

EFFECT OF ANNUAL GRASS WEEDS ON ALFALFA ESTABLISHMENT, YIELD AND FORAGE QUALITY

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Weeds can affect alfalfa establishment, productivity and forage quality but the magnitude of the impact has not been thoroughly studied. Over the past three years we have established studies to evaluate the impact of all of these factors during the establishment year as previous research has shown this to be the most sensitive to weed populations. While previous experiments have been conducted throughout the state, research in 2014 was focused at the Arlington research station to determine the impacts of annual grasses on alfalfa establishment.

Methods. Alfalfa was planted on May 28 at 15 lbs/A PLS with a billion seeder to a tilled field with a prepared seed bed. This field was known to have a high seedbank of annual grasses, particularly giant foxtail. Planting was delayed due to spring precipitation and soil moisture. As the goal was to obtain a range of weed populations we applied herbicides POST with a range of grass (Poast Plus, Select) and broadleaf (Butyrac) specific herbicides applied at several rates. To avoid potential injury and yield reduction, herbicides with extended residual activity were NOT utilized (e.g. Pursuit, Raptor). Applications were applied when alfalfa was at the 1-3 (6/16/14) or 4-6 (7/2/14) trifoliolate leaf stage respectively. Applications were replicated three times within the field. Due to the delayed planting, wet spring, and competitive environment alfalfa was not harvested until 8/15/14 when alfalfa was at 10% bloom. A second harvest was taken on 10/15/14 to alfalfa that was 8-10 inches tall.

Measurements. Cover of alfalfa and weed species were periodically estimated throughout the experiment. Forage yield was taken from the same square meter area within the center of each plot at each harvest. Forage yield was separated into alfalfa, grass weeds, and broadleaf weeds and dried and weighed. After weighing samples were combined for each plot, ground and analyzed for relative forage quality (RFQ) with NIRS. Alfalfa plant density was also counted for each harvested area during each harvest.

Effect of Weeds on Forage Production. Weed species increased production of total forage. The highest yielding plots summed across the establishment year were nearly all grass weeds (3.9 T DM/A), with the lowest yielding plots 75% alfalfa (1.7 T DM/A). While the first harvest on average contributed 80 % of the total yield for 2014, weed species were only common in the first harvest as on average weed species made up 80% of the biomass compared to 12% in the second harvest.

Effect of Weeds on Forage Quality in the first harvest. The primary weeds present (75%) were annual grasses (primarily giant foxtail and barnyardgrass). RFQ from treatments with 50% or less weed biomass had RFQ values > 165 (dairy quality) with estimated reductions in RFQ by 5% for every 10% weeds in the total forage biomass.

Effect of Weeds on Forage Quality in the second harvest. Weed species were much less common in the second harvest and consisted of both annual grass and broadleaf (pigweed spp., common ragweed) weed species. Only three samples (5%) had an RFQ < 165, indicating feed was of high quality. No relationship was found between RFQ and percent of weed biomass between forage.

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Effect of Weeds on alfalfa establishment. Alfalfa plant density was 5.6 and 6.2 plants per square foot at the first and second harvest respectively. Low alfalfa plant counts are likely due to the late planting date and competitive environment and are likely underestimated by visual counts. While populations are low, no relationship was found between alfalfa plant density and weed biomass.

In summary, the majority of the weed impact to establishing alfalfa is from reductions in forage quality. While forage biomass is maximized when weeds are not controlled, forage quality drops as weed biomass increases. Forage quality can drop below dairy quality with moderate to high weed populations. While the impact on forage quality can vary depending on the weed species, our results suggest that RFQ will be reduced by 3-5% for every 10% of forage biomass that consists of weeds. The impact of weeds on forage quality is only seen in the first harvest, however. Contrary to popular belief, weeds do not affect alfalfa establishment in Wisconsin. This research confirms results from 2012 and 2013 and suggest that other factors are drivers in alfalfa plant establishment and survival, and weed management does not improve alfalfa establishment. Based on these findings I recommend that any management costs associated with weed control while establishing alfalfa should be recouped during the first harvest as one can expect minimal to no benefits after this timeframe.