FORAGE PRODUCTION OF IRRIGATED LUCERNE-GRASS MIXTURES GRAZED BY SHEEP

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ABSTRACT

The forage production and botanical changes of lucerne cultivars in pure stands and in grass mixtures were studied in a split-plot experiment with irrigation and sheep grazing. The non dormant lucerne cultivars (*Medicago sativa*) CUF 101, Monarca SPINTA, P 30 and common were the main plots, and tall fescue (*Festuca arundinacea*), canarygrass (*Phalaris aquatica*), cocksfoot (*Dactylis glomerata*), tall wheatgrass (*Thynopirum ponticum*) and prairie grass (*Bromus catharticus*) were the subplots. The experiment was grazed 3, 6 and 4 times during 3 years. Total yield was similar for all lucerne cultivars except P 30. Grass production and non sown species incidence did not differ between main plots. Lucerne yield was lower in tall fescue subplots than in other mixtures and pure stands ($P<0.05$). Grass production was higher in tall fescue mixtures than in tall wheatgrass, canarygrass and prairie grass, and all were superior to cocksfoot ($P<0.05$). Tall fescue severely suppressed lucerne and non sown species. All lucerne-grass mixtures were superior to pure lucerne, so it emphasized the grass contribution to forage production and to non sown species control.

KEYWORDS

Lucerne, grasses, forage production, sheep grazing

INTRODUCTION

The irrigated valleys are the most productive environments in the Patagonia region of Argentina. Pure lucerne and lucerne-grass pastures are utilized for hay mowing or cattle and sheep grazing. Forage production and persistence of pastures are affected by botanical composition, low drainage and soil salinity, deficient irrigation and poor control of sheep grazing. Thus, the objective of this experience was to determine forage production and botanical changes of lucerne cultivars sown in pure stands and in grass mixtures with the usual irrigation and sheep grazing conditions in the region.

METHODS

The experiment was sown in April 1992 at the EEA Valle Inferior, Viedma, Río Negro (40½48' S, 63½05' O) on a mazacuent entic, pH 7.5, 3.6 % organic matter and 5.3 ppm phosphorus. A split-plot design with 3 replicates was used with lucerne cultivars as main plots (200 m^2) and grasses as subplots (25 m^2). The non dormant lucerne cultivars CUF 101, Monarca SPINTA, P 30 and common were sown in pure stands and in single mixtures with tall fescue, canarygrass, cocksfoot, tall wheatgrass or prairie grass. Plots were grazed for 2-3 days with a stocking rate equivalent to 800-1000 sheep.ha^{-1}, when lucerne reach early flower stage or 5 cm of basal regrowth. The experiment was conducted during the 1992/3, 1993/4 and 1994/5 grazing seasons with 3, 6 and 4 grazing periods respectively. At the beginning of each cycle and after each grazing 1-2 irrigations were applied. Herbage yield and botanical composition were estimated by samples of 0.25 m^2 at each subplot before grazing periods. Total yield was examined with ANOVA and means were compared with SNK test.

RESULTS AND DISCUSSION

Forage production of lucerne cultivars were similar except P 30 which had inferior yield. Grass yield and non sown species incidence did not differ between main plots (Table 1a). Total yield of lucerne fraction was lower in tall fescue subplots than in other mixtures and pure stands ($P<0.05$). The grass yielded a higher proportion of the total yield in tall fescue mixtures compared to tall wheatgrass, canarygrass and prairie grass mixtures, and all were superior to cocksfoot ($P<0.05$). The invasion of nonsown species was nil in tall fescue subplots and increased in the other grass mixtures and were greatest in pure lucerne stands (Table 1b). It was observed that legume yield was lower than grasses in all mixtures and decreased in the third grazing season (Figure 1). This decrease was higher in pure lucerne and tall fescue plots. Tall fescue mixtures showed the poorest legume-grass balance in order to its competitiveness. The relationship between lucerne and grasses was more stable in canarygrass, tall wheatgrass and cocksfoot associations. The last one was the most balanced but it was the least productive mixture. Prairie grass contribution decreased after the first cycle (Figure 1). All lucerne cultivars could decrease yield as the short grazing periods (2-3 days) could cause a drastic and severe defoliation during the complete cycle of lucerne that could reduce lucerne regrowth (Leach, 1979; Cosgrove and White, 1990). The autumn defoliation could reduce carbohydrate accumulation for early spring regrowth in non dormant lucerne cultivars (Smith, 1972) and the low temperature requirement for grass regrowth could be the initial causes of the imbalance between sown components. Selective defoliation of lucerne plants by sheep could increase the imbalance. For all grass-lucerne mixtures, yields of herbage were more than those for pure lucerne, showing the contribution of grass species to produce forage and to control non sown species. The high yield of tall fescue mixtures contrasts with its low lucerne contribution while canarygrass and tall wheatgrass mixtures showed intermediate and more stable production.

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Table 1
Total herbage yield of 3 years (t MS.ha^{-1}) of lucerne, grasses and non sown species in the main plots and subplots.

a) Main plot	Lucerne	Grasses	Non sown spp.
Common	8.63 a(*)	13.18 a	9.16 a
CUF 101	10.00 a	13.07 a	7.53 a
Monarca SPI	10.75 a	13.79 a	8.72 a
P30	4.99 b	13.02 a	8.81 a
b) Subplot			
Tall fescue	4.48 b	21.80 a	4.20 c
Canarygrass	8.76 a	16.62 b	6.81 b
Cocksfoot	9.35 a	10.13 c	8.49 b
Tall wheatgrass	8.97 a	17.14 b	7.74 b
Prairie grass	8.57 a	13.90 b	7.58 b
Pure lucerne	11.42 a	—	16.53 a

(*) Values with common letters within a main plot or subplot column are not significantly different (SNK, P<0.05).

Figure 1
Herbage production and botanical composition of lucerne mixtures and pure stands during 3 grazing seasons. Each bar corresponds to 1992/3, 1993/4 and 1994/5.