

AGRONOMIC Spotlight



Technology
Development
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Yield Components of Soybean during Flowering R1-R2

Vegetative growth stages in soybean are numbered according to how many fully-developed trifoliolate leaves are present. The reproductive stages begin at flowering (R1-R2) and include pod development (R3-R4), seed development (R5-R6), and plant maturation (R7-R8). Growth stages can overlap. Determine the growth stage of a crop when 50% or more of the plants are in or beyond that growth stage in question. This Agronomic Spotlight is part one of four in a series that focuses on yield components of soybean during the reproductive growth stages.



Figure 1. Soybean plant during the Beginning Bloom (R1) growth stage. Picture courtesy of Palle Pedersen, Iowa State University.

Beginning Bloom (R1)

Beginning bloom (R1) is a time of rapid growth. During this reproductive growth stage, at least one flower is located on the plant (Figure 1). Soybean flowering always initiates on the third to sixth node of the main stem. The initial flowering node depends on the vegetative growth stage when flowering begins. Flowering will continue up and down the main stem and then eventually move to the branches. Each raceme, or group of flowers, will occur from the base to the tip. Consequently, the pods at the base of the plant are usually more mature than those at the tips. Primary racemes dominate secondary racemes. Secondary racemes can develop just to the side of primary racemes on the same axil. The vertical roots are rapidly growing along with secondary roots and root hairs. This root growth will continue until R4-R5. Plants are 15 to 18 inches tall and are at a vegetative stage somewhere between V7 to V10. Stress, such as defoliation or root damage, that occurs during the early reproductive stages (R1 to R5.5) can affect growth rate and may have an impact on yield potential.



Figure 2. Soybean plant during the Full Flower (R2) growth stage. Picture courtesy of Palle Pedersen, Iowa State University.

Full Flower (R2)

Full flower (R2), also known as full bloom, is distinguished by an open flower at one of the two top nodes on the main stem (Figure 2). One or more of these upper nodes has a fully developed leaf and approximately 50% of the total number of nodes has developed. New flower development slows down between R2.5 to R3 with completion typically taking place by R5. At the beginning of full flower, soybean plants are in the V8 to V12 vegetative growth stage and are around 17 to 22 inches tall. Roots can reach across 40-inch rows. Major lateral roots have turned downward in the soil and nitrogen fixation by root nodules is increasing quickly. Rapid accumulation of dry matter along with nitrogen (N), phosphorus (P) and potassium (K) is occurring and will take place until V6. During this stage the soybean plant will accumulate 25% of total dry weight and nutrients and about 50% of the mature height. The biggest yield reducing stress during full flower is defoliation, which can occur from various sources including insect damage, disease, or hail. Fifty percent defoliation at this stage can reduce yield by 6%.

Sources: McWilliams, D.A., et al. 1999. *Soybean Growth and Management Quick Guide*. North Dakota State University Extension. Publication Number A1174, June 1999. <http://www.ag.ndsu.edu>; Naeve, S. 2005. *Growth and Development (Soybean)*. University of Minnesota Extension. <http://www.soybeans.umn.edu> (verified 7/14/10); Pedersen, P. 2007. *Soybean Growth and Development*. Department of Agronomy. Iowa State University Extension. <http://extension.agron.iastate.edu> (verified 7/14/10).

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