Potential Yield of Contrasting Soybean Maturity Groups in Southern Uruguayan Conditions

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Abstract

Soybean potential yield (*Glycine max* (L.) Merr.) is determined by temperature, radiation, photoperiod and genotype in every location. The variability of potential yields is strongly associated with changes in available solar radiation through years. Selection of management practices that lead to maintaining high yields are: genotype, sowing date and row spacing. Sowing date enables coupling solar radiation offer with the crop stages were yield is defined. Furthermore, potential yield for every environment depends on genotype. Selection of the maturity group (MG) defines the initiation of the reproductive period, which conditions the nod number, the maximum leaf area index (LAI) and the environmental conditions during grain filling. Additionally, growth habit of each genotype is also related to potential yield. Early sowing date allows the expression of the greatest differences among MG. A crop growth simulation study showed that the average potential productivity of early maturing cultivars (MG from III to V) achieved higher yields than later maturing cultivars (MG from V to VII) at early sowing date conditions in Uruguayan latitudes. Later maturing cultivars localize their critical period when daily radiation curve declines (late January - February) and consequently the growth rate during reproductive stage is not maximized. The objective of this study was to determine the potential crop growth and yield of different MG in two ambient crated by early and mid sowing date, at southern Uruguayan latitudes. The experiment was carried out during summer 2014-2015. Contrasting MG -from III to VII- were tested on two sowing dates: 15/10 and 15/11. Different growing variables were measured during the growing season: evolution of the intercepted solar radiation, biomass (B), soil water content, number of pods per square meter and crop yield. Results showed that early maturing cultivars expressed higher yields in both sowing dates. The yield on mid-October sowing date ranged from 5400 to 6300 kg ha^{-1} for early maturing cultivars and 4600 to 5600 kg ha^{-1} for later maturing cultivars. For mid November sowing date the yields ranged from 4600 to 5200 kg ha^{-1} for early maturing cultivars and 3800 to 5500 kg ha^{-1} for later maturing cultivars. However, evolution of LAI and B was similar among MG. The main difference showed was accumulated biomass at initial reproductive stage. Daily water uptake did not differ among MG; nevertheless, total water uptake responded positively to the increase of the crop cycle length. The highest potential yield for season 2014-2015 was reached with early maturing cultivars. Results showed that yields could be maximized with management practices as supplementary irrigation and the use of short MG sowed in October. The use of these practices lead to obtain over 6000 kg ha^{-1} crop yield combined with high water productivity.

Keywords: sowing date, intercepted solar radiation, leaf area index, biomass, supplementary irrigation, water productivity