

Abstract

In order to study the effects of barley as companion crop on weed density and biomass, alfalfa forage yield and quality and establishment, an experiment was conducted based on a randomized complete blocks design with 17 treatments and 4 replications at research fields of Plant Protection Research Institute, Karaj, Iran, in 2012-2014. Treatments comprised of: 30 and 45 kg ha⁻¹ alfalfa seeding rates with 0, 30, 60, 90, 120 and 150 kg ha⁻¹ barley companion crop seeding rates. In addition, sole alfalfa (30 and 45 kg ha⁻¹) with herbicide treatments, sole alfalfa (30 and 45 kg ha⁻¹) with hand weeding, sole alfalfa (30 and 45 kg ha⁻¹) without weed control and sole barley (150 kg ha⁻¹) were considered. In the second year, only herbicides treatments were used. Measured traits in this experiment included quality traits of forage (cut 1), alfalfa density (cut 1 and last cut), dry matter yield and weed density and biomass (if any) during two years of experiment. Results showed that in first cut of establishment year, treatments containing barley companion crop in comparison with alfalfa + herbicide and control, had more forage yield and quality, weed density and biomass and alfalfa plants density. The highest forage dry matter yield in the first year was observed in 150 kg ha⁻¹ barley seeding rate (19451 kg ha⁻¹). Moreover, among treatments, the highest percentage of dry matter digestibility, crude protein, protein yield and ash, and lowest percentage of acid detergent fiber and neutral detergent fiber in first cut related to sole alfalfa with herbicide and hand weeding and in terms of the forage quality treatments containing companion crop were better than control. Highest alfalfa plants density at the end of the first year was observed in alfalfa 45+ barley 60 barley treatment and in both alfalfa seeding rates, increasing the density had negative effects on these traits. In first cut of second year also treatments containing barley companion crop seeding rates in other to had in terms of weed density and biomass was better than control treatments and in most cases the 60 kg ha⁻¹ seeding rate of barley was similar herbicide treatment. Between all treatments, highest forage dry matter yield (17573 kg ha⁻¹), alfalfa plant density (507 plants /m²) at the end of the year 2 and two-year forage yield was related to alfalfa 45+ barley 60 barley treatment. Based on results, intercropping of alfalfa and barley in this region for 45 and 60 kg ha⁻¹ seeding rates (for alfalfa and barley, respectively), in addition to increasing the forage quality and quantity, effective control of weeds and successful alfalfa establishment, can reduce farmers dependence on use of herbicides.

Key words: Companion crop, Forage legume, Non-chemical weed control, Dry matter digestibility, Crude protein



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