

Row width and population effects on weed and crop development in black and small red beans

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The development and widespread use of upright, short-vine black and small red bean varieties has led to changes in grower practices, including the use of narrow rows by some growers. Since narrow rows have been shown to have weed suppression and yield benefits in other crops, research was undertaken to determine the benefits and/or limitations of growing upright black and small red beans in narrow rows in Michigan. Planting population must also be considered when studying row width since altering between-row plant spacing alters within-row plant spacing. Therefore, field studies were conducted in 2010 and 2011 at two sites in Michigan to examine the effect of varying row width and bean populations on: 1) weed suppression, 2) crop development, and 3) yield. Varieties examined were 'Zorro' black and 'Merlot' small red beans; both are new upright varieties. In addition to class, three factors were examined: row width, plant population, and weed management. Three row widths were used at one site: 1) 38 cm, 2) 51 cm, and 3) 76 cm, while at the other only 38- and 76-cm rows were examined. Black bean populations were 1) 196,400 plants/ha, 2) 261,800 plants/ha, and 3) 327,300 plants/ha; small red bean populations were 1) 148,200 plants/ha, 2) 196,400 plants/ha, and 3) 261,800 plants/ha. Each combination of row width and plant population was planted in two plots in each replication, one of which was POST-treated, the other maintained weed-free. While the result was not consistent across all site-years, narrow rows were found to result in higher yields than wide rows in 4 out of 8 dry bean class-site-year combinations. Increases in yield were observed equally in each class. At one site-year, black bean yield was lower in narrow rows ($P=0.1$); this may have been a result of extremely dry conditions. Planting population had little or no impact on yield. Narrow rows were found to result in increased weed suppression in POST-treated plots except in the unusually dry site-year, and wide rows were never found to increase weed suppression. Plant population had no impact on weed suppression. Narrow rows resulted in greater canopy closure during at least part of the growing season, except in small red beans in the dry site-year. In some cases, high populations also increased canopy closure. While some of the benefits of narrow rows appear to be lost under drought conditions, these results suggest that in typical growing seasons, narrow rows may result in improved weed control and sometimes in higher yields in Michigan dry bean production.

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