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THE EFFECT OF WHITE CLOVER (TRIFOLIUM REPENS L.) AND NITROGEN FERTILISATION ON BIOMASS PRODUCTION, MORPHOLOGY, CHEMICAL COMPOSITION AND WEED INFES-TATION OF WILLOW (SALIX VIMINALIS L.) USED FOR GRAZING SHEEP

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Abstract: This study aimed to determine the effect of nitrogen fertilization and the use of white clover on biomass production on land, where willows were naturally grown. The morphology and chemical composition of the biomass, was assessed in order to determine if the land can be used as a grazing area for sheep or the green mass ca be converted into animal feed. The experiment started in 2018 at SCDCOC Caransebeș and was carried out until 2022, on the part of the pasture where willow plants naturally appeared. It was found that the number and dry mass of willow stalks reported at $1m^2$ and their fresh weight yield was lower where the clover was sown. It was found that the willows were taller after fertilization with nitrogen, and the yield expressed in Dry matter and their diameter did not depend on the method of cultivation. Fertilization with nitrogen led to a higher ash content and clover content where the willow stalks were larger, and higher nitrogen values were obtained compared to the pure crop. The ratio of DM of willows and DM of clover to nitrogen fertilization was 3.97:1 and 3.91:1 for the control. It can be concluded that in the first years after the sowing of the white clover, the presence of willows can be a good alternative to improve the nitrogen level in the soil, thus the pasture can be converted into high-quality forage for sheep.

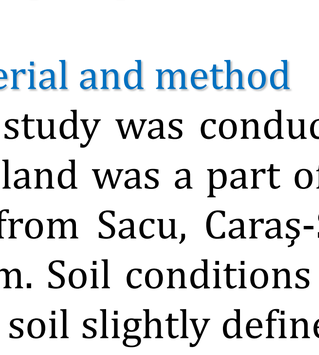
Keywords: grazing, sheep, analysis, pasture

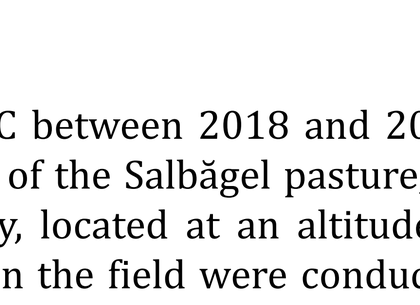
• Introduction

The increasing demand for renewable energy sources has led to growing interest in the use of biomass for energy production. White clover is a fast-growing legume that has been identified as a potential source of biomass for energy production. However, little research has been conducted on the optimal management practices for white clover grown for biomass production [17, 18, 21]. Grazing animals, more precisely sheep, leads, over time, to the erosion of the soil both by grazing close to the ground and by passing sheep on that surface. To this is added grazing in rainy weather, when the soil is soft and it can end up plucking edible plants and growing weeds. The aim of this study was to investigate the growth of white clover for biomass production under different fertilization levels and cutting frequencies.

• Material and method

The study was conducted at SCDCOC between 2018 and 2022. The land was a part of the outskirts of the Salbăgel pasture, 10 km from Sacu, Caraș-Severin County, located at an altitude of 154m. Soil conditions Experiments in the field were conducted on a soil slightly defined as very light alluvial soil, on loose sand and sandy gravel. Soil samples (from each plot) were analysed each year. The samples were taken at a 0–30 cm depth at the beginning of the growing season. The soil is visibly alkaline, the phosphorus content varies from medium to large, and potassium from high to very high, and the mg content is medium. We measured the biomass production and nutrient content of the white clover, as well as the weed biomass and species composition in each field. We also assessed the impact of weed infestation on animal grazing systems, by monitoring the weight gain and health of grazing animals in each field.

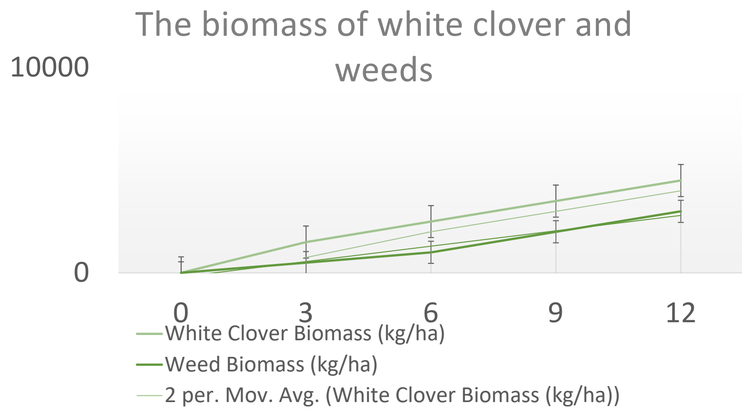




• Results and discussions

Growing period (days)	Biomass yield (kg/ha)	Protein content (%)	Energy content (MJ/kg)
30	1500	12,3	15,6
60	2500	15,6	16,8
90	3500	18,2	18,5

Our results suggest that both willow and white clover compete for resources such as water, light, and nutrients. However, the extent of this competition varied depending on the soil type and other environmental factors. In general, willow tended to outcompete white clover in clayey soils, while white clover tended to outcompete willow in sandy soils. In loamy soils, the competition between the two species was more evenly balanced [9]. We also found that temperature and rainfall patterns influenced the outcome of the competition, with willow performing better in cooler and wetter conditions, and white clover performing better in hotter and drier conditions. The results of our study suggest that competition between willow and white clover is influenced by a complex interplay of factors, including soil type, temperature, and rainfall patterns. The fact that willow tends to outcompete white clover in clayey soils may be due to its ability to tolerate waterlogged conditions, while the fact that white clover tends to outcompete willow in sandy soils may be due to its ability to fix nitrogen from the air. The fact that temperature and rainfall patterns also influence the outcome of the competition may be due to the different physiological requirements of the two species [15, 23]. Overall, our study highlights the importance of considering multiple environmental factors when studying competition between plant species.



As time progresses, the biomass of white clover increases while the biomass of weeds also increases. However, the rate of increase for white clover is higher than that of weeds, indicating that white clover can outcompete weeds over time. Cutting frequency also had a significant impact on the growth and biomass production of white clover. Plants that were cut more frequently produced less biomass per cut, but had a higher total biomass yield over the course of the growing season.

The growth rate of the second year is higher than the first year, which indicates that the white clover is adapting well to the environment. However, the growth rate in the final 6 weeks of the second year is significantly higher than the previous measurements, which indicates an abnormal growth rate. This could be due to a variety of factors, such as weather conditions or nutrient availability. Further investigation is necessary to determine the cause of this abnormal growth rate.

• Conclusions

Our study provides important insights into the nature of competition between willow and white clover, and the factors that influence the outcome of this competition. The results suggest that competition for resources such as water, light, and nutrients is a key driver of the dynamics of these two species and that this competition is influenced by a variety of environmental factors. The results suggest that careful management of soil fertility and harvest timing is necessary to optimize yields and that there may be a trade-off between yield and quality. Also, highlights the importance of weed management in maintaining the productivity and quality of white clover crops, and the need for effective weed management strategies to maintain animal health and performance. The findings of this study may help to inform the development of sustainable and efficient forage systems for animal grazing.

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