NDSU PLANT SCIENCES

Alfalfa and silage corn interseeding in North Dakota

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INTRODUCTION

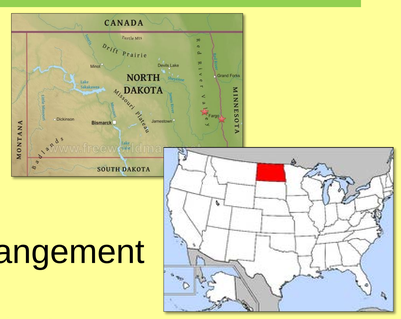
- ✓ In the Corn Belt over the last few decades, forage-based, high diversity crop rotations have transitioned to less diverse, shorter, and annual crop-based rotations.
- ✓ This resulted in the reduction of alfalfa (*Medicago sativa* L.) production on dairy farms, in favor of higher in yield continuous silage corn (*Zea mays* L.).
- ✓ With the availability of glyphosate-tolerant corn and alfalfa, and the use of growth regulators, corn-alfalfa intercropping has interesting potential in North Dakota.
- ✓ The corn would serve as a companion crop to alfalfa during establishment and the interseeded alfalfa would serve as a cover crop after corn harvest, preventing soil erosion and enhancing nutrient cycling.

OBJECTIVE

To determine the productivity, forage quality and stand establishment of alfalfa interseeded with corn in the previous season.

METHODS

Locations ✓ Fargo and Prosper, ND
Years ✓ 2014 and 2015



Design
- ✓ RCBD in a split-plot arrangement
- ✓ Main plots:
  - Row spacing: 61 and 76 cm
- ✓ Sub-plots:
  - Silage corn (C)
  - Alfalfa (A)
  - C + A
  - C + A + Prohexadione (PHX)

Evaluations
- ✓ Biomass yield from the 2-center rows of each plot (silage corn) and biomass yield from 6-center rows of each plot (alfalfa)
- ✓ Alfalfa was harvested in 2015 between late vegetative and bloom (0.48- to 0.62-m in height).
- ✓ Corn biomass was harvested at kernel milk stage (70% moisture).
- ✓ Forage quality parameters were determined with a NIRS.

RESULTS

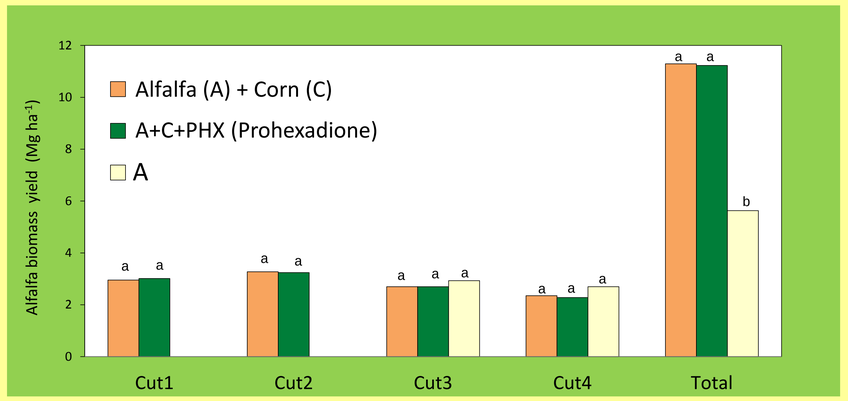


Fig. 1. Alfalfa biomass yield (by cut and total cumulative) across two locations in 2015. Means with different lower case letters within the same main effect indicate significant differences, LSD test *P*=0.05. Alfalfa (A), corn (C), and prohexadione (PHX). Yellow bars indicate the yield of spring seeded alfalfa.

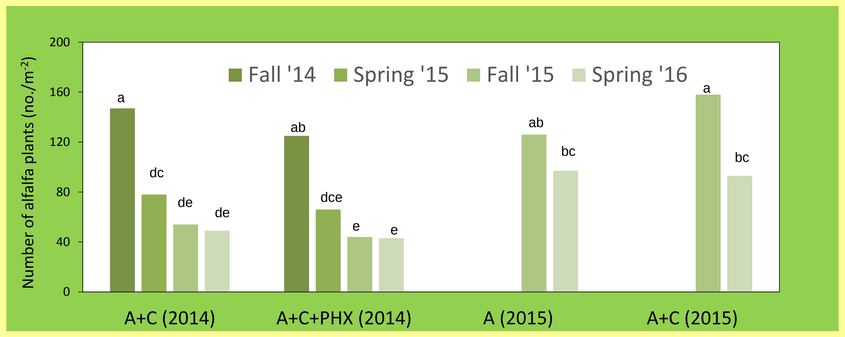


Fig. 2. Alfalfa plant density progression across two locations. Plants were counted in the fall 2014, spring and fall 2015, and spring 2016. Means with different lower case indicate significant differences, LSD test *P*=0.05. Alfalfa (A), corn (C), and prohexadione (PHX).

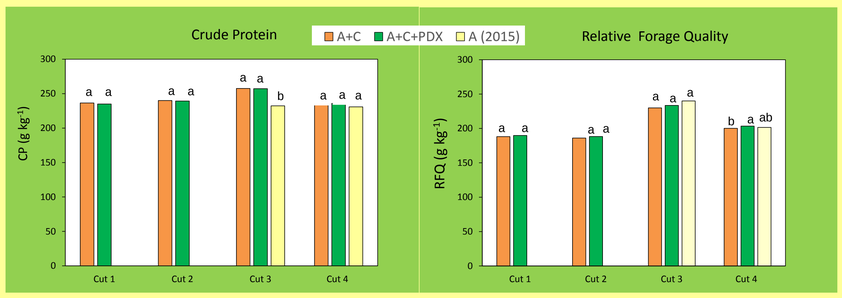


Fig. 3. Crude protein (CP) and relative forage quality (RFQ) of alfalfa in intercropping treatments across locations in 2015. Means with different lower case letters within the same main cut indicate significant differences, LSD test *P*=0.05. Treatments abbreviations are: alfalfa (A), corn (C), and prohexadione (PHX).

Fig. 4. Corn-alfalfa intercropping near the time of corn harvest in 2014.

Fig. 5. Corn and alfalfa intercropping compared with alfalfa monoculture in 2015.

Biomass yield and plant stand

- ✓ Total seasonal biomass yield for alfalfa established in May 2015 was 5.6 Mg ha^{-1} (total accumulation of two cuts) across row spacings (Fig. 1).
- ✓ Total seasonal biomass yield for alfalfa established in May 2014 was 11.3 Mg ha^{-1} (total accumulation of four cuts) across row spacings (Fig. 1).
- ✓ There were no differences in biomass yield for alfalfa with or without PHX (Fig. 1).
- ✓ Stand reduction was severe the first winter across all treatments. PHX did not improve plant survival (Fig. 2).

Quality

- ✓ There were not significant differences in CP, across four cuts, for alfalfa established in 2014 (Fig. 3).
- ✓ CP was lower in the first cut of alfalfa (232 g kg^{-1}).
- ✓ RFQ was similar across treatments except in the fourth cut were small differences were detected between alfalfa treated with PHX and alfalfa without PHX (203 vs. 200) (Fig. 3).

CONCLUSIONS

- ✓ Alfalfa established in 2014 had approximately twice the yield of spring alfalfa seeded in 2015.
- ✓ Use of PHX did not improve alfalfa winter survival and had no effect on alfalfa forage quality.
- ✓ The interseeding system can provide a head start for alfalfa increasing the biomass yield the first production year.