Early Interseeding of Alfalfa Combined with Early Harvest of Corn Silage is Recommended for Intercropping in Southern Wisconsin

John Grabber, USDA-ARS, U.S. Dairy Forage Research Center

Establishment of alfalfa by interseeding into a corn silage companion crop has the potential to double first-year yields of alfalfa, increase overall forage production and the profitability of crop rotations, and decrease soil and nutrient loss from cropland. Prior studies with this system indicate concurrent planting of both crops often gives good establishment of alfalfa but yields of silage corn are often reduced. One recent study conducted under normal to dry rainfed conditions in Wisconsin and semiarid irrigated conditions in Idaho found that delaying interseeding from corn planting until the VE stage reduced early season growth of alfalfa and improved silage corn yield without adversely affecting alfalfa stand density or forage yield the following year (Grabber et al., 2024). That study also provided limited evidence that early harvest of silage corn favored greater fall growth and subsequent forage production by alfalfa. Therefore, the objective of this study was to identify suitable timings for planting corn and alfalfa during May and for harvesting silage corn during September to help ensure good establishment of alfalfa and good forage yields from this intercropping system.

Three experiments were planted during six growing seasons on silt loam soils near Prairie du Sac, Wisconsin. Experiments 1 and 2 evaluated two planting times for corn (early vs. mid-May), two or three timings for interseeding alfalfa (corn planting, VE, or V2 stage), and two timings for harvesting silage corn (early- vs. mid-September). Experiment 3 was planted with corn in early May and evaluated three timings for interseeding alfalfa (corn planting, VE, or V2 stage) and four timings for harvesting silage corn (1st to 4th week of September). Corn was planted at approximately 80,000 plant ha^{-1} and alfalfa was interseeded at 18 kg live seed ha^{-1}. Alfalfa foliage was treated with agrichemicals to improve its survival under corn. Dry matter yield of silage corn and 1st cut alfalfa the following year were measured in all experiments. Alfalfa stand density after establishment was assessed from plant counts, stem counts, or groundcover estimates. Crop growth patterns were primarily assessed by measuring plant height.

Shifting corn planting from early to mid-May or delaying interseeding from corn planting to the VE stage had little effect on alfalfa stand density and first cut yield the following spring if silage corn was harvested in early September. Delaying interseeding to the V2 stage in combination with delayed corn harvest often adversely affected alfalfa stand density and first cut yield. The effects of crop planting time and corn harvest timing on alfalfa establishment and yield were, however, small under dry growing conditions that stunted corn. Conversely, wet growing conditions favored corn growth, which resulted in poor stands of low yielding alfalfa, especially if late interseeding was used in combination with late corn harvest. Delaying interseeding from corn planting to the VE or V2 stage usually improved corn silage yield. Plant height measurements indicated early interseeding and early corn harvest favored alfalfa growth, while delayed interseeding and late corn harvest favored corn growth. In conclusion, interseeding up to the VE stage combined with early corn harvest generally provided good establishment and forage production of alfalfa and good yields of silage corn. However, successful establishment of interseeded alfalfa remains a challenge under wet growing conditions, but this may be addressed by ongoing work to breed alfalfa that is well adapted for intercropping.

References

Grabber, J.H., D.L. Bjorneberg, D.L. and C.W. Rogers. 2024. Crop Science 64:1061-1071.