RESEARCH ARTICLE

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Quality parameters of *Paspalum paspalodes* in wetland of Kızılırmak delta

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Abstract

The Kızılırmak Delta, located in the north of Turkey, covers approximately 20,000 hectares and contains seven lakes of various sizes. There are Balık, Cernek, Gıcı, Liman, Uzun and Tatlı Lakes in the east and Karaboğaz Lake in the west and the width of these lakes is around 3,600 hectares. While the lakes have the largest area in the winter months, the water level decreases in the summer months and livestock are grazed in these areas. This study was carried out in the grassland areas formed by the withdrawal of water in the summer period in the south of Balık Lake. *Paspalum paspalodes* is the powerful plant species that appears with the withdrawal of water in the summer grazing period. In the present study, the CP, ADF, NDF and RFV values of the watergrass plant were found to be 8.92, 36.83, 60.57 and 92.45%, respectively. According to the results of the research; It was determined that *Paspalum paspalodes* was lovingly eaten by water buffaloes in the Kızılırmak Delta and the forage quality was medium.

Keywords: Kızılırmak Delta, Yield, Quality, Water grass, Buffalo

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INTRODUCTION

Kızılırmak Delta is located in Ondokuz Mayis, Bafra and Alaçam districts of Samsun, Turkey. The size of the delta area is 23.686 hectares in total. There are seven lakes in the delta. Six of them are on the east side and one on the west side. There is Karaboğaz Lake in the west, Tatlı Lake, Balık Lake, Gıcı Lake, Cernek Lake, Uzun Lake and Liman Lake in the east. Wetlands (lakes) in the delta have an average (between 2015-2021) total area of 3595.53 ha. This size corresponds to approximately 15% of the delta. According to the 6-year average size of the wetlands, the maximum size is 6012.14 ha (approximately 25% of the area), and the minimum size is 1930.52 ha (approximately 8% of the area). Wetlands throughout the delta are at their widest in December-February; it also has the narrowest spread in August-September (Anonymous, 2021).

When the main habitat types and related habitats are examined in the Kızılırmak Delta, it has been determined that there are 12 different species groups (plant associations, plant communities). These groups of species have come together in different parts of the delta according to their relations and contacts with fresh and salt water, changes in soil structure and formed plant communities with different floristic compositions (Şahin et al. 2013). One of these plant communities is flooded meadows.

Flooded meadows develop in places where the altitude is very close to sea level

(0-1 m), where the ground water remains on the soil surface or in water for part of the year, close to lakes and in relatively shallow places. The surface area of the lakes expands with the increasing amount of water from autumn, and it is reduced to its normal size in the spring. Here, some of the parts that are under water with the expansion in this winter continue to remain wet in the summer, with the ground water not being fully withdrawn. These flooded meadows, which developed under the dominance of Paspalum paspalodes species in the delta, actually have the appearance of a swamp, as the clayey soils keep this water inside. However, the low depth of the soil prevents the swamp from being dangerous for living things. While Paspalum paspalodes shows a very good growth here, species diversity is very low due to the excessive amount of water and the tightly developed roots of the Paspalum do not allow other plants to cling. It offers a very good nutrition opportunity for both cattle and birds. These flooded meadows, which can be grazed all summer long, are sensitive to the operation of the delta system and changes in the amount of water, as they are formed close to the lakes with the arrival of alluvium spreading to the delta (Anomim, 2018).

In this study; the quality characteristics of Paspalum paspalodes (water meadow) plant, which emerged with the withdrawal of water in June in the pasture of Yörükler village, located in the south of Balık Lake in the Kızılırmak Delta, were investigated.

MATERIALS AND METHODS

This research was carried out in the pasture of Yörükler village, located in the south of Balık Lake in the Kızılırmak Delta, in the period of May-August 2022. The study area is at 41° 3201' N, 36° 0431' E, and its altitude is 1 m. This area is under water in winter and turns into grassland with the withdrawal of water in June and the area size is approximately 80 hectares. Paspalum paspalodes (water meadow) is the dominant plant species that emerges with the withdrawal of water in the summer period.

In the research; The inside of the 0.30 x 0.40 = 0.12 m^2 quadrats from 20 different points was made cut with a Bosh brand electric hand mower from 10 mm stubble height. Approximately 250 g of fresh watergrass samples taken randomly from the cut green grass cluster were dried in a drying cabinet at 70°C for 48 hours (Albayrak and Öten, 2020).

For crude protein, 1 g of each grinded sample was weighed and crude protein ratios were determined as % by applying the Kjeldahl method with the help of previously prepared solutions. ADF and NDF analyzes were made with the help of ANKOM 220 Fiber Analyzer device according to the principles reported by ANKOM technology (Albayrak and Öten, 2020). Samples were analyzed in 3 replications.

Total digestible nutrients (TDN), Dry matter intake (DMI), Digestible dry matter (DDM), Metabolic energy (ME) and Relative feed value (RFV) were calculated according to the equation specified by (Albayrak et al. 2012).

TDN = (-1.291 x ADF) + 101.35

DMI = 120% NDF % dry matter basis

DDM = 88.9-(0.779 x ADF % dry matter basis)

ME = 0.15 x ADF (MJ/kg KM)

RFV = DDM x DMI x 0.775

RESULTS AND DISCUSSION

Values of quality parameters of Paspalum paspalodes are given in Table 1. In general, in order to maintain its weight in various ruminant animals, the crude protein ratio of the forage consumed should be at least 6-8% CP (Esmaeli and Ebrahimi, 2003; El-Shatnawi and Mohawesh, 2000; Moinuddin et al. 2012). In our study, the CP ratio of Paspalum paspalodes was found to be 8.92%. The result obtained is within acceptable limits as part of the livestock maintenance diet.

ADF and NDF ratios of Paspalum paspalodes were found 36.83% and 60.57%, respectively. Total digestible nutritional value (TDN) was found to be 53.80%, while Dry matter intake (DMI) and Digestible dry matter (DDM) values were determined as 1.98% and 60.21%. ADF and NDF ratios of forage are directly related to DDM and DMI ratios. An increase in the ADF ratio decreases the DDM ratio, while an increase in the NDF ratio decreases the DMI ratio. Fibers contain the least digestible parts of the herb. NDF ratio is always higher than ADF ratio. ADF contains cellulose, lignin, silica, cutin and pectin, while NDF also contains hemicellulose (Cash and Bowman, 1993). In studies on the determination of ADF and NDF ratios of Paspalum paspalodes; Heydari et al. (2006) found the rate of ADF to be 38.52%, Filho and Rodriges (2001) 44.30%, Ertekin (2021) 36.73%. The change in NDF ratios was found as follows; Heydari et al (2006) 70.27%, Robinson et al. (2004) 53.8%, Suyama et al. (2007) 62.6%, Abideen et al. (2011) 54.6%, Filho and Rodrigues (2001)

Table 1. Average Crude protein ratio (CP), Fiber insoluble in acid solvents ADF), Insoluble fiber in neutral solvents (NDF), Total digestible nutrients (TDN), Dry matter intake (DMI), Digestible dry matter (DDM), Metabolic energy (ME) and Relative Feed Value (RFV)

CP (%)	ADF (%)	NDF (%)	TDN (%)	DMI (%)	DDM (%)	ME (MJ/kg)	RFV
8.92	36.83	60.57	53.80	1.98	60.21	5.52	92.45

73.7%, Ertekin (2021) 67.29%. In conclusion, Heydari et al. (2006) reported that wetland grasses have high NDF and ADF content, while their fiber is highly digestible.

Figure 1. Kızılırmak Delta and natural lake areas.

Figure 2. The area covered with water on March 27, 2022

Figure 3. Water withdrawal area on July 22, 2022.

The metabolic energies of Paspalum paspalodes was measured as 5.52 MJ/kg KM. Nutritional value parameters differed from species to species, and it has been reported in many studies that the nutritional values of various species may differ from each other. Indeed, it was found metabolic energy values of Paspalum paspalodes among 9.2 to 9.5(Heydari et al. 2006; Suyama et al. 2007; Ertekin, 2021).

The relative feed value is determined by evaluating the ADF and NDF ratios of the forage together. Therefore, ADF and NDF ratios should be low for the relative feed value of the forage to be high. It is reported that if the RFV value of dry forage is greater than 180, it is in the highest quality class, in the range of 150-180 superior, 125-150 good, 100-120 medium. If the RFV value of the herb is below 100, it has low quality values (Albayrak and Öten, 2020). In present study, the relative feed value of Paspalum paspaloides has low quality class.

CONCLUSION

It was concluded that the quality values of Paspalum paspalodes, which emerged with the withdrawal of water in the wetlands of the Kızılırmak Delta in the summer period, may be sufficient for the feeding of the water buffaloes grazing in the region. On the other hand, it is thought that it would be beneficial to examine the quality and yield values of Paspalum species for longer periods and at different points in the delta.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of interest

The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

Author contribution

The contribution of the authors to the present study is equal. All the authors read and approved the final manuscript. All the authors verify that the Text, Figures, and Tables are original and that they have not been published before.

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