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#### Abstract

Understanding how certain growth dynamics respond to planting date, plant population and cultivar, and their interactions, is important for cultivating high yielding soybeans [*Glycine max* (L.) Merr.]. The objectives of this study are to determine the effects of cultural practices and their interactions on certain growth dynamics at different developmental stages, and to estimate the associations between seed yield and growth dynamics, such as light interception (LI), leaf area index (LAI), light interception efficiency (LIE), total dry matter (TDM) and crop growth rate (CGR). Field studies were conducted in 2005 and 2006 during mid-April and mid-May planting dates, using cultivars A-3127 and 1530. We planted high plant populations, (330.000 plants ha<sup>-1</sup>) and low plant populations, (660.000 plants ha<sup>-1</sup>). Plots for measurements were sampled at the V<sub>5</sub>, R<sub>2</sub>, R<sub>4</sub>, and R<sub>6</sub> developmental stages. Planting in mid-April resulted in significantly higher LAI, LIE, and TDM but lower CGR compared with the mid-May planting. Light interception (LI) was not affected by planting dates. Leaf area index (LAI), TDM, and LI increases were significantly greater in the narrow rows (high plant populations) than the wide rows (low plant populations). In contrast, LIE and CGR were significantly higher in the wide rows (low plant populations) than in the high plant populations (narrow rows). Late-maturity cultivar 1530 had higher LAI, LI, and TDM but lower LIE and CGR than early-maturity cultivar A-3127. Seed yield was positively and significantly correlated with LI, LAI, and TDM for most of the treatment combinations. It was determined that LIE and CGR were poor predictors of both seed yield and LI.