



YIELD POTENTIAL AND BOTANICAL COMPOSITION IN DIFFERENT CUTTING PERIOD OF NATURAL MEADOW VEGETATION IN DEMIRHANLI VILLAGE IN EDIRNE PROVINCE

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Abstract

This study was conducted in Demirhanlı village in Edirne province for two years in 2008-2009. Demirhanlı village, which was determined as the study field, is situated on the coordinates of 41°43'4"N and 26°44'26"E, and has an area of 311.5 ha. Aim of this study is to determine the change of yield and botanical composition of meadow vegetation in different cutting periods. With this purpose, green forage and hay yields and botanical composition ratios according to their weight in three different cutting periods were determined. Samples were taken on the 30 April, 15 May and 4 June in both trial years (2008–2009).

Whilst in the first year, the green forage and hay yields were 1042.3 and 334.4 kg/ha⁻¹, in the second year their yields were determined as 684.2 and 281.4 kg/ha⁻¹ respectively. In both years, the highest yield of green forage and hay were taken from the second cutting (15 May). When the first year's hay samples were considered according to their compositions throughout the meadow, as the mean of the three different cuttings, gramineae (poaceae) plants took the first place with %63.2, other vegetation families followed with %35.0 and fabaceae plants took place with the lowest ratio of %2.7. When we evaluated the second year's hay samples according to their botanic compositions, gramineae plants were in the first place with a ratio of %68.3, other families (plant species) followed with %26.6 and again fabaceae (leguminosae) plants were in the last place with %5.1. In the year of 2009, while there was an increase in both gramineae and fabaceae plants, there was a decrease in other family species.

Composite fertilizer applications in meadow have a considerable effect on yield and botanical composition. The second cutting date could be advised as the most suitable grazing period and most convenient cutting from the aspects of green forage and hay yields and botanical composition. Besides, this kind of

studies should be encouraged and increased as to demonstrate models for meadow improvement (amendment) and management studies in the region.

Key words: Meadow, Gramineae, Fabaceae, Cutting Time, Hay Yield, Botanical Composition.

Introduction

Yield potentials and grass qualities of Turkey's meadows, most of which were ruined as a result of continuously carried out and inappropriate cultivations in terms of technique, declined dramatically (Gökkuş, 1991). Thrace region, though having a very convenient climate for meadow vegetation composing of cool season plants, is in a weak and average situation according to its precipitation patterns which are also better than the other regions in terms of meadow vegetations. In studies concerning meadow vegetations conducted in Turkey, species in the flora are generally classified as gramineae plants, fabaceae plants and the other families (Koç, 1995). Meadow studies conducted in different parts of Turkey have shown that hay yields of meadows range between 30 to 90 kg/ha⁻¹ and flora coverage ratio is between %10 and 27 (Bakır and Açıkgöz, 1976). In his study aimed to determine botanical composition and yields of gazed and protected meadows, Tuna (2000) has found out that hay yield of meadows which are gazed irregularly every year is 86.6 kg/ha⁻¹ and hay yield of meadows protected for a while in spring is 141.0 kg/ha⁻¹. In thoroughly protected meadows, 183.0 kg/ha⁻¹ of hay in Çorlu (Tekirdağ Province) and 235.3 kg/ha⁻¹ of hay in Gelibolu (Çanakkale Province) were taken. In these meadows, rich variety in species was determined and dominant species were marked. Gramineae plant ratio was %26.8, fabaceae plant ratio was %30.8 and other family species ratio was %57.85 in meadow fields. In his study conducted in Ahi village natural meadow fields of Edirne province, Tuncel (1994) found out that botanic composition included %33.49 gramineae plants, %8.66 fabaceae plants and %42.4 other plants. It was suggested that protecting for 10-20 years could pay back with a plant variety up to %36 (Tükel et al. 1999). In the studies conducted in Turkey, the highest value in terms of botanic composition and vegetation coverage areas was gained from gramineae family (Koç and Gökkuş, 1996; Başbağ et al. 1997; Kendir, 1999; Altın et al. 2007). The aim of this study is to determine meadow vegetation yield and botanical composition change in different cutting periods and to light the way for meadow improvement and management projects to be conducted in the area.

Material and Method

This study was conducted in Demirhanlı village meadow in Edirne province for two years in 2008 – 2009. Soil analysis was carried out in order to determine the specifications of the soil in the field of study. As a result of this analysis, it was found that pH in the meadow area was 6.58, organic substance ratio was %1.75 and soil structure was sandy and loamy.

In Edirne province in the period of May 2007 – 2008, average temperature was 15.2°C and annual total rainfall was 529.6 mm while in the May 2008–2009 period, average temperature was 14.9°C and annual total rainfall was 398.8 mm (Anonymous, 2010).

In the meadow, in spring 2008 15 kg/ha⁻¹ Ammonium Nitrate fertilizer (33%) and 10 kg/ha⁻¹ in spring 2009 was used.

In the study, in order to determine the on-ground biomass amount 1m² quadrates (frames) were used. Cutting material was first dried in furnace at 70°C for 24 hours and then weighed in order to calculate the hay yield in form of kg/ha⁻¹ (Gökkuş et al. 1993). In both trial periods (2008 – 2009), 22 samples from each cutting period were obtained separately on 30 April, 15 May and 4 June. Data obtained in the field studies were assessed and evaluated by using SPSS statistics program.

Research Results and Discussion

Average green forage and hay yields belonging to three different cutting periods in 2008 2009 are given in Table 1.

Table 1: Average green forage and hay yields belonging to three different cutting periods

	2008		2009	
	Green Forage Yield (kg/ha ⁻¹)	Hay Yield (kg/ha ⁻¹)	Green Forage Yield (kg/ha ⁻¹)	Hay Yield (kg/ha ⁻¹)
1. cutting	775.4	234.3	705.8	246.2
2. cutting	1317.6	406.3	970.4	344.6
3. cutting	1034.1	362.7	376.4	253.6
Total	3127.0	1003.3	2052.6	844.4
Average	1042.3	334.4	684.2	281.4
Average of 2008 – 2009	863.2	307.9		
F values	Years: 30.0** Cuttings: 3.9* Year x cutting: I	Years: 66.2** Cuttings: 10.2* Year x cutting: 2.7*		

F values shown with *, ** are significant at 1% and 5% level respectively, I: Insignificant

In the study, in both 2008 and 2009, the highest green forage and hay yield was taken from the second cutting and the lowest green forage yield was taken from the first cutting. In the first cuttings, since the flora was in the development stage, yield was found to be low. Second cuttings coincided with the blooming periods of the plants. Especially up to the blooming period, a rapid mass increase in plants occur (Gökkuş and Koç, 2001). In Yörükler village meadow in Tekirdağ, while the highest green forage yield was gained from the cuttings conducted on 1 May with 1457 kg/ha⁻¹, the highest hay yield was taken from the cutting on 30 June with 758.7 kg/ha⁻¹ (Gür, 2007).

It was found that third cutting average green forage yield for the 2008 year was 1042.2 kg/ha⁻¹ and 684.2 kg/ha⁻¹ for 2009. When the hay yields were evaluated, it was found that in 2008 the yield was 334.4 kg/ha⁻¹ and in 2009 it was 281.4 kg/ha⁻¹. In terms of years, it was found that the average yields of green forage and hay were 863.2 and 307.9 kg/ha⁻¹ respectively (Table 1). The effect of years on both green forage yield cutting time were found statistically important. When hay yields were inspected, effects of years and cutting times were found to be significant (p<0.01) and 'year x cutting' interaction was found to be significant, too.

In Pirinçli village meadow in İstanbul province, average green forage yield for two years was determined as 2340.3 kg/ha⁻¹ and hay yield as 507.0 kg/ha⁻¹ (Altın et al. 2005). In Kaşıkçı village meadow in Tekirdağ province, average yields of green forage and hay yields for two years in fertilized areas were determined as 1526.6 and 365.73 kg/ha⁻¹ respectively (Altın et al. 2007). In their studies in Diyarbakır province, Başbağ et al. (1997) determined the hay yield as 377 kg/ha⁻¹ and Yılmaz et al. (1996) determined the yield as 174.14 kg/ha⁻¹ in slightly grazed meadow, and 63.08 kg/ha⁻¹ in heavily grazed meadow.

In the second year of this study, there was a decrease in both green forage and hay yields. Changes in the climate in the second year compared to the first year caused decreases in green forage and hay yields.

Botanical Composition Ratios of Hay Yield in Accordance with Weight.

Botanical composition average values of hay yield according to weight method are given in Table 2.

Table 2: Botanical composition ratios belonging to hay according to weight (%)

	2008			2009		
	Gramineae	Fabaceae	Other Families	Gramineae	Fabaceae	Other Families
1. cutting	4.2	59.8	36.0	4.4	70.0	25.6
2. cutting	4.0	64.4	31.6	6.8	71.8	21.4
3. cutting	0.0	65.5	37.4	4.6	64.9	32.8
Average	2.7	63.2	35.0	5.1	68.3	26.6
F values	Years: 4.5* Cuttings: 4.4 * Year x Cutting: 3.3*	Years: 15.7* Cuttings: 7.1 * Year x Cutting: 5.4*	I			

F values shown with *, ** are significant at 1% and 5% level respectively, I: Insignificant.

When hay samples of the first year were evaluated according to their botanical compositions in general of the meadow, gramineae took the first place with %63.2, other family species followed with %35.0, and fabaceae had the least ratio as the average of three cuttings (Table 2). In the second year of the study, when hay samples were considered according to their botanic compositions, gramineae had the first rank with a ratio of %68.3, the other species were next with a ratio of %26.6, and the fabaceae plants were the last with a ratio of %5.1. In 2009, while there was an increase in both gramineae and fabaceae plants, in other types of plants there was a decrease. It was supposed that this increase in the gramineae and fabaceae plants resulted from nitrogen (N) and phosphorus (P) given with composite fertilizer which was applied in the part of meadow improvement and management project. Nitrogen fertilizer made the gramineae plants in the vegetation grow taller by enhancing their development. On the other hand it limited the growth of other plants and thus caused their ratio in the vegetation to become less (Gür, 2007). In terms of botanical composition, 'years and cutting times' and 'year x cutting' time interactions are statistically significant to the gramineae ratio ($p < 0.05$). In the study, the effect of years, cutting times and 'year x cutting time' interaction is statistically significant to the gramineae ratio ($p < 0.01$).

Conclusion

Vegetation on the meadows and pastures is rapidly changing owing to the various effects such as climate, soil, animals and human. Since the change is rapid, the importance of obedience to the management rules becomes greater during using meadows. It is wished to this change to be slow and in a positive way while applying meadow improvement and management applications.

In the Thrace region, where the business of animal breeding has become very important sector, in order to meet the needs of roughage rapidly, improvement and management studies should begin in natural meadows and they should be conducted for several years. It is sure that strengthening the flora will not only help to meet the needs of roughage of animals, but it will also have positive effects on the soil.

This study, which was conducted to serve as a sample in meadows of Edirne province, is also important since it could shed light on the beginning of the gazing period. In the study, in both years, highest yield of green forage and hay were gained in the second cutting time (15 May). As a result of the study, when green forage and hay yields and botanical compositions were taken into consideration, it was suggested that the most suitable period for cutting and gazing was given as the second cutting period (15 May).

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