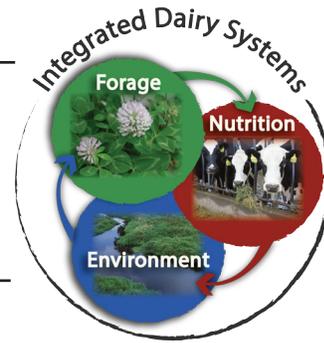


Improving the establishment and subsequent yield of alfalfa interseeded into silage corn



U.S. Dairy Forage Research Center

New approaches are needed to increase the annual dry matter yield of alfalfa, which is lower yielding than silage corn. This yield disparity has contributed to dairy farms abandoning alfalfa-corn rotations in favor of continuous production of silage corn. Eliminating alfalfa, however, can adversely affect the sustainability of crop production by increasing the amount of nitrogen fertilizer purchased, increasing soil erosion, and decreasing soil organic matter which negatively affects water infiltration and water holding capacity. Recent USDA-NASS data indicate alfalfa is planted on about 2.4 million acres per year in the U.S. Because alfalfa is often grown in rotation with corn, a workable interseeding production system could potentially be adopted on a substantial scale.

Interseeded alfalfa could serve as a dual purpose crop for providing groundcover during silage corn production and forage during subsequent years of production, but this system has been unworkable because competition between the co-planted crops often leads to stand failure of interseeded alfalfa and reduced yields of corn. The goal of our research is to identify plant growth regulator (PGR) treatments and management practices that will boost the success rate of alfalfa establishment by interseeding to greater than 80% while limiting yield depression of corn to less than 5%. An economic analysis suggests such a system could improve the profitability of first-year alfalfa by about \$100 per acre compared to conventional spring-seeded alfalfa (Grabber and Vadas, 2011, unpublished). An initial screening of foliar-applied PGRs

suggested that a calcium salt of prohexadione might be useful for limiting excessive top growth of interseeded alfalfa during its establishment in corn. Prohexadione is currently labeled for several orchard crops, peanuts, and grass seed production to limit shoot growth.

Field studies were carried out for four years on a silt loam soil near Prairie du Sac, Wisconsin to evaluate prohexadione applications on alfalfa that was planted with Clearfield or Roundup-Ready corn (no-till) in early to mid May. Prohexadione was sprayed at 10 to 40 ounces per acre with drop nozzles onto alfalfa seedlings about 4 to 6 weeks after planting.



The potential of interseeding to jumpstart alfalfa production is illustrated in this photograph, which was taken during the first year of alfalfa production. Alfalfa interseeded into corn the previous year is ready for harvest in late May/early June (left), whereas alfalfa spring-seeded in April is still getting established (right). First year dry matter yields of interseeded alfalfa averaged 5 tons per acre compared to only 2.4 tons per acre for spring seeded alfalfa.

Prohexadione applied in June typically reduced alfalfa top growth by about 20% in July and doubled or tripled alfalfa seedling stand density by mid-October compared to non-treated controls. Alfalfa interseeding reduced dry matter yields of silage corn by about 12% compared to corn grown without interseeded alfalfa. Application of prohexadione on interseeded alfalfa did not alleviate yield depression in corn.

First-year yields of alfalfa established the previous year by interseeding were two-fold greater than alfalfa conventionally spring-seeded after corn. Prior year prohexadione applications increased first year alfalfa yields by about 12% and fall stand densities by 37 to 130% compared to untreated interseeded controls. Higher rates of prohexadione did not further improve alfalfa top growth suppression, stand density, or forage yields.

Overall as illustrated in Figure 1 and the pictures below, the primary benefit of prohexadione treatment was to substantially improve stand density of interseeded alfalfa and this should markedly improve the success rate of alfalfa establishment in corn and insure high yields of alfalfa across several cropping seasons.

Although the corn-interseeded alfalfa system has great potential, additional studies with prohexadione and other PGRs are needed to find ways of lessening yield reductions in corn and to develop workable and cost-effective production systems for farms. We are, for example, now conducting studies with Mark Renz and Joe Lauer (Agronomy Department, University of Wisconsin-Madison) to see if lower, more economical rates of prohexadione in single or split applications can be effective for boosting stand density and subsequent yields of interseeded alfalfa. Further work is also needed to lessen yield reductions of corn and to refine management practices for producers. □

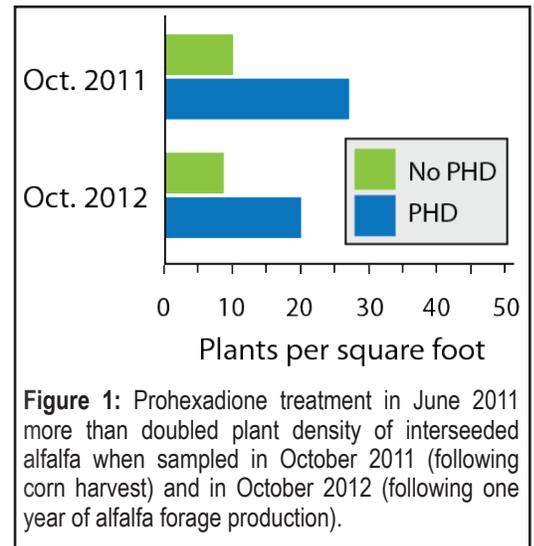
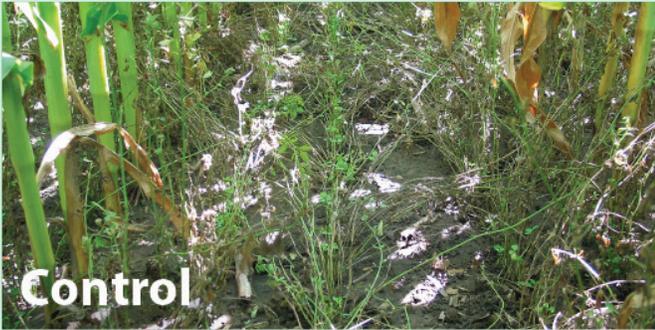
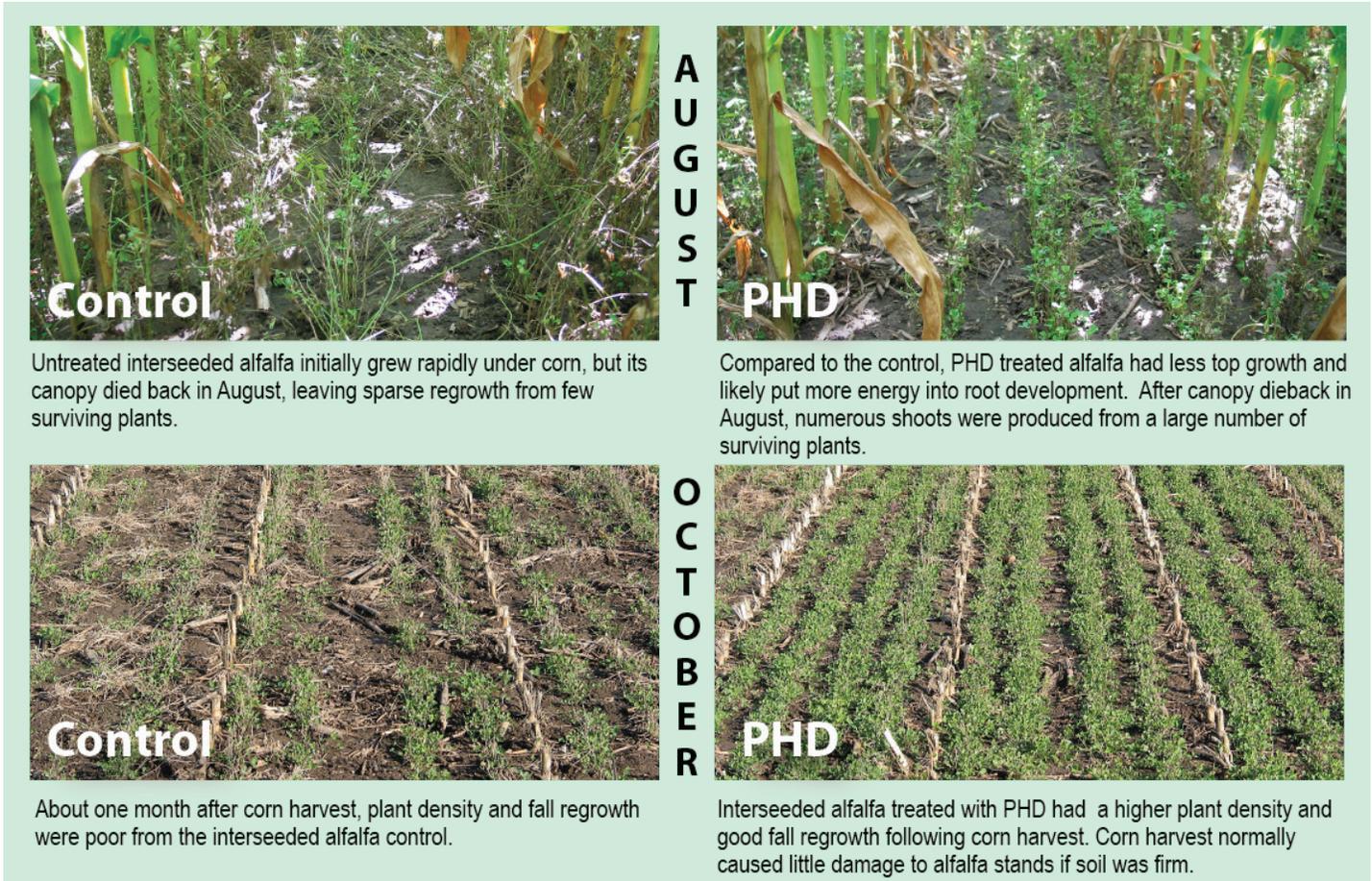


Figure 1: Prohexadione treatment in June 2011 more than doubled plant density of interseeded alfalfa when sampled in October 2011 (following corn harvest) and in October 2012 (following one year of alfalfa forage production).

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Untreated interseeded alfalfa initially grew rapidly under corn, but its canopy died back in August, leaving sparse regrowth from few surviving plants.



Compared to the control, PHD treated alfalfa had less top growth and likely put more energy into root development. After canopy dieback in August, numerous shoots were produced from a large number of surviving plants.



About one month after corn harvest, plant density and fall regrowth were poor from the interseeded alfalfa control.



Interseeded alfalfa treated with PHD had a higher plant density and good fall regrowth following corn harvest. Corn harvest normally caused little damage to alfalfa stands if soil was firm.

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