

Soybean Yield With Varying Light Conditions

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Consistently high soybean yields, above 50 bushels per acre, can be achieved each year in Massachusetts. In some years, yields measured in our research plots have reached above 80 bushels per acre. In an attempt to understand some of the year to year variation in seed yield a field study examined soybean growth and yield under varying light conditions.

Plants were light enriched by installing wire mesh fences to hold back neighboring rows from the central sample row thus preventing canopy closure. Reduced light treatments were achieved by installing shade cloth above soybean plants. Light enrichment and shading treatments were implemented twice - about 8 days prior to flowering (LE₁ and Shd₁) and at the beginning of pod filling (LE₂ and Shd₂).

In general, shading restricted and light enrichment increased yields significantly (Table 1). The pre-flowering treatments resulted in the greatest changes in seed yield, mostly through changes in pod number per plant. Early pod fill treatments also significantly affected seed yield, but to a lesser extent. Pod retention and seed size were factors that contributed the most to these yield effects.

Table 1. Effect of shading and light enrichment on seed yield of Evans soybean in 1988.

Treatment	Yield*	Treatment	Yield*
	g m ⁻¹ row		g m ⁻¹ row
Shd ₀	143a	LE ₀	63c
Shd ₁	81c	LE ₁	178a
Shd ₂	107b	LE ₂	90b

* Means for one treatment are averaged across all other treatments. Means followed by differing letters within columns differ at P < 0.05 level of significance.

An examination of seed size in the non-shaded or non-light enriched treatments showed differences of up to 19 to 24% due to seasonal variation. Our results suggest that seasonal variation in seed size may be an indication of possible over or under compensation of seed size depending on the pod load established during the course of flowering and later pod set.

Exposing soybean plants to shading or extra light especially during the early pod fill period simulated seasonal variations in seed size. The weight per seed was decreased by the early pod fill shade treatment. The late light enrichment treatment increased seed size. This effect demonstrated that seed size can partly compensate for decreased or increased light availability. Assuming shading simulates, at least partly, natural clouding and light enrichment simulates increased light availability, the results help to explain seasonal variation in seed yield and seed size.