

Irrigation Termination for Soybean

- It is especially important to provide adequate water to soybean from growth stages R3 (beginning pod) through R6 (full seed).
- In general, a full soil water profile around the R6 growth stage should be sufficient.
- The coarser the soil texture, the later the final irrigation should occur.
- Closely monitoring soil moisture can help with irrigation scheduling.

Soybean Water Usage

Knowing the optimal time to terminate irrigation can help maximize profitability, as continuing to irrigate longer than needed adds cost with minimal return. However, discontinuing irrigation too soon can result in yield penalties due to decreased seed size. It is especially important to provide adequate water to soybean from growth stages R3 (beginning pod) through R6 (full seed), which are the most sensitive to water stress and potential yield losses.

When to Terminate Irrigation

Methods for determining when to terminate irrigation include testing soil moisture by hand in conjunction with soil moisture sensors (i.e., capacitance probes or tensiometers) or a moisture deficit accounting system. In general, a full soil water profile during the R6 growth stage should be enough to bring the crop through maturity without inducing water stress. If irrigation scheduling is being used to monitor soil moisture, factor in the predicted maturity date of the crop, the estimated water use to maturity (example given in Table 1, may vary by region), and current soil moisture levels to determine when to stop irrigating. Irrigations should provide only what is needed to maintain soil moisture above 50% until the end of R7 growth stage.¹ However, it is critical to monitor soil moisture through R7 because conditions that increase water use such as high heat, high winds, and low humidity may require extra irrigation to prevent yield loss. By R8, water is no longer needed for seed enlargement and soil moisture can be allowed to reach 60% depleted.²

Growth stage	Days to maturity	Water use to maturity
R4 – Full Pod. Pods are 3/4 inch (19 mm) long on at least one of the four uppermost nodes	50	8.5 inches (21.5 cm)
R5 – Beginning Seed Enlargement. Seed is 1/8 inch (3 mm) long in a pod located on one of the four uppermost nodes	40	5.5 inches (14.5 cm)
R6 – Full Seed. Pod contains at least one green seed that fills the pod cavity located on one of the four uppermost nodes	30	3.5 inches (9 cm)
R7 – Beginning Maturity. One pod located on one of the four uppermost nodes has reached mature pod color.	10	1.0 inches (2.5 cm)
R8 – Full Maturity. 95% of the pods have reached mature pod color	0	0

Table modified from ³Soybean irrigation and water use. University of Missouri Extension. <https://extension.missouri.edu/media/wysiwyg/Extensiondata/CountyPages/Scott/Soybean-Irrigation-and-Water-Use.pdf>

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Another approach is to determine when pods reach the full seed (R6) growth stage and estimate soil moisture from soil samples. In general, if soil moisture is adequate and 50% or more of the pods have seeds that are fully formed, then irrigation can be terminated. If the soil is beginning to dry, one additional irrigation should be applied to ensure that all seeds reach their maximum weight. If pods are not fully filled and soil is dry, one or more irrigations will be needed to achieve full yield potential. Recommendations on when to terminate irrigation during the R6 growth stage are also dependent on various soil factors. For example, irrigation will be required later in R6 and possibly even into the R7 growth stage on soils with low plant available water holding capacity or when root-restricting layers are present in the soil profile.

Sources

- ¹ Helsel, D.G. and Helsel, Z.R. 1993. Irrigating soybeans. Publication G4420. University of Missouri Extension. <https://extension.missouri.edu/publications/g4420>
- ² Yonts, C.D., Melvin, S.R., and Eisenhauer, D.E. 2008. Predicting the last irrigation of the season. University of Nebraska-Lincoln Extension. NebGuide G1871. <https://extensionpublications.unl.edu/assets/html/g1871/build/g1871.htm>
- ³ Soybean irrigation and water use. University of Missouri Extension. <https://extension.missouri.edu/media/wysiwyg/Extensiondata/CountyPages/Scott/Soybean-Irrigation-and-Water-Use.pdf>

Additional Resources

Tacker, P. and Vories, E. Chapter 8: Irrigation. In Arkansas Soybean Production Handbook – MP197. University of Arkansas Cooperative Extension Service. <https://www.uaex.uada.edu/publications/MP-197.aspx>

Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.

Performance may vary, from location to location and from year to year, as local growing, soil and environmental conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on their growing environment.

The recommendations in this material are based upon trial observations and feedback received from a limited number of growers and growing environments. These recommendations should be considered as one reference point and should not be substituted for the professional opinion of agronomists, entomologists or other relevant experts evaluating specific conditions.

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