Study of herbaceous plant population by quadrate method in Laxmi Venkatesh Desai College campus Raichur, Karnataka State, India

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ABSTRACT: *The plant population occurs in the form of communities in the nature. Every community is determined by structure, diversity, growth forms and dominance successional tendency of the species. The dominant species within the communities are expressed mainly on the basis of numerical data. Thus, the present investigation has been carried out and made the effort to record the presence of dominant species based on certain analytical characters such as frequency percentage, density, abundance and frequency class of plant population at Laxmi Venkatesh Desai College Campus Raichur with the usage of specific type of the quadrant size such as 100 cm X 100 cm.*

KEY WORDS: *Plant population, quadrate, Frequency percentage, Density, Abundance*

I. INTRODUCTION

The plant population occurs in the form of communities in the nature. Every community is determined by structure, diversity, growth forms and dominance successional tendency of the species. The dominant species within the communities are estimated mainly on the numerical data. The Quadrat sampling method is one of the oldest ecological technique in ecology (Pound and Clements, 1898)[1]. Quadrate is a four sided figure and which is usually refers to any sampling unit, whether circular, hexagonal, or even irregular in outline (Dombois and Ellenberg, 1974) [2]. The quadrate method has two basic requirements namely the area is known and the organisms are relatively immobile during the counting period (Krebs, 1999) [3].

Plant ecologists have struggled with these questions since early studies on the optimal size quadrate to characterize vegetation and to estimate the abundance of an individual plant species (Gleason, 1920[4], Clapham, 1932)[5]. Furthermore, the work has been continued to examine the statistical efficiencies of quadrates of various sizes and shapes. However, few studies have been given consideration to the field efficiency and time costs associated with different sampling designs. The Quadrate method of studying vegetation has become an integral part of many of the ecological investigations. Many plant ecologists given their contribution on ecological diversity Chiarucci, A. et.al. (2001).[6], Cadott, M.W. et.al. (2002) [7]., Aerts R et.al., (2006)[8]., Wassie A, et.al., (2010)[9]., Gotelli NJ and Colwell RK (2011) [10].Graham JH, Duda JJ (2011) [11]. Erenso F et.al. (2014) [12]. In the present investigation effort has been to record the presence of dominant species based on certain analytical characters such as frequency percentage, density, abundance and frequency class of plant population at Laxmi Venkatesh Desai College Campus Raichur with the usage of quadrant plotted size 100 cm X 100 cm.

II. MATERIALS AND METHODS

The present investigation was carried out in Laxmi Venkatesh Desai college campus Raichur A quadrat is placed in the campus with definite size 100 cm X 100cm to mark out a specific area enriched with the plant communities. To cover all the herbaceous species occurring in the campus repeated quadrate samples were taken in the rainy season during the year 2018-19. At the same time the plant specimens were collected and carried out to Department of Botany and identified by using the flora such as “Flora of Gulbarga District” (Seetharam

et al, 2000)[13], "Flora of presidency of Madras" (Gamble's 1915-1935) [14],"Flora of Karnataka" (Saldhana *et al,* 1988)[15] and prepared the herbaria. These plants were deposited in the department of Botany, Laxmi Venkatesh Desai College Raichur for further reference. All the species and individual members of the species in each quadrate were recorded and calculated the frequency percentage, density, abundance and frequency class.

1. % Frequency =Total number of Quadrates in which species occured X 100
   Total number of Quadrates studied

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2. Density =Total number of individuals of a species X 100
   Total number of Quadrates studied
3. Abundance= Total number of individuals of a species X 100
   Total number of Quadrates in which species occurred

Based on distribution of various species the five frequency classes has been given such as A (1-20%), B (21-40%), C (41-60%), D (61-80%) and E (81-100%) (Raunkiaer 1934) [16].

III. RESULTS AND DISCUSSIONS

In the present investigation seventeen species were recorded using the quadrate of definite size of 100cm X 100cm and calculated the frequency percentage, density, abundance and frequency class (Table-1). Moseley *et al.,*(1989)[17] who reported that larger quadrants were more efficient statistically. Moreover Barbour *et al.,* (1987)[18] revealed that increasing quadrant size does not significantly increase the number of species encounte red. But in small quadrate the plants can be separated, counted and measured without any duplication or exclusion of individuals. *Acanthospermum hispidum, Phyllanthus niruri* and *Cynodon dactylon* has absolute presence in all the five quadrates with frequency class ' E'. *Tribulus terrestris* and *Parthenium hysterophorus* found in four quadrate with the frequency class 'D'. *Euphorbia hirta , Tridax procumbens, Indigofera Cordifolia* and *Indigofera linifolia are found in three quadrates with the frequency class* 'C'. *Cleome viscose, Boerhavia diffusa, Brassica hispida, Hyptis suaveolens* and *Cucumis prophetarum* were *found in two quadrates with the frequency class* 'B'. *Datura stramonium* was *found in only one quadrates with the frequency class* 'A'.

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Table-1:Determination of Frequency percentage, Density and Abundance of various plant species in different Quadrates

Sl. No.	Name of the Plant species	Number of Quadrates (Number of individuals in different Quadrates					Total number of species	Total number of Quadrates in which species occurred	Total number of quadrates studied	Frequency percentage	Density	Abundance	Frequency class
		1	2	3	4	5							
1	*Cleome viscosa*L.	5	5	-	-	-	10	2	5	40	2	5	B
2	*Tribulus terrestris*L.	10	5	2	-	1	18	4	5	80	3.6	4.5	D
3	*Datura stramonium*L.	5	-	-	-	-	5	1	5	20	1	1	A
4	*Euphorbia hirta* L.	5	4	-	2	-	11	3	5	60	2.2	3.6	C
5	*Tridax procumbens*L.	2	5	-	-	6	13	3	5	60	2.6	4.3	C
6	*Phyllanthus niruri* L.	15	10	12	13	15	65	5	5	100	13	13	E
7	*Indigofera Cordifolia*B.Heyne ex Roth	10	-	8	-	2	20	3	5	60	4	6.6	C
8	*Indigofera linifolia*(L.f.)Retz.	6	8	-	4	-	18	3	5	60	3.6	3	C
9	*Parthenium hysterophorus*L.	5	5	2	-	4	16	4	5	80	3.2	4	D
10	*Cynodon dactylon* (L.) Pers.	12	10	15	11	14	62	5	5	100	12.4	12.4	E
11	*Boerhavia diffusa*L.	2	-	-	2	-	4	2	5	40	0.8	2	B
12	*Malva sylvestris*L.	7	5	3	6	3	24	5	5	100	4.8	4.8	E
13	*Brassica hispida*L.	2	-	3	-	-	5	2	5	40	1.0	2.5	B
14	*Hyptis suaveolens*(L.) Poit.	4	-	-	-	4	8	2	5	40	1.6	4	B
15	*Cucumis prophetarum*L.	1	-	-	2	-	3	2	5	40	0.6	2.5	B
16	*Gynendropsus gynandra*(L.)Briq.	1	1	-	-	-	2	2	5	40	0.4	1	B
17	*Acanthospermum hispidum*DC	11	23	16	10	14	74	5	5	100	14.8	14.8	E

IV. CONCLUSION

The total obtained seventeen species in which the degree of three species namely *Acanthospermum hispidum*, *Phyllanthus niruri* and *Cynodon dactylon* have remarkably rich in its existing study area. The individual species are spread in heterogenous manner in the quadrate plotted area. The frequency values refers to the values of Raunkier's formula A>B>C<D<E. The amount of the species rcorded with the greater number to the meagre number based on its frequency. The Frequency finds out the distribution of the species, Diversity reveals the numerical strength of a species in a community and Abundance gives the number of individuals of species in a habitat.

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