59	6/09	7/31	9/05	61.3
Mycogen	5N342R2	3.4	160	134.46	6/10	7/31	8/29	52.9
Pioneer	P93Y84	3.8	160	102.48	6/11	8/09	9/14	56.6
Pioneer	P36T86R	3.6	160	115.89	6/11	8/05	9/10	53.3
Pioneer	P35T58R	3.5	160	138.21	6/09	8/04	9/03	51.5
Pioneer	P32T16R	3.2	160	127.92	6/10	7/31	8/24	47.1
Pioneer	P93Y05	3.9	160	127.92	6/10	7/31	8/26	44.5
Pioneer	P31T77R	3.1	160	124.14	6/10	8/02	8/25	39.7
								LSD (*P*=0.05) =7.5
								CV = 9.6 %

[1]Phenology dates: R1 was first flower date; R6 physiological maturity (seeds fully develop and are separated from each other in the pod; and R8 is maturity [95% of the pods are brown (dry)].
[2]Shaded values are not different from each other at the 5% probability levels.

Table 3. Maturity group 3 soybean variety response to seeding rates in comparison to maturity group 4 and 5 variety, 2016, Verona, MS.

			----------X 1000-------		--------Phenology Dates[1]-------			
Brand	**Variety**	**MG**	**Seed/A**	**Plants/A**	**R1**	**R6**	**R8**	**Bu/A**
NK	S55-Q3	5.5	140	119.8	7/11	8/19	9/30	66.0[2]
Pioneer	P41T33R	4.1	160	119.3	6/27	8/12	9/13	59.2
NK	S39-T3	3.9	140	118.5	6/27	8/12	9/12	56.8
Asgrow	AG4632	4.6	140	111.9	6/28	8/15	9/26	56.3
NK	S39-T3	3.9	160	125.2	6/28	8/15	9/26	55.6
Mycogen	5N393R2	3.9	160	123.1	6/27	8/01	9/06	53.8
Mycogen	5N394R2	3.9	160	131.0	6/27	8/12	9/12	52.2
Pioneer	P39T67R	3.9	160	105.0	6/28	8/08	9/09	50.8
Pioneer	P93Y84	3.8	160	122.6	6/28	8/05	9/12	50.7
Mycogen	5N406R2	4.0	160	131.4	6/29	8/05	9/06	50.6
Dyna-Gro	32Y39	3.9	160	118.5	6/20	8/05	8/28	49.6
NK	S39-C4	3.9	160	114.5	7/05	8/12	9/09	48.8
Asgrow	AG3755	3.7	160	118.3	6/20	8/05	9/09	48.5
Asgrow	AG3832	3.8	160	131.4	6/27	8/05	8/29	47.6
Pioneer	P36T86R	3.6	160	119.5	6/28	8/05	8/30	46.9
Pioneer	P93Y92	3.9	160	117.1	6/27	8/05	9/06	46.6
REV	39A35	3.9	160	110.7	6/28	8/01	8/31	46.5
Pioneer	P38T42R	3.8	160	116.7	6/27	8/08	9/06	46.3
Pioneer	P35T58R	3.5	160	117.3	6/26	8/08	8/29	44.7
REV	38R10	3.8	160	119.8	6/28	8/08	9/06	43.1
Mycogen	5N342R2	3.4	160	122.2	6/27	8/01	8/24	42.6
Pioneer	P32T16R	3.2	160	122.1	6/20	8/01	8/24	42.4
Asgrow	AG3936	3.9	160	126.4	6/20	8/01	9/06	42.4
NK	S37Z8	3.7	160	124.5	6/20	8/05	9/06	41.9
Pioneer	93Y05	3.0	160	117.4	6/28	8/01	8/29	40.4
Pioneer	P31T11R	3.1	160	111.8	6/20	8/01	8/24	37.5
Pioneer	P31T77R	3.1	160	120.2	6/23	7/29	8/30	36.8
							LSD P=0.05	8.0
							CV	11.8

[1]Phenology dates: R1 was first flower date; R6 physiological maturity (seeds fully develop and are separated from each other in the pod); and R8 is maturity [95% of the pods are brown (dry)].
[2]Shaded values are not different from each other at the 5% probability levels.

Table 4. Maturity group 3 soybean variety leaf disease ratings in 2015, Verona, MS

Brand	Variety	MG	Seed/A X1000	CLB[1,2]	FLS[1,2]	Septoria[3]
NK Brand	S55-Q3	5.5	140	6.0 cd	1.0 ij	2.5 fg
Asgrow	AG4632	4.6	140	4.8 f	0.8 j	2.3 g
Pioneer	P31T11R	3.1	140	7.3 ab	2.8 ef	4.3 a-e
Pioneer	P31T11R	3.1	160	8.0 a	1.5 hij	3.8 b-f
Pioneer	P31T11R	3.1	180	8.0 a	2.8 ef	3.8 b-f
Pioneer	P39T67R	3.9	140	4.8 f	4.3 ab	3.5 c-g
Pioneer	P39T67R	3.9	160	4.8 f	3.8 bc	3.0 efg
Pioneer	P39T67R	3.9	180	6.0 cd	3.3 cde	4.3 a-e
Pioneer	P93Y92	3.9	140	5.8 de	1.0 ij	4.8 abc
Pioneer	P93Y92	3.9	160	5.3 def	1.3 ij	3.8 b-f
REV	38R10	3.8	160	5.0 ef	1.5 hij	4.3 a-e
REV	39A35	3.9	160	4.5 f	2.5 efg	3.3 c-g
NK Brand	S39-T3	3.9	160	4.8 f	4.0 bc	4.7 a-d
NK Brand	S39-U2	3.9	160	5.8 de	5.0 a	3.0 efg
Dyna-Grow	32Y39	3.9	140	5.8 de	1.8 ghi	3.8 b-f
Dyna-Grow	32Y39	3.9	160	6.0 cd	1.3 ij	3.0 efg
Asgrow	AG3735	3.7	160	5.3 def	1.8 ghi	3.5 c-g
Asgrow	AG3832	3.8	160	5.7 de	1.8 ghi	3.8 b-f
Asgrow	AG3934	3.9	160	6.0 cd	1.0 ij	3.0 efg
Mycogen	5N393R2	3.9	160	6.0 cd	1.8 ghi	3.8 b-f
Mycogen	5N342R2	3.4	160	6.0 cd	3.0 def	4.5 a-d
Pioneer	P93Y84	3.8	160	4.8 f	3.3 cde	3.8 b-f
Pioneer	P36T86R	3.6	160	5.3 def	2.3 fgh	4.0 a-e
Pioneer	P35T58R	3.5	160	5.8 de	1.8 ghi	4.0 a-e
Pioneer	P32T16R	3.2	160	7.3 ab	3.3 cde	5.3 a
Pioneer	P93Y05	3.0	160	6.8 bc	1.8 ghi	4.5 a-d
Pioneer	P31T77R	3.1	160	7.3 ab	1.8 ghi	5.0 ab
			CV	11.0	29.5	26.7
			P-value	<0.0001	<0.0001	< 0.0064
			LSD	0.9	0.9	1.5
			ST. DEV.	1.3	1.23	1.13

[1]Ratings for FLS (frogeye leafspot) were based on a scale whereby 0 = no disease and 9 = severe disease. Ratings for CLB (Cercospora blight) were rated progressively based on the presence of disease on leaves (0 to 5), petioles (6), and on pods and stems (7 to 9) based on disease intensity as assessed by coloration of plant material (leaves with distinct purple coloration and petioles, pods and main stems with purple to near black coloration).

[2]Means followed by the same letter(s) within a column are not significantly different according to Fisher's protected LSD (*P*=0.0.5)

[3]Ratings for Septoria (Septoria brown spot) were based on a scale whereby 0 = no disease, 5 = disease in the middle of the canopy, and 9 = disease in the upper canopy with severe defoliation.

Table 5. Maturity group 3 soybean variety leaf disease ratings in 2016, Verona, MS

Brand	Variety	MG	Seed/A X1000	CLB[1,2]	FLS[1,2]	SBS[3]	TS
NK	S55-Q3	5.5	140	6.0 ab	0.0 d	3.8 i	4.3 ijk
Pioneer	P41T33R	4.1	160	5.3 cd	1.0 bcd	4.5 ghi	4.5 hij
NK	S39-T3	3.9	140	4.8 d	1.5 bc	4.8 f-i	4.3 ijk
Asgrow	AG4632	4.6	140	5.0 cd	0.0 d	5.3 d-h	4.0 jk
NK	S39-T3	3.9	160	5.0 cd	1.8 abc	4.8 f-i	3.3 k
Mycogen	5N393R2	3.9	160	5.3 cd	1.0 bcd	5.8 c-f	5.3 e-i
Mycogen	5N394R2	3.9	160	5.0 cd	2.8 a	4.8 f-i	4.5 hij
Pioneer	P39T67R	3.9	160	5.5 bc	2.0 ab	5.0 e-h	4.3 ijk
Pioneer	P93Y84	3.8	160	5.5 bc	1.0 bcd	4.8 f-i	4.8 g-j
Mycogen	5N406R2	4.0	160	5.5 bc	2.0 ab	6.0 b-e	6.3 b-e
Dyna-Gro	32Y39	3.9	160	6.0 ab	1.0 bcd	6.3 bcd	5.3 e-i
NK	S39-C4	3.9	160	5.0 cd	1.0 bcd	4.3 hi	4.0 jk
Asgrow	AG3735	3.7	160	5.5 bc	1.0 bcd	5.8 c-f	5.5 d-h
Asgrow	AG3832	3.8	160	5.3 cd	1.0 bcd	6.3 bcd	5.8 c-g
Pioneer	P36T86R	3.6	160	6.0 ab	1.3 bc	6.5 abc	6.3 b-e
Pioneer	P93Y92	3.9	160	6.0 ab	0.8 cd	6.0 b-e	5.5 d-h
REV	39A35	3.9	160	5.0 cd	1.8 abc	5.8 c-f	5.0 f-j
Pioneer	P38T42R	3.8	160	5.5 bc	1.0 bcd	6.0 b-e	5.3 e-i
Pioneer	P35T58R	3.5	160	6.0 ab	1.3 bc	5.5 c-g	4.8g-j
REV	38R10	3.8	160	5.5 bc	1.0 bcd	6.3 bcd	5.8 c-g
Mycogen	5N342R2	3.4	160	6.3 a	1.3 bc	6.3 bcd	6.3 e-i
Pioneer	P32T16R	3.2	160	6.3 a	2.0 ab	7.0 ab	7.0 ab
Asgrow	AG3936	3.9	160	5.5 bc	2.0 ab	6.5 abc	6.0 b-f
NK	S37Z8	3.7	160	5.5 bc	1.3 bc	6.0 b-e	6.5 a-d
Pioneer	93Y05	3.0	160	6.0 ab	1.5 bc	7.5 a	7.5 a
Pioneer	P31T11R	3.1	160	6.3 a	1.5 bc	7.0 ab	6.8 abc
Pioneer	P31T77R	3.1	160	6.5 a	0.8 cd	7.5 a	7.0 ab
			LSD (0.05)	0.7	1.1	1.1	1.2
			CV	9.5	61.1	13.1	15.5
			Standard Deviation				
			P-value	<0.0001	0.0017	<0.0001	<0.0001

[1]Ratings for FLS (frogeye leafspot) were based on a scale whereby 0 = no disease and 9 = severe disease. Ratings for CLB (Cercospora blight) were rated progressively based on the presence of disease on leaves (0 to 5), petioles (6), and on pods and stems (7 to 9) based on disease intensity as assessed by coloration of plant material (leaves with distinct purple coloration and petioles, pods and main stems with purple to near black coloration).

[2]Means followed by the same letter(s) within a column are not significantly different according to Fisher's protected LSD (*P*=0.0.5)

[3]Ratings for SBS (Septoria brown spot) and TS (target spot) were based on a scale whereby 0 = no disease, 5 = disease in the middle of the canopy, and 9 = disease in the upper canopy with severe defoliation.