

NORTH DAKOTA—Intercropping with Different Row Spacings Affects Intercepted Solar Radiation

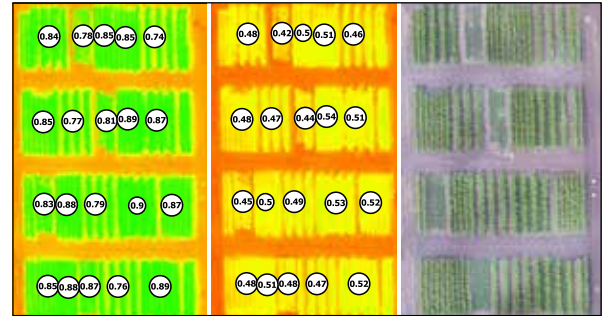
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Alfalfa acreage has declined significantly in the last 30 years. This may be attributed to other row crops increasing in price and yield while alfalfa yields have remained stagnant for >30 years. Loss of alfalfa acreage reduces long-term environmental benefits (e.g., reduced soil erosion, N₂ fixation, crop rotation diversity). Typically, the alfalfa seeding year is the lowest-yielding production year. Project goals were to establish alfalfa into corn to avoid the low-yielding establishment year and increase profitability by increasing average alfalfa yield while minimizing impact to corn yield. Trials were conducted at Prosper and Hickson, ND, in 2020 and 2021, in a randomized complete block design with 4 replicates and 5 treatments. The 1st year (alfalfa seeding year) treatments were: 30" corn, 30" corn+alfalfa, alfalfa alone, 60" corn, and 60" corn+alfalfa (Photo). The 2nd year (alfalfa production year) treatments included a spring-seeded alfalfa and alfalfa established in 2020 alone or intercropped with corn at 30" or 60". All treatments with corn included 4 rows regardless of row spacing. Alfalfa and corn were planted at the same time with two different planters. Corn grain yield was not significantly affected by alfalfa intercropping at the same row spacing. Widening corn rows reduced yield by ~17% without alfalfa intercropped and ~23% with it intercropped. Alfalfa intercropped with corn at 60" row spacing received 8% more light throughout the season than alfalfa intercropped with corn at 30" row spacing. On average, alfalfa and corn intercropped at 30" corn row spacing intercepted more light than any other treatment. Higher light interception in intercrop treatments due to alfalfa could help suppress inter-row weeds. Red edge normalized difference vegetative index (RENDVI) of both intercropped treatments at the end of the season were higher than corn alone at both row spacings, likely due to better ground cover from actively growing alfalfa. On average, RENDVI was significantly higher in intercropped treatments compared to corn alone. The higher RENDVI value from intercropped plots could be an indicator of better crop efficiency than monocrop treatments (Figure 1). Intercropped alfalfa did not affect corn grain yield, although the 60" row spacing had significantly lower corn grain yield compared to 30" corn in both treatments. In Year 2, alfalfa coming from intercropped treatments in Year 1 had greater yield than spring-planted alfalfa after corn.



Corn and alfalfa intercropped.

Figure 1. Normalized difference vegetation index (NDVI), RENDVI, and visual image, from left to right. Photos: July 12, 2021.



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