

Hard Red Spring Wheat Response to Row Spacing, Seeding Rate, and Nitrogen

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Abstract

Row spacing, plant density, and N application timing can be manipulated to optimize plant growth and spatial distribution, therefore maximizing sunlight, nutrients, soil water use efficiency and grain yield. A 2-yr field study to evaluate the effects of four seeding rates (108, 215, 323, and 430 seeds m^{-2}), two row spacings (15 and 30 cm), and three N treatments (FA1, 100% at seeding; FA2, 50% at seeding and 50% at tiller formation; and FA3, 50% at seeding and 50% at shoot elongation) on grain yield of McNeal hard red spring wheat (*Triticum aestivum* L.) was conducted in central Montana. Spring wheat accumulated greater biomass at a faster rate under the 15-cm row spacing than the 30-cm row spacing. Grain yield was 410 and 412 kg ha^{-1} greater at 15-cm than at 30-cm row spacings in 2004 and 2005, and the yield increase was primarily attributed to 44 and 40 more spikes m^{-2} at 15-cm than at 30-cm row spacing in 2004 and 2005, respectively. Grain yield was not significantly affected by the N treatments, thus all N should be applied at seeding. The optimum seeding rate was 215 seeds m^{-2} . Tillers at higher seeding rates had larger phyllochrons and greater mortalities. Low protein content was found in FA3 and high seeding rate treatments in 2005. Narrow row spacing is recommended for high spring wheat yield in the northern Great Plains. This yield increase cannot be achieved by increasing seeding rate at wide row spacing.

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