

Extension Responds: Flood

Soybean management and excess soil moisture

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How late can I plant a full season maturity group soybean?

The short answer is, “full season varieties can typically be planted through the first week of June in Wisconsin.”

The technical answer is “you should plant a full season variety until the expected maturity date matches the expected first frost date for your field. The goal is to plant full season varieties whenever possible. Data from Wisconsin and several other states show that full season varieties will yield more than short season varieties at all planting dates. However, late planting of full season varieties increases the risk of frost damage to immature soybeans. So, the deciding factor will be mainly the first expected frosting date on your field. Keep in mind that your own field (or a portion of it) may freeze earlier or later than the average date for your county. Typically, low ground and fields having northern exposure are more prone to freezing.

Switching to a short season variety too soon, will not only decrease yields, but also produce shorter plants with lower pods often attached below the cutting height.

For more information consult the UW Soybean web site at http://soybean.agronomy.wisc.edu/publications/96_plant_date_aa.pdf

If I plant the same variety on May 1 and May 28 will the soybeans planted later mature 28 days after the early planted ones?

NO! Soybeans planted on May 28th are expected to mature 8 to 10 days after the soybeans planted on May 1st.

Soybeans do not count days from planting and are not highly impacted by degree days either. The soybean plant decides when to flower and mature primarily based on the length of the night. As the growing season progresses the days get shorter and conversely the nights last longer. Eventually the nights reach a minimum number of hours needed to stimulate the plant to flower and mature. Each variety requires a specific number of hours in darkness in order trigger the onset of flowering and decide when to senesce. Varieties with similar darkness requirement are labeled with the same maturity group.

The soybeans from the same variety planted on May 1 and 28 will have their night length requirement satisfied on the same date. However, they will not

start flowering on the same day. The May 28th planting will shorten its vegetative stages to speed up the onset of flowering but it won't skip any developmental phase. It is reasonable to expect the later planting date to catch up about 10 days and start flowering 18 days after the first planted soybeans have. The later planted soybeans will also progress faster through the reproductive stages and further reduce the plant cycle.

Shorter plant cycle or faster development is a mix of good news and bad news. The good news is that the shorter life cycle will help the crop to avoid frost damage. The bad news is that it will also shorten the flowering and grain filling phases and cause the plant to yield less than its full potential.

For more information consult the UW Soybean web site at http://soybean.agronomy.wisc.edu/publications/96_plant_date_aa.pdf

Should I completely replant or just thicken stands by inter-seeding soybean on soybeans that have lower than the desired plant populations?

Typically one can inter-seed soybeans on soybeans of the same variety planted up to 15 days earlier. The soybean plants inter-seeded 15 days later will develop faster and mature only 2 to 4 days later than the early planted ones. If more than 15 days have past since you first planted your soybean field, it is recommended that you eliminate the remaining alive plants and replant the troubled areas with a full stand.

For more information consult the UW Soybean web site at http://soybean.agronomy.wisc.edu/publications/97_replant_guide_aa.htm

Should I change plant population and/or row spacing on late planted soybeans?

Yes and you could! Late planted soybeans will tend to be shorter. They will likely have fewer leaves, shorter internodes, and fewer pods. Increasing the plant population will help the soybean to grow taller and grow the bottom pods above the cutting height. It will also help soybean emergence on heavy or crusted soils.

Narrower row spacing and denser plant population will help the canopy to achieve full soil coverage sooner, intercept more sunlight, maximize photosynthesis, and consequently increase yields.

Under normal soil moisture conditions soybean should be planted one inch deep. Under excessive moisture conditions (particularly on heavy soils) it is advisable to plant soybeans a little shallower. Precision in planting depth is critical! The soybean seed left on the soil surface might lack sufficient moisture to germinate while the deep planted seed may run out of energy to emerge and/or suffocate under excessive soil moisture conditions.

How will the excessive wet conditions and late planting impact soybean disease and insect pests?

Phytophthora Root Rot is the biggest concern at or soon after emergence on saturated soil moisture conditions. Phytophthora rot is a fungal disease that rots seed, kills pre- and post-emergence seedlings and even adult plants. Under saturated soil moisture conditions Phytophthora can reduce stands to the point of needing replant. The most cost effective control method is the selection varietal resistance or tolerance.

White mold is usually less of a concern on late planted soybeans. Late planted soybeans typically have shorter canopy and do not provide the ideal micro environment for white mold infection.

Aphids are typically more numerous on late planted soybeans. Late planted soybeans progress faster through all development stages and have fewer opportunities to recover from a stressful event. Consequently, it is particularly critical to often scout for soybean aphids in late planted soybeans.

For more info consult the UW Plant Health web site at <http://www.plantpath.wisc.edu/soyhealth/>

How late should I plant soybeans in Wisconsin?

Historical records suggest that mid June is about as late as one should plant soybeans in Wisconsin. Soybeans can be planted later than June 15. However, the later the planting, the higher the risk of frost damage and the lower the expected yield. On the other hand, the cost of production is expected to remain the same. Consequently, the later the planting the lower the expected net returns.

How long can soybeans survive completely submersed in water?

The short answer is 2 to 4 days. However, a more accurate prediction need to take in account several factors such as air temperature, cloud cover, soil moisture conditions prior to inundation, and speed of soil drainage after inundation. Soybeans will survive longer when inundated under cooler and cloudy conditions. Higher temperature and sunshine will speed up plant and soil biomass respiration depleting oxygen and increasing carbon dioxide levels more quickly. If the soil moisture was already saturated prior to inundation, soybeans are expected to survive fewer days submersed. Survival will also depend on soil drainage. Slow soil drainage after inundation will prevent fast gas exchange between the rhizosphere and the air above the soil surface. Consequently, the plant roots may continue to experience oxygen deprivation and CO₂ toxicity long after the ponding water has infiltrated the soil.

Several greenhouse experiments show that soybeans can survive inundation indefinitely. However, at field conditions soybeans are known to perish after a few days inundated. The cause for the difference between the survival in the green house and field experiments is unclear. Several explanations have been proposed such as the presence of soil born diseases, elevated soil carbone

dioxide concentration, depleted soil oxygen concentration, and elevated re-dox potential.

How to manage soil fertility for soybeans grown under excessively wet conditions?

Unless, soil moisture saturation persists for a prolonged period yet, the fertility recommendations for Wisconsin soybean production remains unchanged. It is noteworthy however, that the current soil moisture condition is detrimental to inoculation while it favors soil nitrogen losses. Fields not planted to soybeans in the past, as well as sandy, and or light colored soil fields are highly likely to benefit from inoculation in any given year. This is particularly true on wet spring years. That is because excessive rainfall in May can lixiviate most of the nitrogen mineralized in March and April. Consequently, the soil solution may have low concentration of readily available forms of nitrogen and the soybean plant might have to rely mostly on the rhizobium inoculant to supply its nitrogen needs.

Should I use fungicide seed treatment?

Probably! Fungicide seed treatment has been recommended on soybean for decades. This practice is still not widely used though. Some argue that the return to the investment is highly variable from year to year, location to location, and average out to a small return over several years. However, the current cool and wet conditions compounded by late planting and potentially lower quality seed due to the drought of 2003, suggest that fungicide seed treatment would be highly beneficial to Wisconsin soybeans in 2004.

What will happen if my beans get frosted before reaching full maturity?

Typically, the plant will wilt a few hours after thawing. In a couple of days the green tissue will turn dark gray or brownish and the plant will virtually die. Yield loss is possible but not common. If the soybean is at R6 or less, the grain filling will cease and grain will become smaller and discolored. If the crop is at R7 or beyond, the grain size is typically not affected but grain discoloration may still occur.

Naturally matured soybeans take about 10 days to dry in the field. Frost killed soybean will take longer to dry. Stems will remain green, moist, and flexible. The grain will remain green and swollen. Timing the harvest is typically a balancing act between minimizing drying cost and lodging losses. Delaying harvest to let frosted damaged soybeans dry in the field can save on grain drying cost, but created the opportunity for more plant lodging and consequent harvest losses.

Frost will reduce germination of soybean seed.

Storing frost damaged soybean will require extra care to assure that all grain is dry and minimize fungal spoilage.

The corn has died. Can I replace it with soybeans?

Maybe. The key factors to consider are herbicide and nitrogen applications. Some corn herbicides will damage the crop and others might have legal impediments. For instance, fields sprayed this year with Atrazine, Bullet, or Harness Extra (among many other products) can not be legally planted with soybeans this year. Please consult Appendix 2 of the Pest Management in Wisconsin Field Crop bulletin (A3646) for a full listing of rotational restrictions.

Nitrogen management may also impact your decision. The soybean crop requires a substantial amount of nitrogen. About 200 pounds of nitrogen are required to produce 50 bushels of soybean grain with 34% protein. About half of the amount is typically provided by rhizobium nodules and the other half comes from the soil solution. High concentrations of nitrogen in the soil are known to suppress nodulation. Assuming that the nitrogen applied to the corn has not been lost the soybeans will first deplete the readily available nitrogen from the soil before modulating. When that is the case, nitrogen deficiency symptoms might appear later in the season (particularly during dry periods).

Further resources:

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