MANAGEMENT DECISIONS BASED ON PLANTING DATE

Early Planting

Today's "conventional" soybean production system in the Midsouth is the Early Soybean Production System (ESPS), which is based on early planting of early-maturing soybean (MG IV–early MG V) varieties. Early planting (late March through mid-April) of soybeans in Mississippi is now common, and should be considered the norm for achieving high yield. It is used as a mechanism to avoid drought and late-season pest problems, plus ensure early harvest. The ESPS is likely a significant contributing factor to the Midsouth states' high yields in recent years.

There has never been a set date for the earliest allowed planting in this system. Rather, this is usually dictated by the estimated last frost date for a given location in the region that generally favors the start of planting in the accepted optimum window of April 10-20. This is addressed in a Feb. 10 2006 Delta Farm Press article and in a White Paper posted on this website.

Ultra-early planting is generally considered anytime before about Apr. 5. This raises the question "what are the advantages/disadvantages from ultra-early planting such as in late March–very early April?". There is a paucity of data that can be used to answer this question. However, Dr. Trey Koger collected 2 years of data from plantings that were made starting in January on a nonirrigated clay site using MG 4.7 varieties. Click here for yield data from those tests.

The graphed data show there is no yield advantage to planting before mid-April. Even though these data show that good yield can be achieved from plantings made prior to that period, yield potential will depend on there not being a frost or freeze that will negatively affect plantings made prior to mid-April. The following additional points should also be considered if ultra-early planting of soybeans is desired.

- Plants in plantings made during the above-defined ultra-early period will begin flowering very soon after emergence, and will likely be shorter than desired. This, plus the fact that pods on these plants likely will be close to the ground, will reduce harvest efficiency.
- The shorter plants in ultra-early plantings dictate that they be grown in narrow rows, or rows that are 20 in. or less in width. Otherwise, these short plants will not form a canopy, resulting in problems such as season-long weed infestations that will be difficult if not impossible to manage.
- There is a unique situation where planting soybeans in the above ultra-early window may be of benefit. If the planting site is a very sandy soil that will depend on frequent rainfall (say every 5-7 days) to provide plant available water as needed by soybean plants during the growing season, then planting in the ultra-early window may be the best option for avoiding the drought that will be the bane of yield potential of soybeans growing on these sites with a very low water holding capacity. Again, these sites are totally dependent on frequent rainfall for plant available water, and this is most likely to occur well before the beginning of summer. So planting early-maturing soybean varieties ultra-early may be the best option for these environments.

The greatest risk with early planting is perceived to be from low air temperature that occurs after soybean emergence. There are known cases of soybean seedlings surviving frost after emergence, but the severity and duration of these cold temperatures are not documented. Presumably, there is a difference in how 2 hours at 36 degrees that may result in a light frost and 8 hours at 33 degrees that may result in a heavy or "killing" frost will affect soybean seedlings.

Knowing the estimated last spring date of a particular low temperature is important. Estimated dates for 36, 32, and 28 deg. temperatures at Mississippi locations and locations in other Midsouth states have been calculated. Click here to access this information for locations in other states.

Again, there is no documentation of just what level of frost will be detrimental to soybean seedlings. One choice to lower risk of stand loss is to time planting so

that emergence will occur after the estimated 50% last spring frost date for a given location. Seedling emergence in early plantings will take about 4 days longer than emergence from plantings made a month later. This should be factored into an early planting date decision; i.e., this longer time to emergence will actually allow even earlier planting.

If any stand failure resulting from frost or freeze injury is unacceptable because of a shortage of seed of desired varieties available for replanting, then delaying planting to ensure that emergence occurs after the 10% last frost date may be preferred. If this approximate 2-week delay in planting is too great for production and/or marketing goals, then planting on dates that fall between the 50% and 10% last frost dates will impart a risk of stand loss that falls between those for the two dates.

For those who choose the early planting option, here are a few important points and tips.

- It is generally recognized that the standard germination (SG) test (used to determine seed germination potential under ideal laboratory conditions) is deficient as a measure of the potential field performance of seeds, and this is especially true for early plantings. A seed vigor test more accurately measures seed properties that determine the potential for rapid and uniform emergence, and development of normal seedlings under a wide range of field conditions.
- The accelerated aging (AA) test is the preferred method for evaluating the vigor of soybean seeds. This test evaluates the germination capacity of seeds that have been subjected to high temperature and humidity stresses for a defined period before the standard germination test. Farmers who anticipate planting early should request information on seed vigor from the supplier of a seed lot, or obtain this information from an independent laboratory.
- Egli and TeKrony (J. Prod. Agric. Vol. 9, 1996) published results from extensive research in Kentucky (26 field experiments over 10 years) that was designed to evaluate the effects of seedbed conditions on the relationship between SG or AA on emergence of soybeans planted in the field. They found that the prediction accuracy of both SG and AA was at or near 100% when seeds were planted in ideal soil/environmental conditions. However, the prediction accuracy of both tests declined as seedbed stress increased. In soil stress conditions, prediction accuracy of SG decreased faster than AA. Most importantly, in moderate soil stress environments (likely encountered in most soybean plantings), the AA test always had a higher predictive ability than the SG test. They concluded that it was necessary to select seedlots with an AA of 80% or greater.
- Preferably, lower quality seeds should not be planted in the conditions that usually occur with early planting. However, when seed lots with a lower-than-desired germination (<80%) must be used, the vigor test is especially important. Also, these seed should be planted at an increased rate.
- High-quality seeds that have received an appropriate fungicide seed treatment to control both seed- and soil-borne pathogens will germinate and emerge. Emergence time may be extended by cold soils, but emergence will occur as long as adequate soil moisture is available.

The most important point to remember about seed treatment use in early plantings is that a product that is effective against both seed- and soil-borne fungal pathogens should be used in all early-planting situations to ensure a stand.

- Soybeans can be planted at varying seeding rates because different rates within an acceptable range can be used without affecting yield potential. It is generally accepted that seeding rates between 120,000 and 140,000 per acre should be used to attain a final stand of at least 100,000 plants per acre. A lower seeding rate can be used when the appropriate seed treatment fungicide is applied to seed before planting.
- Plantback restrictions when auxin herbicides (2,4-D, dicamba) are used in a burndown application mix to control early-season weeds that have emerged before planting are especially important since the required interval between the burndown operation and planting may conflict with intended early

plantings.

- Soybean varieties grown in the Midsouth generally need 135 to 140 days from planting to maturity to reach full yield potential. MG IV varieties planted early fit this criterion. MG V varieties can also be planted early, but their 15-20 days longer growing season provides no yield advantage. Click here and here for details.
- If sudden death syndrome (SDS) is suspected to be a problem in fields with a previous SDS history (recent evidence indicates that SDS has moved into the Midsouth), then consider adding a seed treatment (Table 1) that provides protection from seedling infections by *Fusarium virguliforme*, the causal agent of SDS.

Late Planting

A minor portion of Midsouth soybean acreage is doublecropped with wheat, and these soybeans will by necessity be planted after early June, which is classified as late. Also, in years such as 2019, adverse spring weather dictated more late-planted soybean acres in the Midsouth.

Late plantings in the midsouthern US will require a management strategy that is different from that for earlier plantings.

- There is now evidence from recent research with newer MG IV varieties that using late-maturing varieties in late plantings is not the best option. Similar informaton for other Midsouthern states can be found here. Use the SOYMAP tool to determine which MG to plant on an intended date at a particular location.
- Preventing and/or alleviating short-term stresses during early vegetative development is more critical with late plantings. Therefore, seed treatments should be used, even though the threat of seedling diseases associated with cool, wet soils is not considered as serious with later planting. Using a combination product that contains both fungicides and an insecticide is relatively inexpensive insurance to prevent stand losses and the early-season stresses caused by seedling diseases and insects.
- Planting late results in later calendar-date maturity and a higher probability of detrimental infestations of both foliage- and pod-feeding insects during reproductive development (Click here and here for verification of this). This will result in either increased cost associated with more spraying or unacceptable yield loss if control measures are not applied. Up-to-date information and advisories about pest outbreaks during the growing season are available from AgFax Media and the Mississippi Crop Situation blog. Thresholds for making treatment decisions along with recommended control measures are available in the latest MSU-ES Insect Control Guide.
- Planting late results in a higher risk of detrimental effects from drought, especially during soybean's reproductive development. In irrigated plantings, this means more irrigation during reproductive development with subsequent higher input costs. Information in the Irrigation White Paper on this website will help with irrigation decisions for late plantings.
- The threat of soybean rust to the midsouthern US soybean crop has always been a major concern. However, that threat has not manifested itself since it was first discovered in the US in the early 2000's. When it does occur, it usually is detected no earlier than late July/early August, which coincides with beginning bloom or R1 of MG VI varieties planted in mid-June. Thus, later plantings should be scouted closely to detect possible rust infestations.
- Since late plantings do not reach R6 until about Oct. 1, they are susceptible to rust incursions during their entire reproductive period. Thus, they are more likely to require treatment to prevent or control late-season rust infestations that may occur.
- Late plantings will have less time to recover from stresses, especially during reproductive development. Therefore, it is critical that manageable stresses caused by pests, weeds, and drought are either prevented or are quickly identified so that remedial measures can be applied as soon as possible.
- Later-maturing varieties used in late plantings will be harvested in October and November when there is a greater probability of wet soil. Harvesting at this time usually results in some level of rutting that

may require remedial tillage. This may interfere with a continuous no-till system in some years, but as stated in the Tillage White Paper on this website, this occasional tillage does not necessarily compromise the long-term goals of a no-till system.

- With the apparent adaptation of newer MG IV varieties to late planting, and with the above negatives associated with using later-maturing varieties in late plantings, the new dogma is that MG IV varieties are preferred for late plantings in the Midsouth.
- Information in the above-linked pest management resources and advisories will be invaluable in planning pest management activities in late plantings. By following the management recommendations based on these resources, time and money will be saved by only applying control measures that are warranted.

Conclusions

Early plantings are preferred for Midsouth soybean production systems because they will produce greater yields and are less likely to be infested with late-season disease and insect pests.

Seedlots with an AA of 80% or greater should be selected in order to have the greatest assurance of achieving an acceptable stand in all plantings.

A fungicide seed treatment should always be applied to soybean seed that are planted both early and late.

Late plantings of late-maturing soybean varieties are more vulnerable to late-season insect and disease pests, and will yield less than early plantings.

MG IV varieties are now apparently the best choice for all plantings in the Midsouth.

Soybeans can be planted at varying seeding rates because different rates within an acceptable range can be used without affecting yield potential. It is generally accepted that seeding rates between 120,000 and 140,000 per acre should be used to attain a final stand of at least 100,000 plants per acre. A lower seeding rate can be used when the appropriate seed treatment fungicide is applied to seed before planting.

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