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Determining Features and State of a Pasture

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Abstract: This study was carried out in Elmacayır Pasture, Yesilyurt County of Malatya/Turkey in 2002-2003 period. In order to determine pasture position, the parcel of pasture was established by soil analysis. Thus, botanical composition, hay yield and plant covered area was determined as well. In Hay yield, the percentage of plant covered area and the rate of good type pasture plant Elmacayır Pasture was divided into three regions as First, Second and Third Region. Hay yield, percentage of plant covered area and good type pasture of these three region were determined. In First region hay yield was determined as 1239.4 kg ha^{-1}, percentage of plant covered area as 35% and good type pasture plant rate as 20.9%. In Second region hay yield was determined as 1643.1 kg ha^{-1}, percentage of plant covered area as 64% and good type pasture plant rate 16.3%. In third region hay yield was determined as 1619.9 kg ha^{-1}, percentage of plant covered area as 47% and good pasture plant rate as 33.4%. It has been determined that the state of the first and the second pasture regions are poor, that of the third region is medium. It has also been fixed that each region indicates arid-pasture feature.

Key words: State of pasture, botanical composition, hay yield

INTRODUCTION

Having the features of covering the needs of animal fodder, preventing soil erosion, increasing the output of soil fertility, enriching the rivers and water table, forming biological resources and recreational areas, the pasture grounds are assumed to be valuable natural areas which are vital to be protected such as tropical forests[1].

Natural pastures which exposed to heavy animal pressure have lost their efficiency power. Due to this situation, the research and examination studies have to be started immediately in order to improve the hay yield and other features of natural ranges. Hence, ıt is necessary to determine the natural vegetation, its structural features and other qualities[2].

The vegetation study to be achieved for determining the similarities among different parts of a pasture vegetation shall help on appropriate selection of management plans to be applied[3].

Schmutz *et al.*[4] in Arizona had determined 88 plant species in pasture ground covering 90% of trees and bushes and protected areas against grazing and also determined 38 plant species in a grazed-pasture ground. Besides, researchers explained that the average pasture output in not-grazed areas is 3680 kg ha^{-1}, while it was 2570 kg ha^{-1} in grazed areas. They also implied that the difference was due to the pasturage.

According to a research made in the territories of Middle East Technical University by Bakır[5] determined the total amount of plant species was 82 of which 21 wheat, 21 leguminosae and 40 other plants. Plant covered ground in the pasture was determined as 28% on the base, 13.4% on the hill, 11.3% in the west, 10.7% in the North, 9.9% in the East and finally 8.2% in the South. Regarding the botanical composition, wheat species constituted the highest rate, hay yield was determined as 684 kg ha^{-1} in the South and 2323 kg ha^{-1} in the base. The average hay yield was around 1223 kg ha^{-1}.

According to Helm and Box[6], they determined that despite the density of wheat species were same as each other, "climax wheat" in the higher level of lime pasture showed bigger rate. In addition, it was noticed that P, Na, pH and organic substance were in high proportion in the area of higher lime-level.

Ozmen[7] determined that plant covered area varied between 13.8 and 36.6%, wheat species covered the area of 28.2%, leguminosae covered 4.2% and other vegetation covered 67.6%. Four of the examined pastures showed poor and the rest showed insufficient features.

Hoffman and Stanley[8] noticed that the pasture vegetation had been formed by lots of species and the different types of plants on different areas showed very little similarities. Results also determined that similarity had effected the index of similarity having influence on

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botanical composition. Istanbulluoglu and Sevim[9] determined the soil was non-salted, less-calcareous and it was on medium level for P and organic substance. Besides, the K level was high.

Şılbır and Polat[10] determined that the plant species and composition in protected and grazing areas in Tektek Mauntains as following. The total average plant covered area is 52.63% in protected pasture area and this value is 38.1% in the grazed-pasture.

Basbağ *et al.*[11] have determined 48 different types of plant in a Diyarbakır pasture protected for 37 years. In this study, it has been determined that the botany composition covers 48.32% wheat, 24.6% leguminosae and 27.2% others. 85.2% of examined pasture forms plant-covered area and the average hay yield is 3770 kg ha^{-1}.

Yılmaz *et al.*[12] shows that heavy grazed-areas cover 39% of plant covered area, 21.01% wheat, 9.20% leguminosae and 69.71% others. In light-grazed areas, 74% plant-covered areas, 29.14% wheat, 25.91% leguminosae and 45.45% other constitute the whole area.

Erkovan[13] examined the pastures by dividing them into three different parts as to their distance to village, altitude and usage levels. The vegetation on the first part of the pasture covers at maximum rate of 40.56% and minimum rate of 23.86% on the second part. The highest quality degree (5.03) was determined on the third part.

The aim of this study is to determine pasture state Pasture of Elmaçayır and to comparison with present vegetation and climax vegetation.

MATERIALS AND METHODS

The research was carried-out in Elmacayır pasture, Yesilyurt county of Malatya/Turkey in 2002-2003 period. It is located on the Upper Fırat River Basin, eastern region of Turkey and 25 km distance from Malatya.

The average rainfall nearest to the research area is 387.5 mm and the average temperature is around 13.6°C. However, it was 178.8 mm less than the average rainfall in 2002[14,15].

1x1 meter long quatrats were used in order to determine botanical composition and output. Dried-weight was designated as to light air cured process[12,15].

Designated plants were identified in the herbarium laboratories in the Yıl University[16]. Then, these designated plants was classified according to Brown[17] and Bakır[18] by calculating weight percents of decreasing, increasing and invader plants in each example and also by comparing the maximum percent of invader plants in that area.

Hay yields were calculated after the sample plants, available for animals taken from 1 m^2 area, kept in the shade until the plants reach at their dried-weight. Plant covered area was confined inside the quatrats divided into dm^2 and by ocular estimate. pH was determined by glass pH electrode and the proportion of organic substance was determined by Walkley Black method. According to Jackson[19] and Richard [20]soil contents of sand, clay and silt were determined by hidrometer method. Eventually, pasture state was determined according to Bakir[21] as poor and medium pasture.

In order to determine the factors applied through research, the Costat computer programme was used. According to Duzgunes *et al.*[22] variance analysis and Duncan Multiple comparing tests was made.

RESULTS AND DISCUSSION

Soil and topography: The examined pasture grounds illustrate following features; First region of the pasture has a slope in the direction of North-SouthWest. Second region is pasture-base and has a slope in the direction of North-South. Third region of the pasture has a slope in the direction of South-NorthWest Besides, a dry-stream has gone through the second region and the water-table reaches up to soil level in the early spring with dry-stream.

The highest average (7.78) of pH is found in the first region (Table 1). There are no statistical differences between second and third regions which have the pH values of 7.27 and 7.17, respectively. The rate of total salt amount in the third region is 0.074% while the first region is 0.06%. The lowest rate was found in the second region (0.054%). The average phosphorous rate was obtained the maximum of 7.07% in the first region and minimum of 1.19% in the third region. The minimum rate of organic

Table 1: Soil and topography state relating to regions and Duncan comparing test

Analysis	Number	Region	Average*
pH	1	I	7.780a
	2	II	7.270b
	3	III	7.170b
Salinity	1	I	0.060b
	2	II	0.054c
	3	III	0.074a
Phosphorus	1	I	7.070a
	2	II	4.770b
	3	III	1.190c
Organic matter (%)	1	I	0.867b
	2	II	1.737a
	3	III	1.733a

*Difference indicated with same letter are non significant

Table 2: The average of plant covered areas relating to regions and Duncan comparing test

No	Region	Average*
1	I	35b
2	II	64a
3	III	47b

*Difference indicated with same letter are non significant

Table 3: The average of hay yield (kg ha^{-1}) relating to regions and Duncan comparing test

No	Region	Average*
1	I	1239.4b
2	II	1643.1a
3	III	1619.9a

*Difference indicated with same letter are non significant

Table 4: Botanical composition rate relating to First region. (%)

Plants	Sample 1	Sample 2	Sample 3	Sample 4	Av.
Phleum montanum	2.8	1.9	1.3	1.7	1.9
Elymus lazicum	4.2	6.4	5.1	4.2	5.0
Agropyron intermedium	3.1	1.9	5.3	4.5	3.7
Koeleria cristate	1.1	3.7	1.1	3.9	2.5
Hordeum bulbosa	4.2	4.5	4.2	4.4	4.3
Decreasing plants	15.4	18.4	17.0	18.7	17.4
Poa psychrophila	1.4	2.9	1.9	1.7	2.0
Poa bulbosa	1.9	1.5	1.4	1.3	1.5
Increasing plants	3.3	4.4	3.3	3.0	3.5
Bromus tectorum	2.1	3.4	2.3	2.7	2.6
Taeniatherum caput-medusa	38.2	20.1	32.3	38.1	32.2
Aegolops biuncialis	8.1	12.3	7.2	9.1	9.2
Medicago minima	0.0	0.7	1.3	0.0	0.5
Anthemis wiedemannia	1.9	0.0	0.9	1.3	1.0
Senecio vernalis	2.2	4.0	0.0	0.0	1.6
Chondrilla junceae	2.2	4.2	5.1	3.6	3.8
Eryngium billandieri	5.3	0.0	12.3	10.3	7.0
Verbascum sp.	12.3	7.2	0.0	0.0	4.9
Astragalus sp.	9.0	25.3	18.3	13.2	16.5
Invader plants	81.3	77.2	79.7	78.3	79.1
Total amount	100.0	100.0	100.0	100.0	100.0
Good type plants	18.7	22.8	20.3	21.7	20.9

Table 5: Botanical composition rate relating to Second region. (%)

Plants	Sample 1	Sample 2	Sample 3	Sample 4	Av.
Alopecurus arundinaceus	1.4	0.0	2.5	1.3	1.3
Phleum montanum	0.0	2.1	1.0	1.0	1.0
Bromus tomentellus	2.0	1.0	0.0	2.0	1.3
Trifolium repens	0.0	2.0	0.0	0.0	0.5
Agropyron intermedium	2.5	0.0	0.0	0.0	0.6
Hordeum bulbosa	13.0	8.0	3.0	5.0	7.3
Decreasing plants	18.9	13.1	6.5	9.3	12.0
Poa psychrophila	0.0	6.0	0.0	0.0	1.5
Poa bulbosa	2.1	2.0	2.0	2.0	2.0
Sanguisorba minor	2.1	0.0	0.0	1.0	0.8
Increasing plants	4.2	8.0	2.0	3.0	4.3
Carex stenophylla	0.7	0.0	0.0	0.0	0.2
Bromus tectorum	2.0	4.0	5.0	3.0	3.5
Bromus scoparius	1.0	0.0	0.0	0.0	0.3
Taeniatherum caput-medusa	33.6	20.4	35.0	13.5	25.6
Aegolops biuncialis	8.0	23.2	12.0	12.0	13.8
Vulpia ciliata	2.0	2.0	1.0	0.9	1.5
Medicago minima	2.8	1.8	0.3	2.6	1.9
Ziziphora capitato	1.1	0.8	4.4	1.2	1.9
Torilis leptophylla	0.8	0.8	0.0	0.0	0.4
Anthemis wiedemannia	3.0	2.0	5.6	1.5	3.0
Senecio vernalis	5.0	0.0	8.0	4.0	4.3
Chondrilla junceae	4.0	5.4	7.5	6.0	5.7
Gaudiniopsis macra	1.5	0.0	0.0	1.0	0.6
Phlomis kundica	0.0	4.2	0.0	0.0	1.1
Eryngium billandieri	5.3	4.0	0.7	6.0	4.0
Verbascum sp.	6.1	10.3	12.0	11.1	9.9
Astragalus sp.	0.0	0.0	0.0	24.9	6.2
Invader plants	76.9	78.9	91.5	87.7	83.8
Total amount	100.0	100.0	100.0	100.0	100.0
Good type plants	23.1	21.1	8.5	12.3	16.3

Table 6: Botanical composition rate relating to Third region(%)

Plants	Sample 1	Sample 2	Sample 3	Sample 4	Av.
Alopecurus arundinaceus	1.5	0.0	1.5	1.3	1.1
Phleum montanum	0.9	1.3	0.9	0.0	0.8
Bromus tomentellus	1.4	2.3	0.0	2.4	1.5
Agropyron intermedium	4.3	3.5	5.3	3.2	4.1
Koeleria cristate	3.1	2.3	3.3	0.0	2.2
Elymus lazicus	4.3	6.2	3.9	7.4	5.5
Hordeum bulbosa	7.2	6.3	5.1	8.8	6.9
Decreasing plants	22.7	21.9	20.0	23.1	21.9
Poa psychrophila	3.1	1.9	2.8	2.8	2.7
Poa bulbosa	1.3	1.4	0.0	1.0	0.9
Festuca woronowii	2.8	4.8	2.1	2.0	2.9
Stipa holosericea	9.5	6.8	9.8	9.9	9.0
Increasing plants	16.7	14.9	14.7	15.7	15.5
Bromus danthoniae	1.7	0.0	1.8	1.5	1.3
Bromus tectorum	2.4	3.3	2.4	1.5	2.4
Taeniatherum caput-medusa	5.8	7.2	6.8	3.5	5.8
Aegolops biuncialis	3.2	5.2	2.5	2.7	3.4
Vulpia ciliata	1.5	0.0	2.3	1.2	1.3
Medicago minima	0.0	0.0	1.0	0.0	0.3
Anthemis wiedemannia	0.0	2.0	0.0	0.0	0.5
Chondrilla junceae	4.8	0.0	5.2	11.4	5.4
Phlomis kundica	6.2	7.3	3.8	3.4	5.2
Eryngium billandieri	5.7	2.9	4.5	6.2	4.8
Verbascum sp.	3.9	7.9	0.0	0.7	3.1
Astragalus sp.	25.4	27.4	35.0	29.1	29.2
Invader plants	60.6	63.2	65.3	61.2	62.6
Total amount	100.0	100.0	100.0	100.0	100.0
Good type plants	39.4	36.8	34.7	38.8	37.4

Table 7: The average of plants relating to regions and Duncan comparing test

Plant groups	Number	Regions	Average
Decreasing plants	1	I	17.4a
	2	II	12.0b
	3	III	21.9a
Increasing plants	1	I	3.5b
	2	II	4.3b
	3	III	15.5a
Invader plants	1	I	79.1
	2	II	83.8
	3	III	62.6

*Difference indicated with same letter are non significant

substance is in the first region (0.867%). It has been noticed that there are no statistical differences between the averages of the second and the third regions. The findings on the soil features have shown similarities with the studies of Istanbulluoglu and Sevim[9].

Plant covered area: The highest rate of plant covered area considering regions is found at second region (64%) and that of the lowest rate is found at third region(35%). The average level of third region(47%) and that of first region indicate no statistical differences. Determined values of plant covered areas concerning statistics differ from each other (Table 2).

The findings concerning the plant covered areas show higher results than those made by Ozmen[7] while they indicated similarities with the results of Şılbır and Polat[10].

Table 8: Botanical compositions (%) and status of pasture of regions

Region number	Botanical composition					
	Decreasing	Increasing	Increasing	Incre.max	Good type pasture plant	Pasture status
I	17.4	3.5	3.5	79.1	20.9	Poor
II	12.0	4.3	4.3	83.8	16.3	Poor
III	21.9	15.5	11.5	62.6	33.4	Medium

Hay yield: The highest hay yield was obtained as 1643.1 kg ha^{-1} from Second region and as 1619.9 kg ha^{-1} from Third region. The lowest hay yield was obtained as 1239.4 kg ha^{-1} from First region. There was no significant in hay yield between Second and Third region (Table 3). The findings concerning hay yield have shown similarities with those results obtained by Bakır[5]. However they do not compare with the results found by Basbag[11].

Botanical composition: In the First region, by taking four samples in order to analyse botanical composition, ıt was determined that there are 5 pieces of decreasing plant, 2 pieces of increasing plant and 10 pieces of invader plant. In these samples, it has been designated that *Taeniatherum caput-medusa* forms the highest rate, (32.2%) and *Medicago minima* forms the lowest rate (0.5%) *Elymus lazicum* forms the highest rate (5.0%) and *Poa bulbosa* forms the lowest rate (1.5%) in the content of good type pasture plants (Table 4).

In the botanical composition of the Second region, it was determined that there are 6 pieces of decreasing plant, 3 pieces of increasing plant and 17 pieces of invader plant. In these samples, it has been designated that *Taeniatherum caput-medusa* forms the highest rate, (25.6%) and *Carex stenophylla* forms the lowest rate. (0.2%). *Hordeum bulbosa* forms the highest rate (7.3%) and *Trifolium repens* forms the lowest rate (0.5%) in the content of good type pasture plants including decreasing and increasing plants (Table 5).

In the botanical composition of Third region, it was determined that there are 7 pieces of decreasing plant, 4 pieces of increasing plant and 12 pieces of invader plant. In these samples, it was determined that *Astragalus* sp. forms the highest rate (29.2%) and *Medicago minima* forms the lowest rate (0.3%). *Stipa holosericea* forms the highest rate (9.0%) and *Phleum montanum* forms the lowest rate (0.8%) in the content of good type pasture plants including decreasing and increasing plants (Table 6).

According to Duncan test concerning the averages and the differences of their averages of plant groups, decreasing plants are determined as 21.9% (the highest rate) and there is no statistical differences between the First and the Third regions. The increasing plants locate in the Third region with the max. rate of 15.5% and decreasing plants was determined in the First region with the min rate of 3.5%. There is no statistical differences between the First and the Second regions. The invader plants was formed with the rate of 83.8% in Second region, 79.1% in the First region and 62.6% in the Third region (Table 7). The number of plant type inside the botanical composition are similar to the results of Schmuz *et al.*[4].

Pasture status: By examining the analysis results of organic substance, pH and saltiness of soil samples, the First, Second and Third regions indicated arid pasture feature (Table 1). *Stipa holosericea* has an average rate of 9.0% in Third region. Good type of pasture plants in the First region is at the rate of 20.9%, while 16.3% in the Second region and 33.4% in the Third region. In such a case, the pasture status of the First and the Second regions indicated poor and the Third region indicated medium level (Table 8).

According to these finding, it was determined that a pasture region have a maximum hay yield and maximum plant covered area, indicated poorer pasture feature than others. Therefore, this may lead to incorrect results if the pastures are graded only by taking into account of dry grass output and plant covered areas.

Since the research ground does not have a homogeneous structure concerning the dispersal of plant species, it has complicated the statistical analysis. It is necessary to collect large numbers of samples for the analysis of botanical composition, to be made with quadrant, in our pasture regions showing heterogeneous features. However it reaches an impossible point to collect large numbers of samples on extensive grounds due to the lack of time and equipment.

REFERENCES

1. Büyükburç, U., 1999. Range Management and Breeding. Range Law, Education Hand Book. Agricultural and Rural Ministry. Agricultural Production and Development General Managership. Ankara.
2. Avcıoğlu, R., 1997. Measurement and Evaluation Technics of Range Vegetations Agricultural and Rural Ministry. Agricultural Production and Development General Managership. Ankara.

3. Okatan, A., 1987. A research on the physical and hydrological soil features of alpin range of trabzon meryemana stream precipitation basin. Agricultural and Rural Ministry Agricultural Production and Development General Managership Publishing No: 664 Ankara.
4. Schmutz, M., C. Mıchales and B. Judd, 1967. A relict area on the north rim of grand Canyon in Arizona. Boysag Point. J. Range Manage., 20: 363-369.
5. Bakır, Ö., 1970. A Study on the METU Range. Ankara University, Agricultural Faculty Publishing No: 382 Ankara.
6. Helm, V. and T. Box, 1970. Vegatation and soils of two southerm high plains range sites. J. Range Manage., 23: 447-450.
7. Özmen, T., 1977. Studies on the vetation of Konya range. Ph.D Thesis, Ankara University Natural Science Institue. Ankara.
8. Hofman, G.R. and L.D. Stanley, 1978. Effects of Greece and the Aegean Chatto and Windus Ltd. Printed Great Britain by Richard Clay Ltd Bunges, Suffaolk.
9. Istanbulluoğlu, A. and Z. Sevim, 1986. Some Important Physical and Chemical Features of Erzurum Range. Agricultural and Rural Ministry. Rural Affair Research Institue.
10. Şılbır, Y. and T. Polat, 1996. A Study on the determining of plant species and botanical compositions with lup method in tektek mauntains of Şanlıurfa. Range and Forage Congress. June 17-19 Erzurum pp: 90-97.
11. BaŞbağ, M., L. Gül and V. Saruhan, 1997. A study for plant species and compositions and hay yield in protected range of Diyarbakır. 2nd Field Crops Science Congress of Turkey, September 22-25, Samsun, pp: 499-503.
12. Yılmaz, I., Ö. Terzioğlu, H. Akdeniz, B. Keskin and F. Özgökçe, 1999. A study on the investigation of plant cover and hay yield of heavy and relatively light grazed ranges. 3rd Field Crops Science Congress of Turkey, November 15-18, Adana, pp: 23-28.
13. Erkovan, 2000. The present status of range vegetations of çiğdemli village of Bayburt. M.Sc Thesis, Atatürk University, Natural Sciences Institue.
14. Anonymous, 2003. Meteorology bulletin. Meteorology Affair General Managership, Ankara.
15. Avcıoğlu, R., 1983. The investigation of range and forage plant communities. Ege University. Agricultural Faculty, Publishing No: 466, Izmir.
16. Davis, P. H., 1965-1985. Flora of Turkey and East Aegean Islands. Vol: I-IX. Edind. Üniv. Press. U.K.
17. Brown, D., 1963. Methods of Surveying and Measuring Vegetation. Commonwealth Agric. Bureaux, England.
18. Bakır, 1987. Range Management . Ankara University, Agricultural Faculty Publishing, Ankara.
19. Jackson, L., 1958. Soil Chemical Analysis Prentice-Hall. Inc. Englewood Cliff, New Jersey.
20. Richard, A., 1954. Diagnosis and Improvement of Salina and Alkalina Solis. Hand Book: 60, US. Department of Agriculture.
21. Bakır, 1998. Pasturage capasity. Range Law, Education Handbook. Agricultural and Rural Ministry. Agricultural Production and Development General Managership. Ankara.
22. Düzgüne, Ş., O.T. Kesici, D. Kavuncu and F. Gürbüz, 1987. Research and experiment methods. Ankara University Agricultural Faculty Publishing No: 1021 Ankara.