

WEEDSOFT: EFFECT OF SOYBEAN ROW SPACING ON BIOECONOMIC PREDICTIONS.
Chris M. Boerboom and Ryan D. Lins, Associate Professor and Graduate Research Assistant,
Department of Agronomy, University of Wisconsin, Madison, WI 53706.

Many research reports have documented greater weed control in narrow row soybeans as compared to wide row soybeans. This result is generally attributed to more rapid canopy closure with narrower row spacings. If soybean row spacing affects the competitive relationship between weeds and soybeans, this effect should be included in bioeconomic weed management models to improve their accuracy within different soybean production systems. WeedSOFT is a decision support software system for weed management that contains a bioeconomic model where yield loss is a function of the weeds' total competitive load. The competitive load is the product of a weed species' density by its competitive index. This product is summed for the different species present in the field to provide the total competitive load. Soybean row spacing is one of the site characteristics that users enter into WeedSOFT when defining a weed management scenario. Each row spacing has a value or modifier that is multiplied by the competitive index of any weed species that is entered in the program. For row spacings less than 30 inches, this reduces the competitive effect of the weeds. Current soybean row spacing modifiers are 0.8, 0.85, 0.9, 0.95, and 1 for 7.5-, 10-, 15-, 20- and 30-inch rows, respectively. Because a weed's competitive index is multiplied by the row spacing modifier, yield loss predictions have equal sensitivity to changes of either value. A 10% change in the row spacing modifier or competitive index results in a 10% change in the predicted yield loss and economic loss when the yield loss function is in the linear phase. Accurate estimates of the row spacing modifier are important at low competitive loads because it will influence whether or not an economic threshold is reached. At high weed competitive loads, the accuracy of the modifier will not significantly affect the yield loss prediction or the subsequent management decision. Accurate estimation of the row spacing modifier may be less crucial than the estimate of a weed's competitive index because the competitive indices may range from 0.25 to 10, whereas the row spacing modifier currently only ranges from 0.8 to 1. The effect of soybean row spacing on weed competitive abilities may also differ depending upon weed species, region of the Midwest, and soybean density, but the influence of these factors is probably minor relative to other estimates used in the model. The current soybean row spacing modifiers in WeedSOFT appear to be conservative estimates and should not be the cause for yield loss to be underestimated. Cooperators have the flexibility to increase the effect of the row spacing modifier as they adapt WeedSOFT for their states if local data support a change.