



LODGING AND SHATTERING IN SOYBEAN

Lodging and shattering of soybean in the Midsouth has been a concern in the past. However, is that still the case, and should producers be cognizant of these traits in the varieties that are now being grown?

The concern about these two traits is rooted in the past history of soybean production in the Midsouth for two reasons.

- When MG's V-VII were being grown in the old "conventional" system—i.e. May and later planting dates—they routinely got very tall [>36 in.] and fell over or lodged before harvest. Often, this led to reduced yield since the lower part of the stems were on the ground and did not set pods.
- When MG IV's were introduced into the Midsouth in the early days of the ESPS, varieties that were available came from more northerly latitudes; thus, they were not adapted to Midsouth conditions. The mature pods of these varieties would often dehisce at maturity because of the hot, dry conditions during this time. The seed from these burst pods would then shatter and fall to the ground. The sound of this shattering was so pronounced that it sounded like popcorn being popped. This was disheartening to hear because it indicated that mature seed that would have been harvested were lost.

So, it appears that scoring of today's varieties for lodging and shattering is a holdover from the past when these traits were often consequential. But are these ratings/scores or consideration of them necessary today? The following presentation will help soybean producers decide.

In **Table 1** below, average values for these two traits along with plant height at maturity are shown from selected Soybean Official Variety Trials [SOVT] that were conducted in Arkansas in 2016. As the tabled data indicate, average lodging scores did not exceed 1.4 in any of the early-planted tests, and only exceeded 2.0 in the full-season test on the silt loam site at Stuttgart, where average plant height was as much as 43 in. A perusal of the Mississippi and Louisiana SOVT reports shows the same result—i.e.

lodging score of the vast majority of tested varieties was 1, and only rarely did any variety receive a score of 2 or greater.

It is known that plants of varieties growing in later plantings on a silt loam soil such as that at Stuttgart likely will reach a height that will be conducive to lodging, and this should be considered when planting during this timeframe on loam soils. Click [here](#) for an example of this occurrence.

In Table 1, average shatter scores rarely exceeded 1.0 in any of the shown tests, which means that there was essentially no shattering of seed from pods of any of the tested varieties no matter if planted early or late at any of the locations. This indicates that recording shatter ratings is apparently not necessary. Today's varieties apparently are not prone to shattering.

So what does this mean? Simply stated, producers should not be concerned about lodging and shattering when deciding on a variety to plant early. These two traits are just not important selection criteria for today's varieties when planted during this preferred timeframe.



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Table 1. Average height, and average lodging and shatter scores for soybean varieties grown in Arkansas SOVT's at Keiser, Rohwer, and Stuttgart in 2016.

Test	Height [in.]	Lodging*	Shatter**
Keiser [planting date and relative maturity (RM) in parentheses]			
Clay–Early-planted (4/13) Irrigated early MG IV (RM 4.0-4.5)	30	1.0	1.1
Clay–Early-planted (4/13) Irrigated mid MG IV (RM 4.6-4.7)	33	1.1	1.0
Clay–Early-planted (4/13) Irrigated late MG IV (RM 4.8-4.9)	34	1.4	1.0
Clay–Early-planted (4/13) Irrigated MG V (RM 5.0-5.3)	31	1.2	1.0
Clay–Full-season (5/13) Irrigated early MG IV (RM 4.0-4.5)	41	1.3	1.0
Clay–Full-season (5/13) Irrigated mid MG IV (RM 4.6-4.7)	43	1.4	1.0
Clay–Full-season (5/13) Irrigated late MG IV (RM 4.8-4.9)	39	1.3	1.0
Clay–Full-season (5/13) Irrigated early MG V (RM 5.0-5.4)	33	1.1	1.0
Clay–Full-season (5/13) Irrigated late MG V (5.5-5.9)	29	1.4	1.0
Clay–Full-season (5/13) Nonirrigated early MG IV (RM 4.0-4.5)	36	1.6	1.0
Clay–Full season (5/13) Nonirrigated mid MG IV (RM 4.6-4.7)	37	1.5	1.0
Clay–Full-season (5/13) Nonirrigated late MG IV (RM 4.8-4.9)	37	1.5	1.0
Clay–Full-season (5/13) Nonirrigated early MG V (RM 5.0-5.4)	32	1.1	1.0
Clay–Full season (5/13) Nonirrigated late MG V (RM 5.5-5.9)	30	1.0	1.0
Rohwer [planting date and relative maturity (RM) in parentheses]			
Silt loam–Early-planted (4/7) Irrigated early MG IV (RM 4.0-4.5)	26	1.0	1.0
Silt loam–Early-planted (4/7) Irrigated mid MG IV (RM 4.6-4.7)	26	1.0	1.0
Silt loam–Early-planted (4/7) Irrigated late MG IV (RM 4.8-4.9)	24	1.4	1.0
Silt loam–Early-planted (4/7) Irrigated MG V (RM 5.0-5.3)	27	1.0	1.0
Clay–Full-season (5/17) Irrigated early MG IV (RM 4.0-4.5)	40	1.6	1.0
Clay–Full-season (5/17) Irrigated mid MG IV (RM 4.6-4.7)	39	1.1	1.0
Clay–Full-season (5/17) Irrigated late MG IV (RM 4.8-4.9)	38	1.1	1.0
Clay–Full-season (5/17) Irrigated early MG V (RM 5.0-5.4)	30	1.0	1.0
Clay–Full-season (5/17) Irrigated late MG V (RM 5.5-5.9)	29	1.0	1.0
Stuttgart [planting date and relative maturity (RM) in parentheses]			
Silt loam–Full-season (5/13) Irrigated early MG IV (RM 4.0-4.5)	41	2.0	1.0
Silt loam–Full-season (5/13) Irrigated mid MG IV (RM 4.6-4.7)	42	2.8	1.0
Silt loam–Full-season (5/13) Irrigated late MG IV (RM 4.8-4.9)	43	2.4	1.0
Silt loam–Full-season (5/13) Irrigated early MG V (RM 5.0-5.4)	37	1.9	1.0
Silt loam–Full-season (5/13) Irrigated late MG V (RM 5.5-5.9)	36	2.0	1.0

*Lodging scores: 1=almost all plants erect; 2=either all plants leaning slightly, or a few plants down; 3=either all plants leaning moderately, or 25-50% of plants down.

**Shatter score: 1=no shattering; 2=1-3% shattered; 3=4-8% shattered.



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The above presentation may give the impression that lodging in soybean is not an important issue. That is not its intent, since lodging can be a serious production problem when it does occur. But with today's varieties, it just doesn't occur very often. The below narrative will provide more in-depth information about lodging, including its causes and when it can be a yield-reducing occurrence.

Most lodging scores that are recorded/published by breeders/researchers/specialists are based on the following scale.

- 1 = almost all plants erect.
- 2 = either all plants leaning slightly, or a few plants down.
- 3 = either all plants leaning moderately (<45° angle), or 25-50% of plants down.
- 4 = either all plants leaning considerably (>45° angle), or 50-80% of plants down.
- 5 = all plants down.

Simulated lodging studies ([Woods and Swearingin, Agron. J., 1977](#)) have shown the following.

- Yield reduction declined in a linear fashion from R1 to R3 to R5 when lodging occurred at those stages. Lodging that occurred at about the R5 stage [beginning seed] had the greatest negative effect on yield. Lodging at R6 had negligible effect on seed yield.
- Yield reductions due to lodging resulted primarily from a reduction in central stem yield. This is because apical dominance was lost when lodging occurred in the early reproductive growth stages. This resulted in longer and vertical lateral branches, and increased yield from branches. However, seed from lateral branches were smaller than those from the main stem.
- The major effect of simulated lodging on soybean was a reduction in the number of pods on the main stem.

The following are important points for assessing lodging occurrence or effect.

- Plants of varieties growing in later plantings on a silt loam soil likely will reach a height that will be conducive to lodging, and this should be considered when planting during this timeframe on loam soils.
- Fertile soils that have adequate available water

during soybean vegetative development will promote height that may be conducive to lodging.

- It is generally accepted that yield will not be adversely affected if lodging scores are less than 3 using the above scale.
- Plant height should not be used as an indicator of lodging potential. A good rule of thumb is that plants that are 36 in. or less in height likely will not lodge barring a weather catastrophe such as a hurricane. Conversely, plants of a variety that routinely exceed 40 in. in height will be prone to lodging in a moderate to high-yield environment.
- Environments such as May plantings that are grown on a silt loam soil and irrigated will generally promote taller plants which will be susceptible to lodging.
- Soybean varieties differ in their susceptibility to lodging. Therefore, use harvest standability scores when selecting soybean varieties for a particular soil environment or planting date. Most companies use a 1 to 9 scale, where 1 is excellent. However, check each company's scale to ensure the range. Click [here](#) for company websites that can be accessed for these scores.
- A too-high plant population will result in taller plants with smaller main stem diameters, and this may contribute to lodging.
- It is generally accepted that lodging will more likely be a problem in high-yielding soybeans. This, of course, will be related to the greater weight of a heavy pod/seed load on individual plants. According to [David Holshouser](#), Extension Agronomist at Virginia Tech Univ., "...20 bushel soybean do not usually lodge".
- Lodging from R6 [full seed] to maturity will have less impact on seed yield, but conversely can have negative effects on harvestability, which in turn can reduce harvested yield. This will likely require an adjustment in combine operation—e.g. slower ground and reel speeds, location of reel closer to cutter bar, and harvest direction.
- The type of lodging is important. For example, soybean plants that are leaning because of a heavy pod/seed load may be considered as moderately lodged, but they will not have a reduced yield because of this type of lodging. Conversely, soybean plants that have a lodging rating based on



a significant number of plants being “down”—i.e. the lower portion of the main stem is on the ground and has no pods at the lower nodes—will likely suffer a yield reduction because of the loss of apical dominance explained above.

So recognize that lodging can occur in certain environments or following certain weather conditions, and that lodging can cause yield loss. The best defense against its occurrence is to select varieties that are noted for having a moderate height and a good standability rating. Also ensure that the selected seeding rate 1) is necessary or recommended for yield optimization, and 2) will produce plants with a stalk size that will not normally lodge in the growing environment.

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