DRY MATTER AND PROTEIN YIELDS OF RED CLOVER, ITALIAN RYEGRASS AND THEIR MIXTURES

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Introduction

- As red clover (Trifolium pratense L.) is adapted to a wide range of soil conditions, it is quite suited for Bosnia and Herzegovina, weil we have large area characterized by heavy and acid soils.

- In Bosnia, red clover is very often sown in mixtures with Italian ryegrass due to easier crop management.

- Although Red clover in pure standand, without fertilization, can give stable and high yields, it was interesting to see if small amount of applied N has any effect on dry matter and protein yield of Red clover, but also of Italian ryegrass and their mixtures.
Material and methods

The field experiment was established in Butmir near Sarajevo (518 m a.s.l.) with an average annual precipitation of 902 mm and an average annual temperature of 9.5 ºC.

Soil of the experimental field is loamy-clay, characterized by pH - 5.6 (in H2O), P - 11 mg, K - 14.6 mg (determined by using ammonium lactate-acetic extraction) and 160 mg N in 100 g of soil. Nitrogen was determined by the Kjeltec method.

We used a randomised complete block design with four replications and plot size of 5 m².

The experiment was set up in spring 2004 with following variants:

- Red clover 100%;
- Red clover 75% + Italian ryegrass 25% (S1);
- Red clover 50% + Italian ryegrass 50% (S2);
- Red clover 25% + Italian ryegrass 75% (S3);
- Italian ryegrass 100%.

Mineral nitrogen (30 kg ha⁻¹) was applied in spring.

The sward was harvested at the beginning of flowering of red clover.

In 2004 we made three cuts and in 2005 four cuts.

Protein yield was calculated on the basis of dry matter (DM) yield and protein content (N × 6.25). Total N was determined using the Kjeldahl method.

Results were subjected to ANOVA and compared by LSD test.
Dry matter yield

- Weather conditions in 2004 were favourable and both species, and their mixtures, established well.
- DM yield ranged from 8.27 (Italian ryegrass) to 11.83 t ha⁻¹ (Red clover) but significant differences were not found.
- In 2005 temperatures were normal and the rainfall sufficient throughout the vegetation season. In this year red clover was again most productive (22.62 t/ha), but very productive were mixtures with high portion of Red clover.
- Italian ryegrass gave the lowest yield (10.9 t ha⁻¹). The differences were highly significant.
- An application of 30 kg N resulted in 5.58 and 5.00 t ha⁻¹ DM for Red clover and Italian ryegrass, respectively, while the DM yield differences for the mixtures were much smaller.
Results and discussion

Crude protein content

- Crude protein content ranged from 6.85 to 18.4%, depending on species, proportion of Red clover or Italian ryegrass in mixtures, defoliation cut, and applied N.
- The highest crude protein content was found in Red clover and the lowest in Italian ryegrass.
- Mixtures with higher proportions of Red clover were characterized by higher crude protein contents.
- Applied N had, in most cases, some positive effect on crude protein content.
- It is interesting to note that in 2005 Italian ryegrass had less crude protein in the N-fertilized treatment.
Results and discussion

Protein yield

A low rate of applied N had a positive effect on protein yield, even in Red clover grown as a pure stand.

In 2004 applied N in Red clover resulted in an improvement of 553 kg ha\(^{-1}\) and in 2005 of 1093 kg ha\(^{-1}\).

Differences in protein yield decreased with increasing proportion of grass component in mixtures.

Although Italian ryegrass yielded more in 2005 with applied N, protein yield was higher when N was not applied.

Differences were, in most cases, highly significant among Red clover and its mixtures compared to pure Italian ryegrass.

Results of DM and protein yields also suggest that applied N supported both nitrogen use efficiency as well as apparent N recovery, especially by Red clover due to its role in N fixation, and also in mixtures with high proportion of red clover.

![Protein yield graph]

- 100 % Red clover
- 75 % Red clover + 25 % Italian ryegrass (S1)
- 50 % Red clover + 25 % Italian ryegrass (S2)
- 25 % Red clover + 75 % Italian ryegrass (S3)
- 100 % Italian ryegrass
Conclusions

- Low rate of applied nitrogen had positive effects on DM and protein yields of Red clover, Italian ryegrass and their mixtures.
- In similar conditions the application of such small rate of mineral N could be reasonable.
THANK YOU FOR YOUR ATTENTION