

Mineral Composition and Monthly Variations of *Dactyloctenium aegypticum* (L.) Beauv. in a Semi arid Grass Community

Piyush A. Parekh¹, Prakash L. Patel², Nirmal P. Patel³, Prakash H. Patel⁴

¹Biology Department, C.U. Shah Science College, Ashram Road, Ahmedabad -14, India

^{2,3,4}Physics Department, C.U. Shah Science College, Ashram Road, Ahmedabad -14, India

Abstract: Ecological study of *Dactyloctenium aegypticum* in semi arid grassland is described with a view to utilize it for the regional wasteland development. *Dactyloctenium aegypticum* is a dominant species. Maximum individual density was found nearly 40% of the total density in the community. Biomass was also found nearly 44% of the total biomass. The species was rich in Ca⁺ content, less in P content. *D. aegypticum* owes its significance in the region as it forms a species for bioreclamation of salt affected soils. The soil in the region requires special management practices and areas unfit for agriculture can be utilized for pasture development.

Keywords: *Dactyloctenium aegypticum*, Ecoclimate, Livestock, Grass community

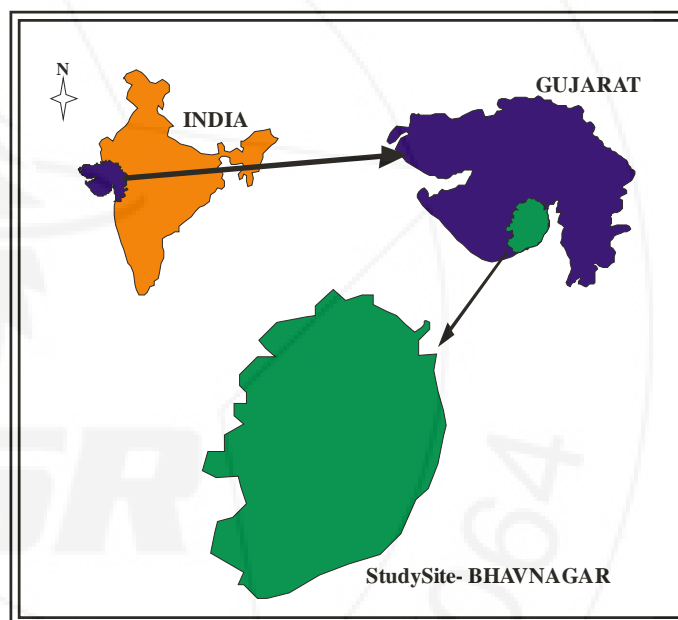
1. Introduction

A judicious management of available natural resources is necessitated by the unprecedented increase in the human population in the country. The deteriorated condition of the grazing lands is due to sum total of the effect of the existing ecoclimatic stress, socio – economic condition and land use pattern. Conservation of the grazing lands is the need of the day in this area, as most of the grasslands are denuded, and productive and nutritive status of the grasses in these grasslands are diminishing as a result of overgrazing. Efficiency of a grazing land ecosystem to support its livestock compartment directly depends on the species composition, phytomass and nutritive value of the dominant grass species. Ecosystem analysis of these grasslands by several workers [7], [9] revealed that *Dactyloctenium aegypticum* is a co-dominant species next to the dominant grasses like *Dichanthium annulatum* and *Cynodon dactylon*.

2. Materials and Methods

2.1 Study Site

The study was conducted in moderately grazed semi arid grassland near Bhavnagar (72° 45' E and 21° 45' N and MSL 11m) district of Gujarat state, known for its livestock population.



2.2 Climate

The climate of the area is semi-arid with three distinct seasons. The maximum and minimum temperatures recorded during the study period were 36.2° C and (June) and 13.8° C (January) respectively. The total annual rainfall was 778 mm. The ecoclimate of the area can be formulated as DA₃' ad₄', which indicates that it is a semi-arid climate. The aridity index (IA: 52.58%) and moisture index (IM 31.55%) also confirm the semi-arid nature of the climate.

2.3 Soil

The texture of the soil is clay and has a high water holding capacity. The soil moisture ranged between 23.6% (In July) to 6.78% (In May). The soil pH ranged from slightly acidic to natural. 0.5 m² quadrates at random were put to study the density of the community and biomass was estimated by harvest method at monthly intervals. Plant analysis was

carried out by standard analytical procedures suggested by [3],[5].

3. Results and Discussion

Table 1 & 2 gives the monthly variation in the individual species density, individual percentage contribution to the total density of the community, biomass, percentage of minerals and crude proteins. Maximum individual density was found in the month of August, where the plant itself contributed nearly 40% of the total density in the community. Thereafter the individual density gradually declines together with the total density of the community and finally disappears from the ground by the end on November. Seasonal variation in the density is a common feature of grassland communities at various centers in India [10]. Biomass was also found maximum in the same month in accordance with the density. Nearly 44% of the total biomass was contributed by this single grass species, which indicates the dominance of the species in the community. The abrupt fall in the percentage contribution to the total density and to the total above ground biomass by this grass to the community during November shows its monsonic nature. Only in the onset of rain in the next season a gradual increase in these values were recorded. This makes it difficult to conservation and exploitation of these natural and grassland resources. But during the short period of growth, the grass is heavily grazed by livestock and it provides most of the required mineral elements to them. Maximum value of percentage content of all elements were noted during the month of peak biomass growth and declined thereafter. The grass species was rich in calcium content with a maximum value of 0.425%. the minimum requirement of phosphorus in the animal diet as given by [1] has never achieved by this grass. [2] reported that the amount of potassium in *D. aegypticum* as 1.19%, where as in the present study it was found comparatively low (0.03%) and insufficient to serve the needs of livestock, which can be attributed to the poor soil fertility in the study area. [4] has reported essential 7% crude protein in the animal diet. But in this wild fodder grass species *D. aegypticum* from the semiarid grazing lands of Bhavnagar, maximum 5.28% crude protein was observed which was not consistent with the 7.44% reported for the same grass species by [2] for the Bombay region.

A part from the fact the *D. aegypticum* is a fodder grass, it owes its significance in the region as it forms a species for bioreclamation of salt affected soils. Positive changes in the physio-chemical properties of the soils as a result of leaf decomposition of *D. aegypticum* has been observed [8]. Alkaline and salt affected soil of the wasteland of Bhavnagar and Saurashtra coast are characterized by the excessive concentration of soluble salts or exchangeable sodium or both [6]. The soil of this region requires special management practices due to these problem and the areas unfit for agriculture can be utilized for pasture development. Thus a mediocre type of pasture constituting some beneficial grasses like *D. aegypticum* can be supported by these soils. A strategy has yet to be framed which may enable the successful utilization of the natural resources like the salt affected wastelands in the area. The present study about *D.*

aegypticum deserves its attention in view of its role in minimizing auxiliary input of energy and finance for the wasteland development, by the bioreclamation of the salt affected soils of the wastelands of the Bhavnagar and Saurashtra coast.

Table 1: Monthly variations in some ecological parameters in *Dactyloctenium aegypticum* in a semi arid grass community.

Month	ID	% ID	TD	AGB	% AGB	TAGB
July	763	39.47	1933	21.316	43.09	49.47
August	1092	40.27	2712	40.656	43.6	92.12
September	78	5.644	1379	2.55	4.71	54.26
October	98	13.17	744	2.883	8.91	32.36
November	41	4.98	823	0.938	3.21	29.23
December	-	-	566	-	-	26.80
January	-	-	380	-	-	14.73
February	-	-	324	-	-	9.80
March	-	-	191	-	-	5.29
April	-	-	114	-	-	3.06
May	-	-	100	-	-	2.66
June	105	7.46	1407	3.49	25.58	13.60

Table 2: Monthly variations in mineral composition in *Dactyloctenium aegypticum* in a semi arid grass community.

Month	K %	Ca %	P %	N %	CP %
July	0.031	0.31	0.127	0.815	5.093
August	0.038	0.425	0.105	0.845	5.281
September	0.032	0.218	0.082	0.812	5.075
October	0.028	0.214	0.061	0.511	3.199
November	0.025	0.325	0.034	0.493	2.690
December	-	-	-	-	-
January	-	-	-	-	-
February	-	-	-	-	-
March	-	-	-	-	-
April	-	-	-	-	-
May	-	-	-	-	-
June	0.037	0.38	0.047	0.792	4.45

ID: Individual density (tillers.m⁻²)

CP: Crude protein

TD: Total density (tillers.m⁻²)

'-': Indicates the absence of the plant in the community.

AGB: Above ground biomass (gm⁻²)

TAGB: Total above ground biomass (gm⁻²)

References

- [1] A.R.C."The nutritional requirement of farm livestock". No. 2, Runinants, Agricultural council, London, U.K., 1995
- [2] F.K. Bharucha, and K. A. Shankaranarayan, "The chemical composition of some pastures of Bombay", Bombay J. of Research, 26 : 10-17, 1958
- [3] M.L. Jackson. "Soil chemical analysis", Prentice Hall of India Ltd. New Delhi. 1973
- [4] F.B. Morrison, "Feeds and Feeding", 22, Clinton, Iowa, p. 1165, 1959
- [5] S.C. Pandeya, G. S. Puri, and J.S. Singh, "Research methods in Ecology", Asian Publishing Company, Bombay, 1968.

- [6] U. Pandya, "Biomass attributes of some wasteland biomes in Bhavnagar", Ph.D. Thesis, Bhavnagar University, Bhavnagar, 1992.
- [7] T.S. Redy, "Grassland biomes of Bhavnagar", ecological studies, Ph.D. Thesis, Bhavnagar University, Bhavnagar, 1986.
- [8] K.A. Siddiqui, "Contribution of *Dactyloctenium aegypticum*(L) Beauv. To bioteclamation of salt affected soil". Annals of Arid Zone, 26(4): 301 – 303, 1987.
- [9] K. Vallikadevi, "Ecosystem analysis of some grassland near Bhavnagar". Ph.D. Thesis, Bhavnagar University, Bhavnagar, 1988.
- [10] P. S. Yadava, and J.S. Singh, "Progress in Ecology", Vol. 2, Grassland Vegetation, Today and Tomorrows Printers and Publishers, New Delhi, 1986.

Author Profile



Piyush Parekh received the B.Sc., M.Sc. and Ph. D. degree in Ecology (Botany) from Maharaja Krishnakumarsinhji Bhavnagar University in 1992, 1994 and 2000, respectively. He is a guide of Pacific University, Udaipur, Rajasthan, India