

Early interseeding of alfalfa combined with early harvest of silage corn is recommended for intercropping in southern Wisconsin

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Establishing alfalfa in a silage corn companion crop can enhance soil and nutrient conservation and boost forage yields

Impact of successful corn-alfalfa intercropping

- 3- to 4-fold more forage during alfalfa establishment.
- Expected to increase net return of corn-alfalfa forage rotations by about 12%.
- Improves water infiltration and reduces losses of soil, P and N by up to 80% during and after corn production.

Objectives of research program

- Identify suitable crop germplasm and agronomic practices for establishing alfalfa under silage corn.
- Evaluate crop yields, forage quality, environmental impacts, and the economic viability of the corn-alfalfa intercropping system.

Overview of the system

- Alfalfa planted between corn rows
- Silage corn harvested, alfalfa remains as a cover crop
- Following years alfalfa harvested for forage



Objective

Identify suitable timings for planting corn and alfalfa during May and for harvesting silage corn in September to help ensure reliable establishment of alfalfa and good forage yields from this system.

Experimental methods

Location and duration of study

- **Prairie du Sac, Wisconsin on silt loam soils with a pH 6.4 to 7.0**
- **Intercropping experiments conducted from 2020 to 2024.**

Experimental design:

- **Factorial treatment combinations in a RCBD with 4 replications:**
 - **Three timings for interseeding alfalfa (at corn planting or at the VE or V2 stage of corn) during May.**
 - **Up to four timings for harvesting silage corn during September (1st through 4th week).**

Crop Management

- **Sites fertilized with 180 lb per acre N. Based on soil test, applied P, K, S and B to meet crop requirements.**
- **Glyphosate-resistant corn planted in a 30-inch row spacing during the first week of May at 30,000 to 34,000 seed per acre.**
- **4 rows of glyphosate and potato leafhopper resistant alfalfa (fall dormancy 4) was drill interseeded at 16 lb per acre into each corn interrow. Used a variety with average survival under corn.**
- **Glyphosate was applied in early May and in mid-June to control weeds.**
- **Alfalfa was sprayed with prohexadione-Ca in mid-June and fungicide plus insecticide in early July to enhance survival under corn.**
- **A small plot harvester with weigh cells was used to chop corn and cut alfalfa.**

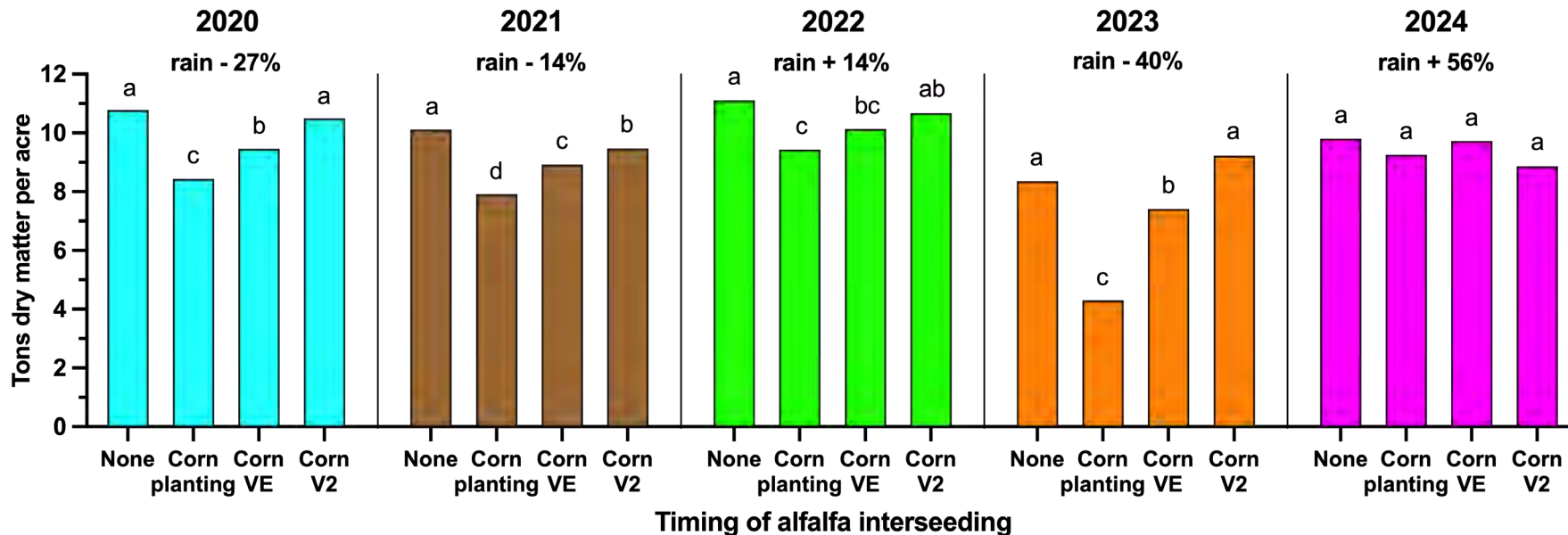
Data collection

- **Temperature and rainfall.**
- **Corn and alfalfa plant height to estimate crop growth during cropping season.**
- **Leaf area index of corn.**
- **Alfalfa stand density during and after establishment.**
- **Nitrogen status of corn at harvest (nitrogen nutrition index).**
- **Silage corn yield and first cut alfalfa yield the following year.**

Selected results

Effect of alfalfa interseeding time on silage corn yield

(Data averaged across September corn harvest timings)

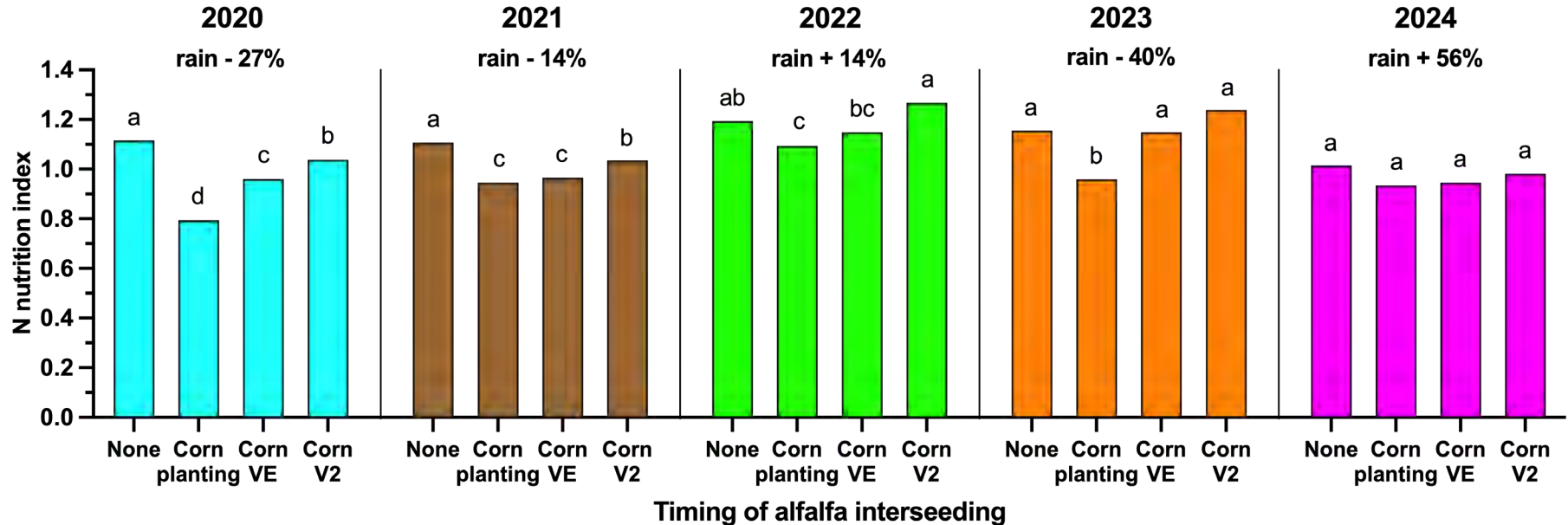


- Interseeding at corn planting usually reduced silage corn yield, especially during dry spring conditions in 2023.
- Delaying interseeding until the VE or especially the V2 stage usually improved silage corn yield.

Means within years with no letter in common are different at $P = 0.05$.

Nitrogen nutrition index of silage corn at harvest

(Data averaged across September corn harvest timings)

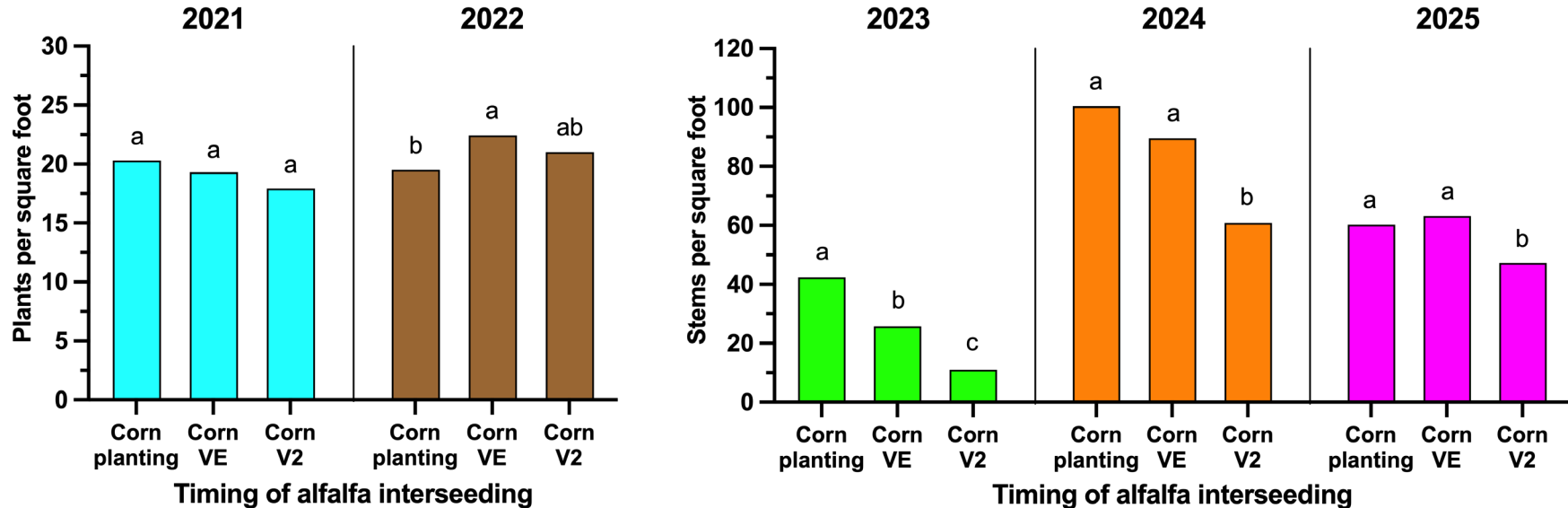


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- Delaying interseeding until the VE or especially the V2 stage often improved corn nitrogen status.

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Alfalfa stand density in mid-April in response to the timing of interseeding the prior year

(Data averaged across corn harvests during the 1st and 2nd week September)

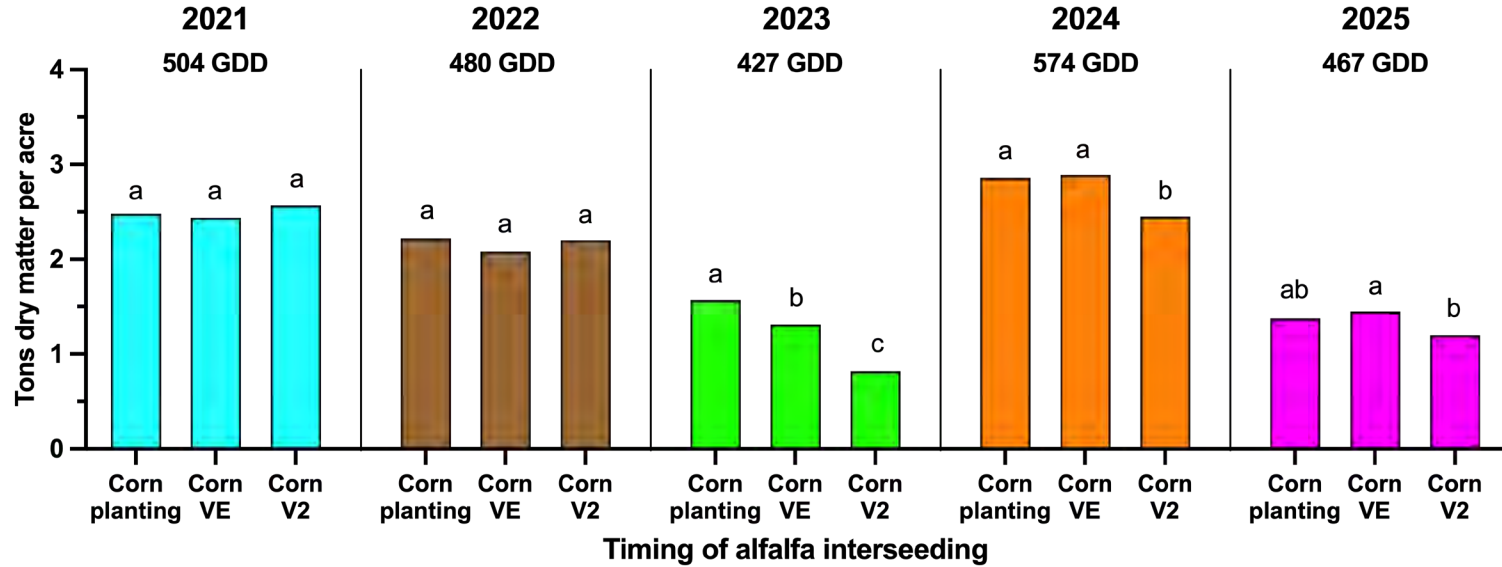


- Delaying interseeding until the V2 stage of corn reduced alfalfa stands in three out of five years.
- Dry conditions during establishment gave excellent alfalfa stands in 2021, 2022, and 2024.
- Widespread crown and root disease during establishment caused in poor stands in 2023.
- Wet establishment conditions with patchy areas of disease gave marginal stands in 2025.

Means within years with no letter in common are different at $P = 0.05$.

1st cut alfalfa yield in late May as influenced by alfalfa interseeding time the prior year

(Data averaged across 1st and 2nd week September corn harvest timings)



- Delaying interseeding until the V2 stage of corn reduced alfalfa yields in three out of five years.
- Excellent stands and good fall regrowth contributed to good first cut yield in 2021, 2022, and 2024.
- Poor stands, limited fall regrowth, and cool-dry conditions in spring limited yield in 2023.
- Marginal stands, limited fall regrowth, and cool spring conditions limited yield in 2025.

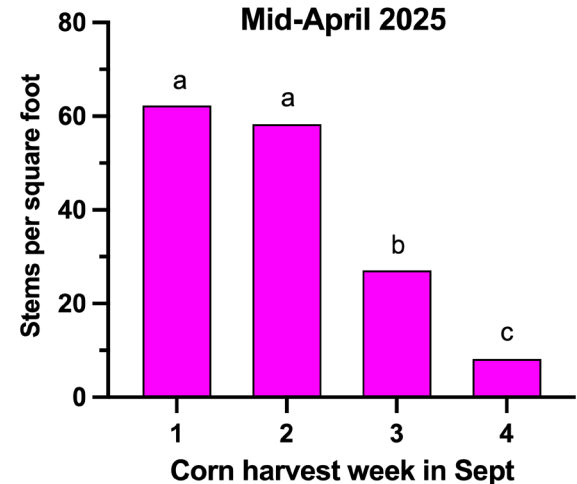
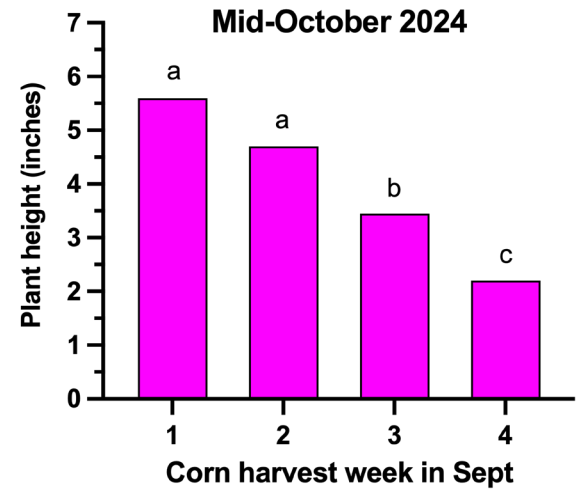
Means within years with no letter in common are different at $P = 0.05$.

Can silage corn be harvested in late September? **NO!**

Early interseeded alfalfa in mid-October 2024
after wet early season and dry late season stress



- Delayed harvest prolongs shading stress on alfalfa.
- Delayed harvest limits fall regrowth of alfalfa.



Means within years with no letter in common are different at $P = 0.05$.

Primary conclusions

- Interseeding at corn planting gave the best establishment and yield of alfalfa.
- Delaying alfalfa interseeding until the VE or V2 stage improved corn yield.
- Best compromise: Interseed alfalfa at VE stage with early corn harvest **but** need additional approaches to ensure more reliable crop production. Those under investigation include...
 - Breeding alfalfa for improved establishment under corn.
 - Deep banding nitrogen fertilizer to favor uptake by corn.
 - Planting corn in widely spaced twin rows (Romulo Oliva presentation).

Thank you!

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Alfalfa established
under corn silage
at the University
of Wisconsin
Arlington Research
Station