

Soybean Maturity and Low Temperatures

Minimum temperatures for soybean seed ripening has been shown to be 8-9°C and optimum being 19-20°C¹. Cool temperatures (<10°C) during seed fill can negatively affect soybean yield through reduced seed size although the most serious impact may be delayed maturity. While we are not expecting a killing frost (-2.2°C), recent cool temperatures will lengthen the time to maturity for Manitoba soybeans and keep them at a vulnerable stage for frost damage longer into September. As we move from R-6 (full seed) to R-7 (early maturity), the risk of yield loss from frost declines. Soybeans are normally in the R-6 stage for 18 days but can be as long as 30 days.

When night-time temperatures dip below 5°C, there is a risk for low-lying areas to see a light frost. The impact of frost will depend on the nighttime low and how long that temperature is sustained. Other factors such as soil moisture (moisture in the soil will maintain heat), cloud cover (cloudy is better) and wind speed (windy is better) can also impact the degree of frost. Further, soybeans in narrow rows and thick canopies are able to maintain ground heat longer. A light frost (0 to -1°C) may kill top leaf growth but should not affect pods and seeds. Temperatures below -1°C for an extended time period will cause damage to green stems, pods and seeds, reducing yield and quality. Maximum yield loss would occur in soybeans at R-5 (early seed).

Literature Cited:

¹ Holmberg S. A. 1973. Soybeans for cool season climates. Agric. Hort. Genet. 31:1-20.

² Fehr W. R. and C. E. Caviness. 1977. Stages of soybean development. Spec. Rep. 80 Iowa State Univ. Coop. Ext. Serv., Ames.

³ Saliba M. R., L. E. Schrader, S. S. Hirano, and C. D. Upper. 1982. Effects of freezing field-grown soybean plants at various stages of podfill on yield and seed quality. Crop Sci. 22: 73-78.



Stage	R-6 Full Seed	R-6.5 Halfway through seed fill	R-7 Physiological maturity	R-8 Full Maturity
Description	Plants still green, seed fills pod on one of top four nodes.	Full seed to the top of the plant, starting to drop bottom leaves. Pod color green/yellow.	At least one pod on main stem is yellow (the membrane around the seed will be completely absorbed).	95% of pods will be brown, seeds will rattle in pod and all leaves will be dropped.
Days to Maturity ²	25-30	10-15	8-10	
% Yield Loss from frost ³	Up to 50%	Up to 30%	<10%	0