



SOYBEAN VARIETIES' RATINGS FOR STEM CANKER AND FROGEYE LEAF SPOT–2023

Dr. Tom Allen, MSU Extension/Research Professor at the Delta Research and Extension Center in Stoneville, Miss., has provided the below ratings for frogeye leaf spot [FLS] and stem canker [SC] diseases of soybeans. The ratings were made on varieties that were entered in the 2023 Mississippi Soybean Official Variety Trials [OVT].

level, the more stringent the statistical test.

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The following points are pertinent for the ratings.

- According to Dr. Allen, Verona in northeast Miss. was the only OVT location that had a meaningful FLS infestation. Thus, FLS ratings are shown for that location only.
- Stem canker ratings are those from inoculated trials. No letter groupings for these ratings are shown in the SC data tables since the checks were susceptible to the disease pathogen, and the OVT entries had little or no disease symptoms. Thus, originators of the varieties grown in the OVT have ensured that SC resistance has been maintained in those varieties.
- A description of the rating system used for each disease is given in the footnote of each table.

Statistics

MSE [Mean Squared Error]. The MSE of an estimator measures the average of error squares—i.e. the average squared difference between the estimated values and true value. It is a risk function, corresponding to the expected value of the squared error loss. The MSE assesses the quality of an estimator [the ratings shown here are estimators of how a variety will tolerate a disease]. In other words, it measures the quality of the estimate of the disease incidence [ratings] on the varieties in the accompanying tables. It is always positive and values closer to zero are better—i.e., an MSE of zero means the estimate predicts disease infection potential with perfect accuracy, which is not typically possible.

CV [coefficient of variation] and/or R^2 [coefficient of determination]. These values are a measure of the relative precision of a given trial and can be used to compare the relative precision of different trials. The CV is generally considered to be an estimate of the amount of unexplained variation in a given trial or test, while the R^2 is a measure of the amount of variation that is explained or accounted for in a given test. A CV below 10% [10% unexplained variation in a trial] is desired, while an R^2 above 0.90 [90% of the variation in a trial has been accounted for] is desired.

Probability level [p value)]. The smaller the probability

Table 1. Ratings for FLS infection of MG IV Enlist soybean varieties grown in the MSU OVT, Verona, Miss., 2023.

Company/Variety	Rating^{1,2}
Delta Grow 46E10	1.3 c
Delta Grow 46E30	0.0 d
Delta Grow 48E59	1.0 c
Delta Grow 49E30/STS	2.7 a
Delta Grow 49E80	0.0 d
Innvictis B4903E	1.0 c
Innvictis B5013E	2.0 b
MSE	0.29
CV (%)	25.85
<i>P</i> -value for F-statistic	<0.0001

¹Frogeye leaf spot observation was conducted by observing the foliage in the upper third of the canopy for the presence of lesions associated with FLS. Ratings were given for each individual plot and then averaged for the three replicate plots of each cultivar. Plots were evaluated on a 0-9 scale.

²Means followed by the same letter(s) within a column are not significantly different according to Fisher's Protected LSD ($P=0.05$).

Table 2. Ratings for FLS infection of MG IV early Xtend soybean varieties grown in the MSU OVT, Verona, Miss., 2023.

Company/Variety	Rating^{1,2}
Armor Seed 44-D49	0.3 hi
Armor Seed 45-F02	4.3 a
Armor Seed 46-F96	1.3 efg
Asgrow AG39XF3	1.0 fgh
Asgrow AG45XF3	2.0 cde
Asgrow AG46XF3	2.3 bcd
Beck's 4337XF	1.0 fgh
Delta Grow 44XF75/STS	0.3 hi
Delta Grow 46X65/STS	1.0 fgh
Delta Grow 46XF54	1.7 def
Don Mario DM45F23 (DM45F61)	0.0 i
Dyna-Gro S42XF93S	2.3 bcd
Dyna-Gro S46XF31S	0.3 hi
Gateway Seed 457XFS	1.0 fgh
Gateway Seed 461XFS	0.0 i
Gateway Seed 469XF	1.3 efg
Great Heart Seed GT-4366XFS	1.0 fgh
Great Heart Seed GT-4538XFS	1.3 efg
Great Heart Seed GT-4677XS	1.0 fgh
Great Heart Seed GT-4681XFS	1.0 fgh
Innvictis A4503XF	1.0 fgh
NK NK42-T5XF	1.0 fgh
NK NK43-Y9XFS	2.7 bcd
NK NK44-J4XFS	0.7 ghi
NK NK46-B4XFS	1.7 def
Pioneer P44A21X	0.0 i
Progeny 4604XFS	1.0 fgh
Progeny 4623XFS	1.0 fgh
Progeny 4665XFS	1.0 fgh
Progeny 4691XFS	2.0 cde
Revere 4415XF	0.0 i
Revere 4526XF	3.0 b
Revere 4606XF	0.7 ghi
MSE	0.58
CV (%)	47.81
P-value for F-statistic	<0.0001

¹Frogeye leaf spot observation was conducted by observing the foliage in the upper third of the canopy for the presence of lesions associated with FLS. Ratings were given for each individual plot and then averaged for the three replicate plots of each cultivar. Plots were evaluated on a 0-9 scale.

²Means followed by the same letter(s) within a column are not significantly different according to Fisher's Protected LSD ($P=0.05$).

Table 3. Ratings for FLS infection of MG IV late Xtend soybean varieties grown in the MSU OVT, Verona, Miss., 2023.

Company/Variety	Rating^{1,2}
Asgrow AG47XF2	0.3 fg
Asgrow AG48X9	2.0 bcd
Asgrow AG48XF2	0.3 fg
Asgrow AG48XF3	2.0 bcd
Asgrow AG49XF4	0.3 fg
Beck's 4887XF	0.3 fg
Delta Grow 47XF38	1.7 cde
Delta Grow 48X45	0.7 efg
Delta Grow 48XF33	0.0 g
Delta Grow 48XF42	1.0 d-g
Delta Grow 49XF85/STS	0.0 g
Don Mario DM48F53 (210985)	0.0 g
Dyna-Gro S47XF23S	0.7 efg
Dyna-Gro S49XF43S	0.7 efg
Dyna-Gro S49XF82	2.0 bcd
Gateway Seed 473XFS	1.7 cde
Great Heart Seed GT-4756XF	1.3 d-g
Great Heart Seed GT-4762XF	1.0 d-g
Great Heart Seed GT-4867XF	0.0 g
Innvictis A4862XF	0.3 fg
NK NK47-Z1XF	0.3 fg
NK NK48-A8XFS	3.7 a
NK NK49-C2XFS	3.0 ab
Pioneer P47A64X	0.3 fg
Progeny 4755XFS	2.0 bcd
Progeny 4778XFS	0.0 g
Progeny 4798XF	1.0 d-g
Progeny 4806XFS	2.7 abc
Progeny 4947XFS	0.3 fg
Revere 4727XF	1.0 d-g
Revere 4731XF	0.3 fg
Revere 4795XS	2.0 bcd
Revere 4826XFS	1.0 d-g
Revere 4934XF	0.0 g
MSE	0.75
CV (%)	74.8
P-value for F-statistic	<0.0001

¹Frogeye leaf spot observation was conducted by observing the foliage in the upper third of the canopy for the presence of lesions associated with FLS. Ratings were given for each individual plot and then averaged for the three replicate plots of each cultivar. Plots were evaluated on a 0-9 scale.

²Means followed by the same letter(s) within a column are not significantly different according to Fisher's Protected LSD ($P=0.05$).

Table 4. Ratings for FLS infection of MG V early Xtend soybean varieties grown in the MSU OVT, Verona, Miss., 2023.

Company/Variety	Rating^{1,2}
Asgrow AG53XF2	0.3 de
Asgrow AG56XF2	0.0 e
Delta Grow 52XF22/STS	2.7 a
Delta Grow 53XF95/STS	0.3 de
Delta Grow 55X25	0.0 e
Delta Grow 55XF23	0.7 cde
Dyna-Gro S52XT91	1.3 a-e
Great Heart Seed GT-5214X	0.0 e
Great Heart Seed GT-5320XF	2.3 ab
Great Heart Seed GT-5417X	0.7 cde
Innvictis A5003XF	0.0 e
NK NK52-V1XF	2.0 abc
NK NK54-J9XFS	1.0 b-e
NK NK56-Z6XFS	1.7 a-d
Pioneer P50A08LX	0.0 e
Pioneer P53A67X	0.0 e
Progeny 5056XFS	1.7 a-d
Progeny 5441XF	0.3 de
Progeny 5641XF	0.0 e
Revere 5029XF	2.0 abc
MSE	0.88
CV (%)	100.93
P-value for F-statistic	0.0007

¹An asterisk denotes an entry that was added to supplement the set of entries evaluated through toothpick ¹Frogeye leaf spot observation was conducted by observing the foliage in the upper third of the canopy for the presence of lesions associated with FLS. Ratings were given for each individual plot and then averaged for the three replicate plots of each cultivar. Plots were evaluated on a 0-9 scale.

²Means followed by the same letter(s) within a column are not significantly different according to Fisher's Protected LSD ($P=0.05$).

Table 5. Ratings for FLS infection of MG V late Xtend soybean varieties grown in the MSU OVT, Verona, Miss., 2023.

Company/Variety	Rating^{1,2}
Innictis A5813XF	1.0 a
Progeny 5751XF	0.0 b
MSE	0.0
CV (%)	0.0
<i>P</i> -value for F-statistic	<0.0001

¹Frogeye leaf spot observation was conducted by observing the foliage in the upper third of the canopy for the presence of lesions associated with FLS. Ratings were given for each individual plot and then averaged for the three replicate plots of each cultivar. Plots were evaluated on a 0-9 scale.

²Means followed by the same letter(s) within a column are not significantly different according to Fisher's Protected LSD ($P=0.05$).

Table 6. Ratings for stem canker infection of MG IV & V Enlist soybean varieties, 2023.

Company/Variety¹	Rating²	Variety designation³
J77-339 (check)	5.7	MS
Petrus 4916GT (check)	6.8	MS
Delta Grow 46E10	0.0	R
Delta Grow 46E30	0.5	R
Delta Grow 48E59	0.0	R
Delta Grow 49E30/STS	0.0	R
Delta Grow 49E80	0.1	R
Innvictis B4903E	0.0	R
Innvictis B5013E	0.0	R
Pioneer P38A28E	3.2	MR
Pioneer P42A84E	0.0	R
Pioneer P45A81E	0.0	R
Pioneer P48A14E	0.0	R
Pioneer P51A33SE	0.0	R
Pioneer P56A71E	0.2	R
MSE	8.27	-
CV (%)	28.04	-
P-value for F-statistic	<0.0001	-

¹An asterisk denotes an entry that was added to supplement the set of entries evaluated through toothpick inoculation. Information from the given entry will only be included in these data tables and may not represent the greater set of data generated by the Mississippi State University Official Variety Testing Program as this entry was not provided for comparison in the greater 2023 soybean OVT program conducted throughout Mississippi.

²Stem Canker Reaction-Ten plants per plot were inoculated with fungus-infested toothpicks. Ratings were given by individual plant reaction using a modified 0-9 scale based on lesion severity and are presented as the average for the ten plants. Where a lesion did not appear, a rating of 0 (Resistant) was assessed. Ratings were assessed based on the presence of a lesion whereby a reaction that produced a visible lesion that did not expand up the length of the stem was assessed as a 1. Dead plants with lesions that extended up most of the plant's length received a score of 9.

³By using the Mean Disease Rating, a standardized designation system is as follows: 1 = Resistant, 3 = Moderately Resistant, 5 = Moderately Susceptible and 7 = Susceptible.

Table 7. Ratings for stem canker infection of MG IV early Xtend soybean varieties, 2023.

Company/Variety¹	Rating²	Variety designation³
J77-339 (check)	5.3	MS
Petrus 4916GT (check)	6.9	MS
Armor Seed 44-D49	0.0	R
Armor Seed 45-F02	0.0	R
Armor Seed 46-F96	0.0	R
Asgrow AG39XF3	0.0	R
Asgrow AG42XF4	0.2	R
Asgrow AG43XF2	0.0	R
Asgrow AG45XF3	0.0	R
Asgrow AG46XF3	0.0	R
Beck's 4337XF	0.0	R
Delta Grow 44XF75/STS	0.0	R
Delta Grow 46X65/STS	0.0	R
Delta Grow 46XF54	0.0	R
Don Mario DM45F23 (DM45F61)	0.0	R
Dyna-Gro S42XF93S	0.0	R
Dyna-Gro S43XS70	0.3	R
Dyna-Gro S46XF31S	0.0	R
Dyna-Gro S46XS60	0.0	R
Gateway Seed 457XFS	0.0	R
Gateway Seed 461XFS	0.2	R
Gateway Seed 469XF	0.0	R
Great Heart Seed GT-4255XS	0.0	R
Great Heart Seed GT-4366XFS	0.0	R
Great Heart Seed GT-4538XFS	0.0	R
Great Heart Seed GT-4677XS	0.0	R
Great Heart Seed GT-4681XFS	0.1	R
Innictis A4411XF	0.1	R
Innictis A4503XF	0.2	R
NK NK42-T5XF	0.0	R
NK NK43-Y9XFS	0.0	R
NK NK44-J4XFS	0.6	R
NK NK46-B4XFS	0.2	R
Pioneer P44A21X	0.0	R
Pioneer P45A70LX	0.0	R
Pioneer P46A90LX	0.1	R
Progeny 4200RXS	1.4	R
Progeny 4604XFS	0.1	R
Progeny 4623XFS	0.0	R
Progeny 4665XFS	0.1	R
Progeny 4691XFS	0.0	R
Revere 4415XF	1.3	R
Revere 4526XF	0.2	R
Revere 4606XF	0.1	R
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	MSE	26.13
	CV (%)	29.70
	P-value for F-statistic	<0.0001

¹An asterisk denotes an entry that was added to supplement the set of entries evaluated through toothpick inoculation. Information from the given entry will only be included in these data tables and may not represent the greater set of data generated by the Mississippi State University Official Variety Testing Program as this entry was not provided for comparison in the greater 2023 soybean OVT program conducted throughout Mississippi.

²Stem Canker Reaction-Ten plants per plot were inoculated with fungus-infested toothpicks. Ratings were given by individual plant reaction using a modified 0-9 scale based on lesion severity and are presented as the average for the ten plants. Where a lesion did not appear, a rating of 0 (Resistant) was assessed. Ratings were assessed based on

the presence of a lesion whereby a reaction that produced a visible lesion that did not expand up the length of the stem was assessed as a 1. Dead plants with lesions that extended up most of the plant's length received a score of 9.
³By using the Mean Disease Rating, a standardized designation system is as follows: 1 = Resistant, 3 = Moderately Resistant, 5 = Moderately Susceptible and 7 = Susceptible.

Table 8. Ratings for stem canker infection of MG IV late Xtend soybean varieties, 2023.

Company/variety¹	Rating²	Variety designation³
J77-339 (check)	6.5	MS
Petrus 4916GT (check)	7.5	S
Asgrow AG47XF2	0.0	R
Asgrow AG48X9	0.5	R
Asgrow AG48XF2	0.3	R
Asgrow AG48XF3	0.0	R
Asgrow AG49XF4	0.0	R
Beck's 4887XF	0.0	R
Delta Grow 47XF38	0.7	R
Delta Grow 48X45	0.3	R
Delta Grow 48XF33	0.4	R
Delta Grow 48XF42	0.0	R
Delta Grow 49XF85/STS	0.0	R
Don Mario DM48F53 (210985)	0.0	R
Dyna-Gro S47XF23S	0.2	R
Dyna-Gro S49XF43S	0.0	R
Dyna-Gro S49XF82	0.0	R
Gateway Seed 473XFS	0.1	R
Great Heart Seed GT-4756XF	0.0	R
Great Heart Seed GT-4762XF	0.1	R
Great Heart Seed GT-4867XF	0.2	R
Innvictis A4850XF	0.0	R
Innvictis A4862XF	0.0	R
NK NK47-Z1XF	0.0	R
NK NK48-A8XFS	0.0	R
NK NK49-C2XFS	0.5	R
NK S49-F5X	0.3	R
Pioneer P47A64X	0.0	R
Pioneer P48A04LX	1.3	R
Progeny 4755XFS	0.1	R
Progeny 4778XFS	0.0	R
Progeny 4798XF	1.3	R
Progeny 4806XFS	0.0	R
Progeny 4947XFS	0.0	R
Revere 4727XF	0.0	R
Revere 4731XF	0.0	R
Revere 4795XS	0.4	R
Revere 4826XFS	0.0	R
Revere 4934XF	0.0	R
MSE	24.75	-
CV (%)	32.35	-
P-value for F-statistic	0.0002	-

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²Stem Canker Reaction-Ten plants per plot were inoculated with fungus-infested toothpicks. Ratings were given by individual plant reaction using a modified 0-9 scale based on lesion severity and are presented as the average for the ten plants. Where a lesion did not appear, a rating of 0 (Resistant) was assessed. Ratings were assessed based on the presence of a lesion whereby a reaction that produced a visible lesion that did not expand up the length of the stem was assessed as a 1. Dead plants with lesions that extended up most of the plant's length received a score of 9.

³By using the Mean Disease Rating, a standardized designation system is as follows: 1 = Resistant, 3 = Moderately Resistant, 5 = Moderately Susceptible and 7 = Susceptible.

Table 9. Ratings for stem canker infection of MG V early Xtend soybean varieties, 2023.

Company/Variety¹	Rating²	Variety designation³
J77-339 (check)	5.2	MS
Petrus 4916GT (check)	6.0	MS
Asgrow AG53XF2	0.0	R
Asgrow AG56XF2	0.7	R
Delta Grow 52XF22/STS	0.0	R
Delta Grow 53XF95/STS	0.0	R
Delta Grow 55X25	0.4	R
Delta Grow 55XF23	0.0	R
Dyna-Gro S51XF84S	0.0	R
Dyna-Gro S52XT91	0.0	R
Great Heart Seed GT-5214X	0.0	R
Great Heart Seed GT-5320XF	0.0	R
Great Heart Seed GT-5417X	0.0	R
Innvictis A5003XF	0.0	R
NK NK52-V1XF	0.0	R
NK NK54-J9XFS	0.1	R
NK NK55-T2XF	0.3	R
NK Seeds NK56-Z6XFS	0.0	R
Pioneer P50A08LX	0.4	R
Pioneer P53A67X	0.9	R
Pioneer P54A54X	0.3	R
Progeny 5056XFS	0.2	R
Progeny 5441XF	0.0	R
Progeny 5641XF	0.0	R
Revere 5029XF	0.0	R
MSE	13.97	-
CV (%)	27.67	-
<i>P</i> -value for F-statistic	<0.0001	-

¹An asterisk denotes an entry that was added to supplement the set of entries evaluated through toothpick inoculation. Information from the given entry will only be included in these data tables and may not represent the greater set of data generated by the Mississippi State University Official Variety Testing Program as this entry was not provided for comparison in the greater 2023 soybean OVT program conducted throughout Mississippi.

²Stem Canker Reaction-Ten plants per plot were inoculated with fungus-infested toothpicks. Ratings were given by individual plant reaction using a modified 0-9 scale based on lesion severity and are presented as the average for the ten plants. Where a lesion did not appear, a rating of 0 (Resistant) was assessed. Ratings were assessed based on the presence of a lesion whereby a reaction that produced a visible lesion that did not expand up the length of the stem was assessed as a 1. Dead plants with lesions that extended up most of the plant's length received a score of 9.

³By using the Mean Disease Rating, a standardized designation system is as follows: 1 = Resistant, 3 = Moderately Resistant, 5 = Moderately Susceptible and 7 = Susceptible.

Table 10. Ratings for stem canker infection of MG V late Xtend soybean varieties, 2023.

Company/variety¹	Rating²	Variety designation³
J77-339 (check)	5.2	MS
Petrus 4916GT (check)	7.3	MS
Innvictis A5813XF	0.0	R
Progeny 5751XF	0.0	R
MSE	1.69	-
CV (%)	19.99	-
<i>P</i> -value for F-statistic	<0.0001	-

¹An asterisk denotes an entry that was added to supplement the set of entries evaluated through toothpick inoculation. Information from the given entry will only be included in these data tables and may not represent the greater set of data generated by the Mississippi State University Official Variety Testing Program as this entry was not provided for comparison in the greater 2023 soybean OVT program conducted throughout Mississippi.

²Stem Canker Reaction-Ten plants per plot were inoculated with fungus-infested toothpicks. Ratings were given by individual plant reaction using a modified 0-9 scale based on lesion severity and are presented as the average for the ten plants. Where a lesion did not appear, a rating of 0 (Resistant) was assessed. Ratings were assessed based on the presence of a lesion whereby a reaction that produced a visible lesion that did not expand up the length of the stem was assessed as a 1. Dead plants with lesions that extended up most of the plant's length received a score of 9.

³By using the Mean Disease Rating, a standardized designation system is as follows: 1 = Resistant, 3 = Moderately Resistant, 5 = Moderately Susceptible and 7 = Susceptible.