

# MONITORING PRODUCTIVITY AND QUALITY OF GRASS-LEGUME PASTURES UNDER IRRIGATED CONDITION

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## ABSTRACT

The performance of six grass-white clover mixtures were evaluated in winter cold zone of Eastern Anatolia. In combination with white clover, ryegrass (*Lolium perenne* L) cocksfoot, (*Dactylis glomerata* L) and smooth brome (*Bromus inermis* Leyss) were used in double and triple plant mixtures. Average DM production ranged from 7.5 to 10 t/ha, with no significant differences observed among the mixed swards. DM production of all mixed swards significantly varied between cutting periods and years. A gradual decrease in DM production was observed both from the first to fourth cut and from the first to third year. Clover and consequently CP content increased from the first to second year and decreased in the third year. The increasing proportion of clover after first cut was also reflected in a higher content of CP. On the other hand, the persistence of grass species to frequent cutting varied but ryegrass became dominant to cocksfoot and smooth brome in triple mixtures.

## KEYWORDS

Pasture, plant mixture, irrigated, legume, grass

## INTRODUCTION

Under harsh climatic conditions, livestock enterprise has played a vital role in farmers' life in eastern Anatolia and still provides the largest family income in the region. Hence, rangelands are very important to the eastern part of Turkey since they constitute the largest renewable natural feed resources. However, with the force of population pressure, overuse of rangelands in the last decades has put the local farmers in a very difficult position. Thus, to increase livestock production and establish an independent livestock farming from the communal rangeland is inevitable. On the other hand, agronomic constraints to intensified dairy and beef production are summer and winter feed shortages. Despite the availability of a large amount of irrigated land and favorable climatic conditions for growth of pastures in eastern Anatolia, so far pasture establishment has not been introduced into the farming system. Establishment of artificial pasture to meet the quality feed requirement of intensified farming in plain areas seems one of the best options for this problem. This experiment was designed to find out the suitable plant mixture for the region. Due to its higher nutritive value (Thomson, 1984), and N fixation ability, white clover was chosen as legume in mixed swards. Previous work with rye grass, smooth brom and cocksfoot under irrigated conditions has shown a good adaptability of these crops to the region (Altyn, 1987).

## METHODS

The study was located at 1750m above sea level, in Erzurum province of eastern Anatolia where characteristic winter cold continental climate prevails. Mean yearly temperature ranges between 6-10 °C and yearly precipitation between 380-1000 mm. The soil at the site is alluvial with a neutral pH, low P<sub>2</sub>O<sub>5</sub> and organic matter but high available K<sub>2</sub>O content. Three grass species; rye grass (RG), cocksfoot (CF) and smooth brom grass (SB) were cross-drilled with white clover (WC) in double and triple 6 forage mixtures, randomized block design using 4 replicates in 1992. The planting rate was 3.5 kg/ha for WC and 20 kg/ha for all grass species in six-row plots. In the establishment year, 100 kg/ha of P<sub>2</sub>O<sub>5</sub> and 150 kg/ha N applied to the trial then N rate reduced to 100 kg/ha in following years. The experiment was irrigated 6 times in the growing season, two irrigations per cut

followed an unirrigated first cut. Whole plot (1.8x6 m) excluding side effects, were cut 4 times, from the first week of June to third week of September for three years excluding establishment year. In addition to DM and CP measurement, contribution of white clover and grass species to the DM yield was determined in fresh and oven dried pasture in each cut (Tiley, 1989).

## RESULTS AND DISCUSSION

When cut for hay, annual DM yield did not differ significantly among the mixtures however, it was the highest in SB+Clover and lowest in RG+CF+clover sward with 9.65 and 8.17 t/ha respectively. Besides, the mean DM yields of mixed swards significantly (P<0.01) changed between the years but with similar ranking orders. Annual DM production was greatest in the first year followed a significant gradual decrease (P<0.01) in the second and third year ranging from 11.42, down to 7.22 t/ha. Forage production of all mixtures significantly (P<0.01) decreased as the season progressed. Pastures grew rapidly in a vegetative state through May, after which with the increasing temperature, seasonal DM production declined from the first to third cut, but it was slightly increased in the fourth cut in September. The clover content of the all mixed swards followed the normal pattern, rising from a low point in early season and increased from the first to fourth cut, while the proportion of the clover increased from first (33.9%) to second (40.6%) year and declined in third (31.8%) year. Early-season sward clover content differed significantly in each year among the mixtures, ranging from 6.5-37.7 % in 1993, 17.7-58.4 % in 1994 and 10-27.7 % in 1995 on a DM basis. Also clover content significantly changed (P<0.01) in annual forage production of the mixtures, while SB+clover had the highest clover content with a mean percentage of 44.8%, the lowest figure was recorded in CF+WC combination with 22.0 %. Clover content appeared to have influenced DM production and CP content along with a significant positive correlation between clover content and CP content but an insignificant correlation between clover content and DM yield. Major contributions to DM yield by grass species at the beginning of the experiment and after 3 years in an intensive cutting system greatly changed in triple mixed swards. RG was dominating species in all triple mixed swards and it constituted 50-90 % of grass part in the pasture in the first and second year but because of winter damage the feature was reversed in the third year. In CF+SB and clover mixtures cocksfoot became the dominant grass species, comprising 60-90% of the grass part in the sward in each year. CP content of the mixtures didn't differ significantly, but in respect to cutting times and years a significant (P<0.01) variation was observed in CP content. Owing to the change in clover content of the swards, CP content increased from first to third cut and slightly decreased at the fourth cut, similarly it increased from the first (14.1%) to (19 %) second year but it was decreased in the third (16.4%) year. In combination with WC three grass species can be used in intensive sward establishment. Since one of the grass species generally disappear from the pasture, double mixtures should be preferred to triple ones. Despite its high feed value, considering the risk of winter damage in RG when there is no sufficient snow cover, SB and CF can confidently be recommended for intensive pasture establishment in the region. The trial results clearly indicate that WC has higher relative growth rates in summer but grasses perform better in spring and autumn. This can facilitate establishment of a relatively stable production system in intensive pastures in the region.

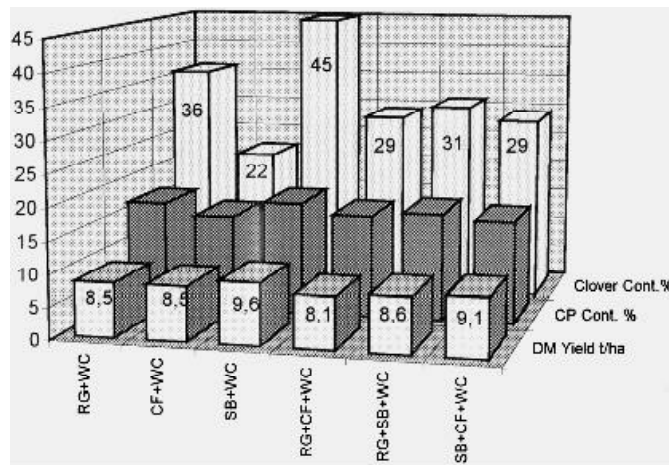
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**Figure 1**  
DM yield, CP and clover content of mixed swards.



**Figure 2**  
Seasonal change in DM yield, CP and clover content.

