Comparative anatomical study of the grasses in the range lands of Kovilpatti, Tamil Nadu of India.

B. Makesh Kumar*, J. Stephan and P. Kumar

Department of Botany,G.Venkataswamy Naidu College, Kovilpatti, India.
*Corresponding author email: bmkgvn@gmail.com

Key words:Range land; Grass Anatomy; South India

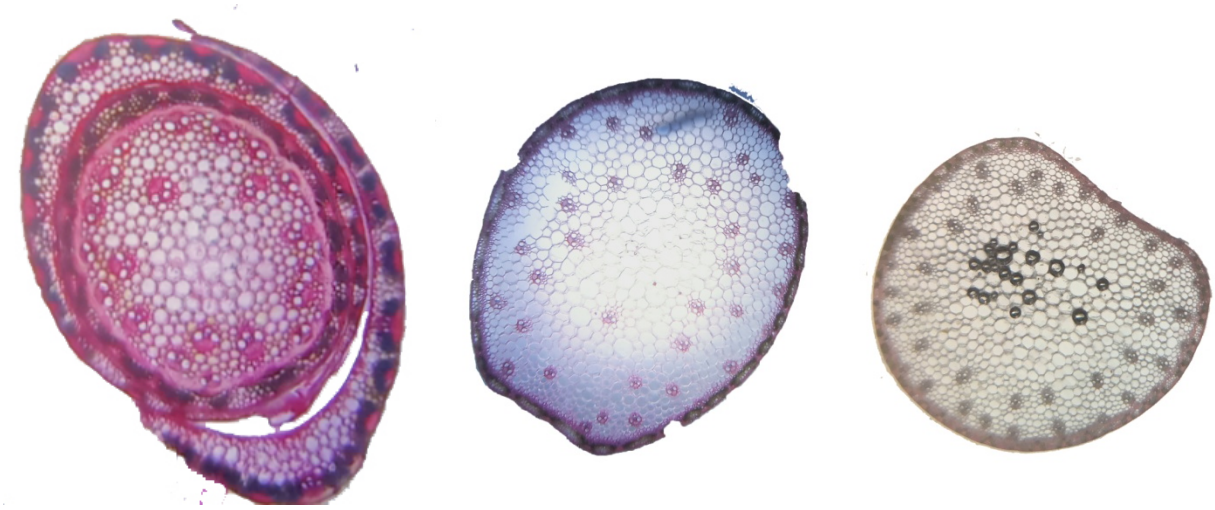
Abstract
Grasses are the crucial component of the rural rangeland ecology. Besides the morphological studies, micro-morphological characters such as stem anatomy were also investigated in this study. So as to get detailed understanding about variations during the summer and monsoon within species and also differentiating the species with the help of supplementary characters such as number of cortical layers and vascular bundles, xylem vessel length etc. In grass anatomy the characters are rather constant for some species and highly variable for others probably often due to the climatic variation. Still the characters are very helpful to differentiate and determine the genus. Also the study proves the adoptive anatomical characters of the selected species in the study area.

Introduction
Grasses belongs to one of the largest and economically important family *Poaceae* Barnhart. In grasses the mature blades are mostly glabrous to pubescent and they bear trichomes on both a side (Metcalfe, 1960), however for few species the trichomes were present only on the sheath (Metcalfe, 1960). The shape of the stem is varying from round, oval to crescent. Members of this family not only provide the stable food material like rice, wheat, barley, corn and other millets also provide fodder to the cattle. Increasing intensities and frequencies of drought events put rangeland agriculture under pressure in semi-arid and arid geographic areas. The geography of the selected study area Kovilpatti of Tamilnady, India, plays an important role in the diversity of the grasses. Major objective of the study is in order to have thorough knowledge on the diversity and distribution of the grass species used as fodder. Thus we have conducted a comprehensive study of the grasses in the study area.

Study Site and Methods
The study area Kovilpatti is located in the Tuticorin district of Tamil Nadu, India. There are approximately 50 species of grasses were identified from the area, in which 15 species were selected for this study (Table 1). Most of the grasses used as fodder by the local people for their cattle. Field explorations were carried out in wetland, scrub jungle, cultivation field, and etc. Plant specimens were collected, prepared herbarium as per standard procedure (Jain & Rao, 1977) and identified with the help of relevant literature, local and regional flora (Gamble; 1935), revision. The sample collections were made from the different sites with varied gradients (wetland, scrub jungle, cultivation field) based on both the details from floras and field notes from herbarium. Morphological variations and phenology were also noted in the field and microscopic observations were carried out in the lab. Voucher specimens were deposited in the G. V. N. college Herbarium. Second node of the stem was selected as working material for microscopic observation. The hand sectioned stem tissues were stained in 1% aqueous Safranin solution for 5 minutes, washed in distilled water and the parts were mounted in glycerin (Johansen, 1940). The materials observed using a Leica DM 100 digital camera attached with Leica DM 2500 trinocular microscope.

Results and discussion (Table 1)
The study area comes under arid zone so the local people mostly depend on the fodder grasses asforage for their cattle. Apart from grasses there are certain other dichotomous plants are also used as fodder, however grasses are the most preferable fodder by the local people. During the summer, to tolerate the high temperature the grasses developed more adoptive characters such as perennial root stocks. Once the favourable condition occurs they will produce the new shoot. These adoptive characters are very important to tolerate the temperature in the rangeland. With these characters anatomical characters also supports to the physiological activities of the plants (Metcalfe, 1960). From the table 1 the sclerenchymatous tissues were continuous or it has been interrupted with collenchymas or chlorenchyma tissues. Number of peripheral vascular bundle been grouped in two categories in which one group has less than 20 vascular bundles and the

group 2 it is more than 30 to upto 50. The size (diameter) of the stem does not correlate with the number of vascular bundles. Number main vascular bundle varies from the range 25-80 and also the number of major vascular bundles vary from one layer to 4 layers (table 1).Hallow pith was not observed in all the species. Among these 15 species the plants which have more vascular bundles on the peripheral area mentioned in Table 1 are very tolerant to the dry climatic condition. Different accessions of these 15 species, accessions collected from cultivation fields and wetlands have more number of major vascular bundles than the accessions collected from the scrub jungle and the road side area.



A. *Arundinella mesophylla* **B**. *Cynodon dactylon* **C**. *Heteropogon contortus*

Figure 1: A-C: Cross Section of Stem

Table 1: Major anatomical characters of the selected grass species

S. No.	Binomial	Habitat	Sclerenchymatous layer	No. of peripheral vascular bundle (VB)	No. of major VB. rows	Diameter of cross section in (mm)
1	*Apluda mutica* L.	Wetland, scrub jungle, road side	continuous	14	2	0.9-2.7
2	*Aristida adscensionis* L.	Scrub jungle, Bunds of cultivated lands	continuous	17	2	1-4
3	*Arundinella mesophylla* Nees ex Steud. (Fig. 1. A)	Road side, waste land	continuous	18	1	2-4.2
4	*Chloris barbata* Sw.	Cultivation field, road side, wetland,	continuous	28	3	1.5-3.3
5	*Cynodon dactylon* (L.) Pers. (Fig.1. B)	Wetland, bunds of cultivation field	discontinuous	30	3	1-3
6	*Dactyloctenium aegyptium* (L.) Willd.	Road side, waste land	continuous	26	2	0.5-1.2
7	*Dichanthium annulatum* (Forssk.) Stapf	Scrub jungle, Bunds of	continuous	17	1	0.9-1.7

		cultivated lands				
8	*Echinochloa colona* (L.) Link	Cultivation field, road side, wetland	continuous	38	3	0.4-0.7
9	*Eragrostis amabilis* (L.) Wight &Arn.	Wetland, scrub jungle, road side	discontinuous	35	3	0.3-0.8
10	*Heteropogon contortus* (L.) P.Beauv. ex Roem. &Schult. (Fig. 1. C)	Wetland, scrub jungle, road side	discontinuous	29	2	0.9-3
11	*Panicum repens* L.	Wetland, bunds of cultivation field	continuous	33	2	2-3.5
12	*Pennisetum glaucum* (L.) R.Br.	Wetland, scrub jungle, road side	discontinuous	26	3	3-7
13	*Perotis indica* (L.) Kuntze	Cultivation field, road side, wetland	continuous	17	2	0.5-1.3
14	*Trachys muricata* (L.) Pers. ex Trin.	Wetland, bunds of cultivation field	discontinuous	19	2	2-3.5
15	*Zea mays* L.	Cultivated	continuous	38	4	10-20

Acknowledgements

Authors thankful to Management and Academic staffers of G.V.N.College, Kovilpatti , India.

References

Gamble, J. S. 1935. *Flora of Presidency of Madras.* Vol. 3. Botanical Survey of India, Calcutta, India.
Johenson, D. A. 1940. Plant microtechnique. Mc Graw Hill Book Co.,New York.
Metcalfe, 1960. **Anatomy of Monocotyledons.** vol. 1, Gramineae, Oxford University Press, New York.