Effects of Row Spacing on Light Distribution & Productivity in Silage Corn-Alfalfa Interseeded Systems

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Silage corn (*Zea mays* L.) and alfalfa (*Medicago sativa* L.) are foundational components of forage systems in the U.S., supporting high-quality feed production for dairy farmers. Silage corn is often prioritized because alfalfa exhibits low yields during its establishment year. Interseeding alfalfa into corn is an agronomic strategy that may establish forage under the corn canopy, allowing regrowth after silage harvest and entry into the first production year with a well-established stand. However, the success of interseeding systems is influenced by factors such as corn row spacing, which regulates light availability and competition. Therefore, this study evaluated (i) the effect of corn row spacing on light penetration and the performance of silage corn and alfalfa, and (ii) the impact of alfalfa interseeding on corn performance relative to a non-interseeded system. A field experiment was conducted in 2025 at the USDA Dairy Forage Research Station in Prairie du Sac, WI, using a randomized complete block design with four replications. Treatments included five row spacings: three twin-row configurations (50/10, 45/15, and 40/20 inches) and two conventional spacings (15 and 30 inches), combined with two cropping systems: interseeded and non-interseeded silage corn. Measurements included alfalfa ground cover, defoliation, and leaf health at corn reproductive stages (R1, R3, and R5); leaf area index (LAI), relative light interception (RLI), and soil moisture at V12, R1, R3, and R5; and silage corn biomass harvested at 65% moisture, with subsamples used to estimate dry matter (DM) yield (Mg ha^{-1}).Preliminary results indicate that alfalfa health and defoliation were not affected by row spacing at any stage, and no differences were observed for soil moisture. At R5, alfalfa ground cover was greater in the 50/10 spacing (52.5%) than in the 15, 30, and 45/15 spacings (approximately 30%), whereas 40/20 (36.6%) did not differ from any treatment. At V12, RLI in the lower canopy was greatest for 50/10 (18%), followed by 45/15 (11%). At R1, RLI remained higher in 50/10 (approximately 10%) than in all other spacings (<5%). No differences in RLI were observed at R5. Silage corn yield was affected by spacing ($p < 0.05$), cropping system ($p < 0.0001$), and their interaction ($p < 0.05$). In the non-interseeded system, yield did not differ among spacings. In contrast, within the interseeded system, DM yield was lowest for 50/10 (17.8 Mg ha^{-1}) and highest for 45/15 (20.2 Mg ha^{-1}). Within-spacing comparisons showed that non-interseeded silage corn yielded more than interseeded corn at 15 (20.8 vs. 18.4 Mg ha^{-1}) and 50/10 (19.8 vs. 17.8 Mg ha^{-1}). These results indicate that wider twin-row spacings can enhance understory light availability and alfalfa ground cover but may reduce silage yield under interseeding. Some spacings, such as 45/15, offer a favorable balance between light availability and corn productivity. Overall, this study provides practical guidance for selecting row spacing in interseeded corn–alfalfa systems to promote alfalfa establishment while minimizing yield penalties.