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Soybean traits related to shading speed for labor-saving weed control

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Earlier shading by the soybean canopy shortens the period in which weed control is necessary, and thereby decreases the labor needed for weed control. Thus, improvement of traits related to shading speed could contribute to improved integrated weed management in soybean production. In this study, 12 varieties from the NIAS soybean mini-core collection with different shading speeds were used to evaluate traits related to their shading ability. Each variety was sown in four rows with 60 cm row spacing and 15 cm intrarow spacing in an experimental field on June 15, 2016. The vertical distance of the farthest leaf from the row was defined as the plant width. The percentage of canopy light interception (LI) was calculated based on the cumulative solar radiation measured by Opt-leaf (Taisei Fine Chemical Co., Ltd.) for 4–5 days on the soil surface at the inter-row center and in a nearby open field. At 4 weeks after sowing (WAS), LI had a stronger positive relationship with plant height ($r = 0.77$; $p = 0.003$) than with plant width ($r = 0.45$; $p = 0.146$). Conversely, at 5 WAS, LI had a stronger positive relationship with plant width ($r = 0.78$; $p = 0.003$) than with plant height ($r = 0.58$; $p = 0.047$). At 5 WAS, plant width was largely based on petiole length of the farthest leaf from the row ($r = 0.95$; $p < 0.001$). The positive correlation between LI and petiole length was also significant ($r = 0.80$; $p = 0.002$). In this study, 5 WAS was an important time to evaluate shading speed because it was the time when the soybean canopy started to close. These results suggested that petiole length may be the most important trait positively related to shading speed of the soybean canopy.