

Chasmophytic grasses of Velliangiri Hills in the southern Western Ghats of Tamil Nadu, India

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Rock crevices play a key role in forming a major habitat for many plants, and host rich biodiversity within a small area. The rocky habitat provides extremely harsh physical environment for plants that leads to the development of specialized plant communities with endemic and habitat specific species. The microhabitat like rock crevices possess diverse forms of plants, which are mainly seasonal herbs. These habitats differ from each other due to changes in geographical terrain and soil cover (Porembski 2000).

Chasmophytes are plants rooted in clefts of rocks that are filled with detritus. In these clefts particles of

earth conveyed by wind and water accumulate. The amount and rate of accumulation depend upon the width and situation of the clefts (Davis 1982). The soil thus constituted facilitates plants to establish and their dead fragments further add to the supply of the nutritive material in the clefts (Bashan et al. 2002). The chasmophytic vegetation inhabiting rock crevices and cliffs represent specific habitat with extreme ecological conditions such as extreme drought, temperature fluctuations, width of the cliffs, rate of accumulation, limited soil volume and scarce nutrients, nature of the rock types, rock hardness and sediment porosity and water holding capacity of the substratum (Nagy & Proctor 1997; Bashan et al. 2002, 2006).

The grass family occupies 23% of the land area of the world, playing a significant role in the life of human beings and animals, and has a paramount role as a food provider, accounting for more than 80% of the world's calories (Kabeer & Nair 2009). A comprehensive account of the grasses of Tamil Nadu was published by Kabeer & Nair (2009) in their floristic studies. However, there has been no study of chasmophytic features of grasses as yet. A comprehensive study was carried out to assess the chasmophytic diversity of grasses from Velliangiri Hills of southern Western Ghats of Tamil Nadu (Fig. 1).

Study area and Methods: Velliangiri Hills are floristically rich and socio-religiously important range of southern Western Ghats situated 40km west of Coimbatore City, Tamil Nadu. The study area lies between 6°40'–7°10'E and 10°55'–11°10'N between 520–1840 m. A famous temple called 'Velliangiri Aandavar' temple also called "Thenkailayam" (South Kailas) is situated at the peak of the hills (1840m). The range of study area consists of seven hills with different altitudes and topography.

Correct nomenclature, habit, habitat, phenology and pattern of distribution available are given (Table 1). Plant specimens were identified with regional and local floras (Gamble & Fischer 1988; Mathew 1983; Chandrabose & Nair 1988; Henry et al. 1989; Kabeer & Nair 2009). The voucher specimens are deposited in the herbarium



Date of publication (online): 26 December 2012
 Date of publication (print): 26 December 2012
 ISSN 0974-7907 (online) | 0974-7893 (print)

Editor: N.P. Balakrishnan

Manuscript details:

Ms # o3107
 Received 21 February 2012
 Final received 14 October 2012
 Finally accepted 29 October 2012

Citation: Thomas, B., A. Rajendran, K.A.A. Kabeer & R. Sivalingam (2012). Chasmophytic grasses of Velliangiri Hills in the southern Western Ghats of Tamil Nadu, India. *Journal of Threatened Taxa* 4(15): 3462–3472.

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Acknowledgements: We are all thankful to Professor and Head, Department of Botany, Bharathiar University, Coimbatore and Head of Office, Botanical Survey of India, Southern Circle, Coimbatore for providing necessary facilities to carry out the present research.

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The publication of this article is supported by the Critical Ecosystem Partnership Fund (CEPF), a joint initiative of l'Agence Française de Développement, Conservation International, the European Commission, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank.

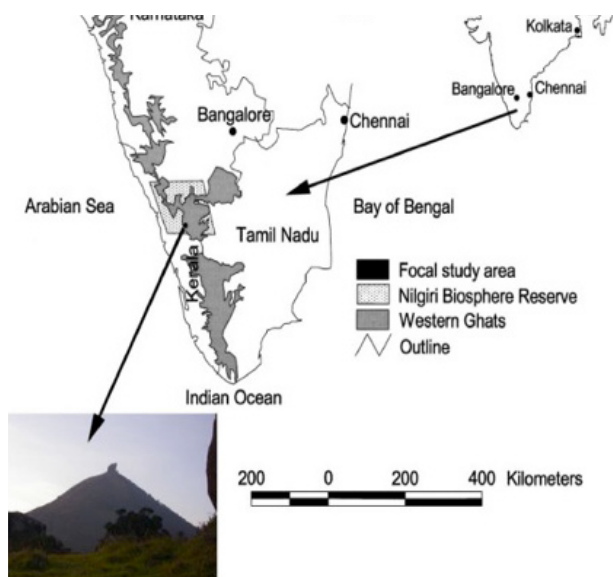


Figure 1. Study area

of Botany Department, Bharathiar University (BUH), Coimbatore, Tamil Nadu, India.

Results and Discussion: The data presented here are the outcome of a series of extensive and intensive studies conducted during September 2010–October 2011 had resulted in the documentation and collection of 30 species of wild chasmophytic grass taxa from Velliangiri Hills of southern Western Ghats of Tamil Nadu (Images 1–35).

The present study incorporated 30 species of chasmophytic grasses distributed in 26 genera (Table 1). Among these genera *Eragrostis* is the dominant genus with four species, namely, *aspera*, *tenella*, *nigra* and *uniloides*. Some of the notable chasmophytic grasses are used by the local tribe ‘Malasars’. The stalks of *Apluda mutica* are used for making hats. *Cymbopogon flexuosus* is used to extract the lemon grass oil for medicinal purposes. Ash of *Pogonatherum crinitum* are used for skin problems. The spikelets of *Setaria palmifolia* and *Melinis repens* are highly attractive and used ornamentally. Most of the grasses are used as fodder.

Some of the threats like heavy influence of pilgrims, recreational pressures, collection of fire wood, lack of suitable management and other construction activities adversely affect the existing ecosystem. It is suggested that the chasmophytic vegetation needs to be protected through sustainable utilization.



Image 1. View of Velliangiri hill top



Image 2. *Pogonatherum crinitum* (Thunb.) Kunth.



Image 3. *Melinis repens* (Willd.) Zizka

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Table 1. Chasmophytic grasses of Velliangiri Hills, southern Western Ghats of Tamil Nadu

Sno	Botanical name (accession number)	Habit	Habitat	Phenology	Distribution
1	<i>Apluda mutica</i> L. (BUH: 7298) (Image 6)	Tufted perennial	Rock crevices of hill slopes up to 1700m	Throughout the year	Common
2	<i>Arthraxon hispidus</i> (Thumb.) Makin. (BUH: 7123) (Image 7)	Tufted annual	Rock crevices of hill slopes up to 1800m.	Apr–Feb	Uncommon
3.	<i>Arundinella pumila</i> (Hochst. ex A. Rich) Steud. (BUH: 7126) (Image 8)	Tufted annual	On dripping rocks	Nov–Mar	Rare
4.	<i>Axonopus compressus</i> (Sw.) P. Beauv. (BUH: 7125) (Image 9)	Perennial grass	Rock crevices up to 1500m	Jun–Feb	Common
5.	<i>Capillipedium assimile</i> (Steud.) A. Camus (BUH: 7142) (Image 10)	Tufted perennial	Cliffs of hill slopes 900–1800 m	Oct–Mar	Uncommon
6.	<i>Cenchrus ciliaris</i> L. (BUH: 7151) (Image 11)	Stoloniferous perennial	Moist places of rocky cliffs	Throughout the year	Common
7.	<i>Centotheca lappacea</i> (L.) Desv. (BUH: 7153) (Image 12)	Decumbent perennial	Moist shaded places of hilly cliffs	Apr–Nov	Uncommon
8.	<i>Cryptococcum oxyphyllum</i> (Steud.) Stapf. (BUH: 7174) (Image 13)	Tufted perennial	Rock crevices of forest floor up to 1400m	Jul–Apr	Uncommon
9.	<i>Cymbopogon flexuosus</i> (Nees ex Steud.) Will. (BUH: 7183) (Image 14)	Tufted perennial	Grassland rocky cliffs at 1700m	Jul–Apr	Common
10.	<i>Cryptococcum trigonum</i> (Retz.) A. Camus (BUH: 7389) (Image 15)	Stoloniferous perennial	Cliffs of moist shady places	Jul–Apr	Uncommon
11.	<i>Eleusine indica</i> (L.) Gaertn. (BUH: 7297) (Image 16)	Tufted annual	Rocky cliffs at 600–800 m	Throughout the year	Uncommon
12.	<i>Eragrostis aspera</i> (Jacq.) Nees. (BUH: 7200) (Image 17)	Annual	Rocky cliffs of hill slopes	Nov–Feb	Rare
13.	<i>Eragrostis nigra</i> Nees ex Steud. (BUH: 7203) (Image 18)	Tufted perennial	Rock crevices of marshy areas	June–Mar	Uncommon
14.	<i>Eragrostis tenella</i> (L.) P. Beauv. (BUH: 7202) (Image 19)	Tufted annual	Rocky cliffs of foot hills	Throughout the year	Uncommon
15.	<i>Eragrostis uniloides</i> (Retz.) Nees ex Steud. (BUH: 7204) (Image 20)	Tufted annual	Rock crevices of marshy areas	Throughout the year	Uncommon
16.	<i>Gamotia arundinacea</i> Hook. (BUH: 7202) (Image 21)	Tufted annual	Rock crevices of open areas at about 1500m	Jul–Feb	Uncommon
17.	<i>Heteropogon contortus</i> (L.) P. Beauv. (BUH: 7220) (Image 22)	Tufted perennial	Rock crevices of hills at about 400–600 m	Throughout the year	Common
18.	<i>Melinis repens</i> (Willd.) Zizka (BUH: 7267) (Image 23)	Tufted annual	Rocky cliffs of open dry areas at about 600–800 m	Throughout the year	Common
19.	<i>Oplismenus compositus</i> (L.) P. Beauv. (BUH: 7275) (Image 24)	Creeping annual	Rocky cliffs of shaded areas	Jul–Mar	Common
20.	<i>Panicum curviflorum</i> Hornem. (<i>Samaikarunai</i>) (BUH: 7281) (Image 25)	Tufted annual	Rocky cliffs of grass lands at about 1300m	May–Feb	Common
21.	<i>Paspalidium flavidum</i> (Retz.) A. Camus (BUH: 7282) (Image 26)	Tufted annual	Moist shady places of rocky cliffs	May–Mar	Uncommon
22.	<i>Pennisetum polystachion</i> (L.) Schult. (BUH: 7286) (Image 27)	Tufted annual	Rocky cliffs of marshy areas at 1250m	Jul–Apr	Uncommon
23.	<i>Pogonatherum crinitum</i> (Thunb.) Kunth. (BUH: 7310) (Image 28)	Tufted annual	Rocky cliffs of hill slopes at 1200m	May–Mar	Common
24.	<i>Rottboellia cochinchinensis</i> (Lour.) Clayton (BUH: 7325) (Image 29)	Tufted perennial	Rocky cliffs along streams at 1200m	Throughout the year	Uncommon
25.	<i>Setaria palmifolia</i> (J. Koenig) Stapf. (BUH: 7333) (Image 30)	Tufted perennial	Rocky cliffs of marshy areas	Jul–Apr	Uncommon
26.	<i>Sorghum halepense</i> (L.) Pers. (BUH: 7337) (Image 31)	Rhizomatous perennial	Rock crevices of hills at about 600–800 m	Oct–Jan	Common
27.	<i>Spodiopogon rhizophorus</i> (Steud.) Pilger (BUH: 7202) (Image 32)	Tufted annual	Rocky cliffs along hill slopes at 1300m	Nov–Dec	Uncommon
28.	<i>Sporobolus indicus</i> (L.) R. Br. var. <i>flaccidus</i> (Roem & Schult) (BUH: 7341) (Image 33)	Tufted annual	Rocky cliffs of forest floor at 600–800 m	May–Mar	Common
29.	<i>Themeda triandra</i> Forssk. (<i>Erigaihattuppullu</i>) (BUH: 7341) (Image 34)	Tufted perennial	Rocky cliffs of hill slopes	May–Mar	Common
30.	<i>Zenkeria elegans</i> Trin. (<i>Kallubothai</i>) (BUH: 7362) (Image 35)	Tufted rhizomatous perennial	Massive clumps in rocky areas at 1700m	Jun–Jan	Uncommon



Image 4. *Sporobolus indicus* (L.) R. Br. var. *flaccidus*



Image 5. *Arundinella pumila* (Hochst. ex A. Rich.) Steud.

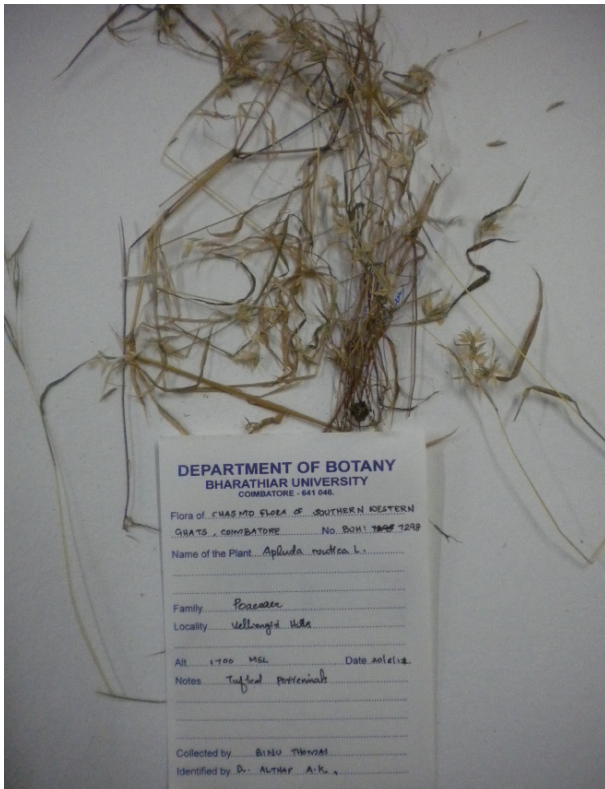


Image 6. *Apluda mutica* L.

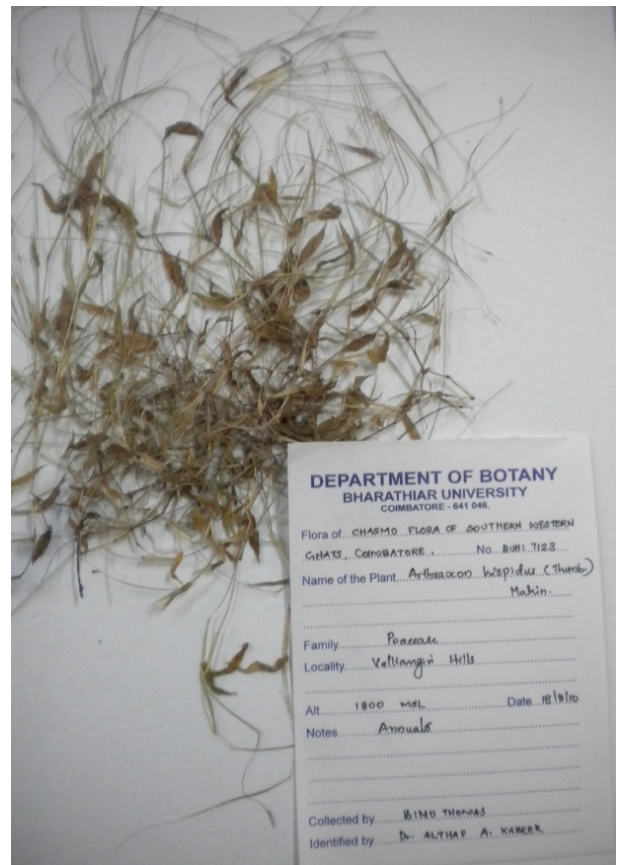


Image 7. *Arthraxon hispidus* (Thunb.) Makin.

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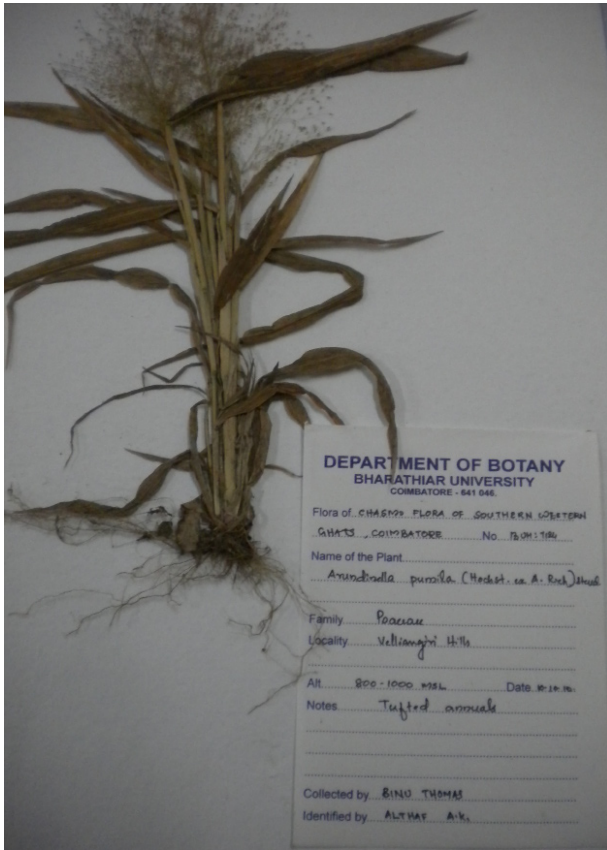


Image 8. *Arundinella pumila* (Hochst. ex A. Rich.) Steud.

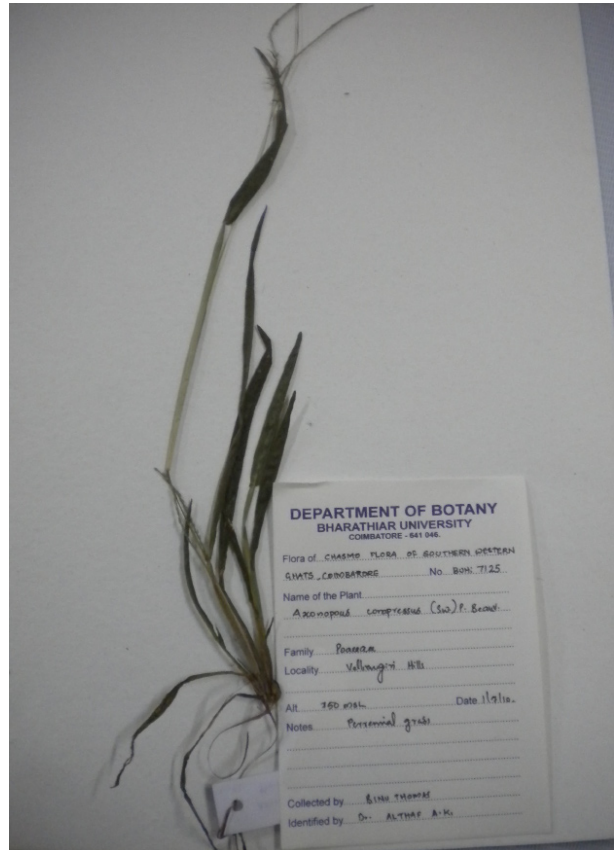


Image 9. *Axonopus compressus* (Sw.) P. Beauv.

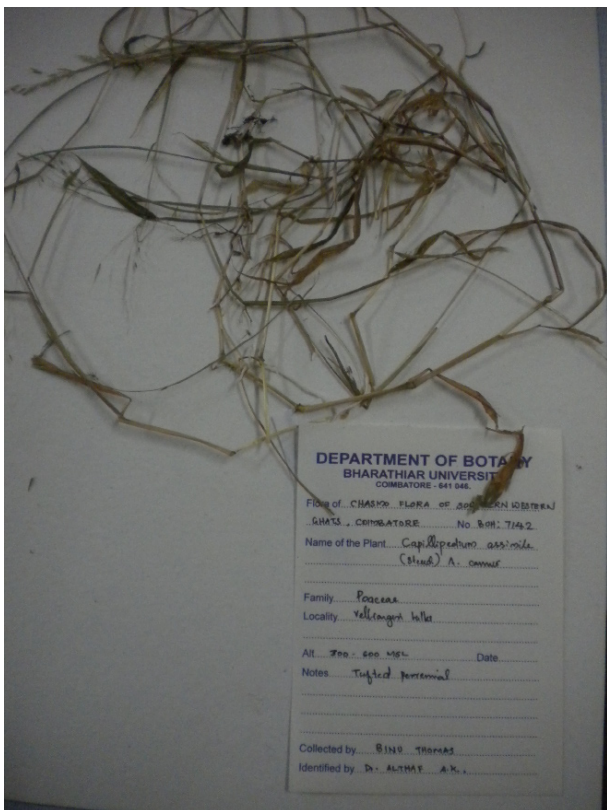


Image 10. *Capillipedium assimile* (Steud.) A. Camus

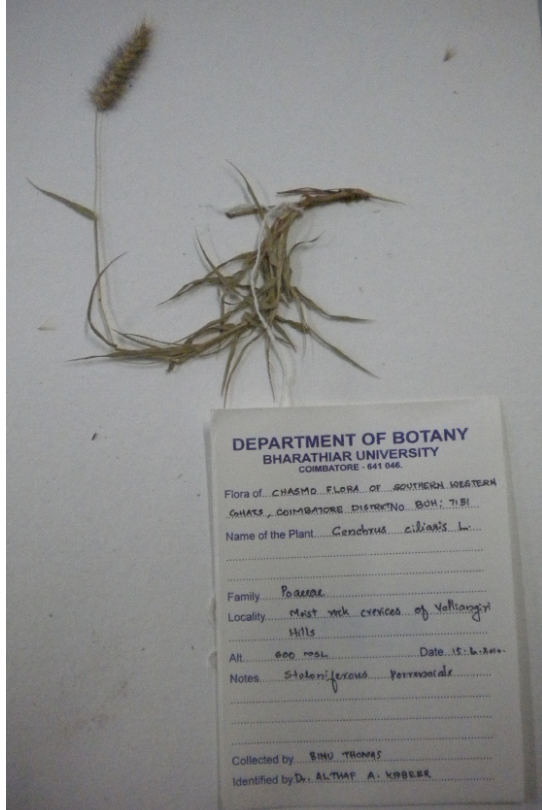


Image 11. *Cenchrus ciliaris* L.

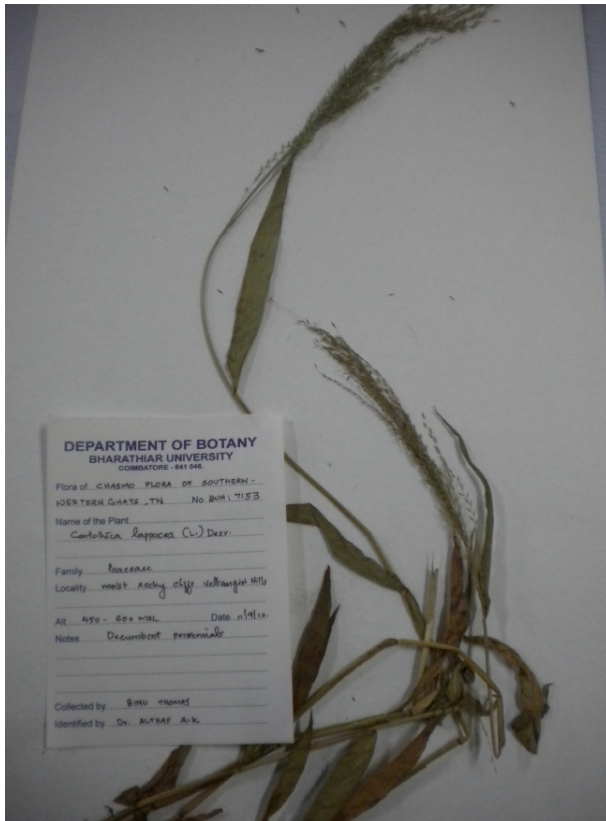


Image 12. *Centotheca lappacea* (L.) Desv.

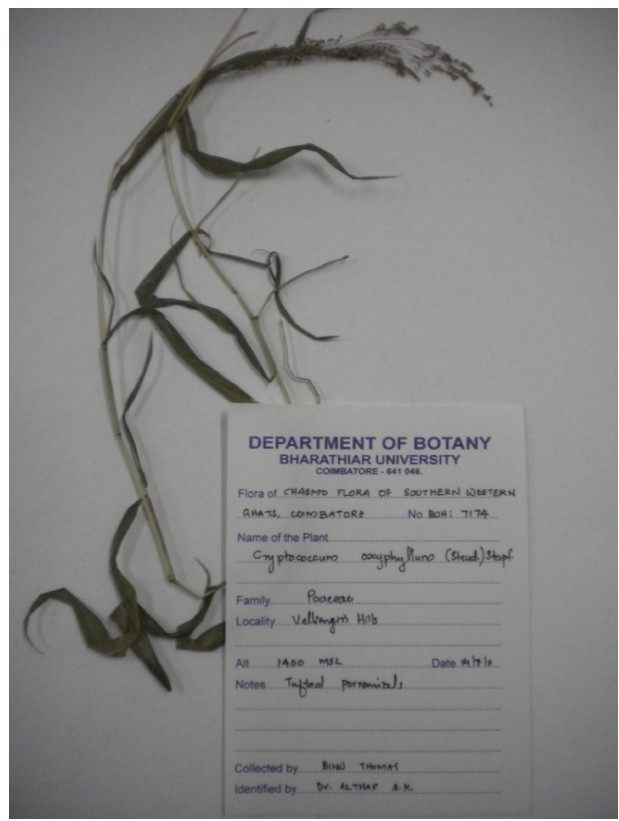


Image 13. *Cryptococcum oxyphyllum* (Steud.) Stapf

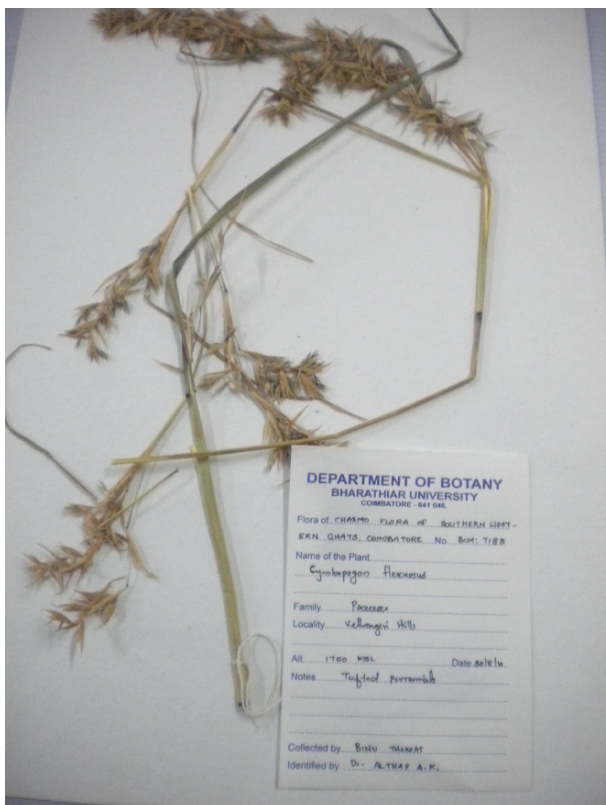


Image 14. *Cymbopogon flexuosus* (Nees ex Steud.) Will.

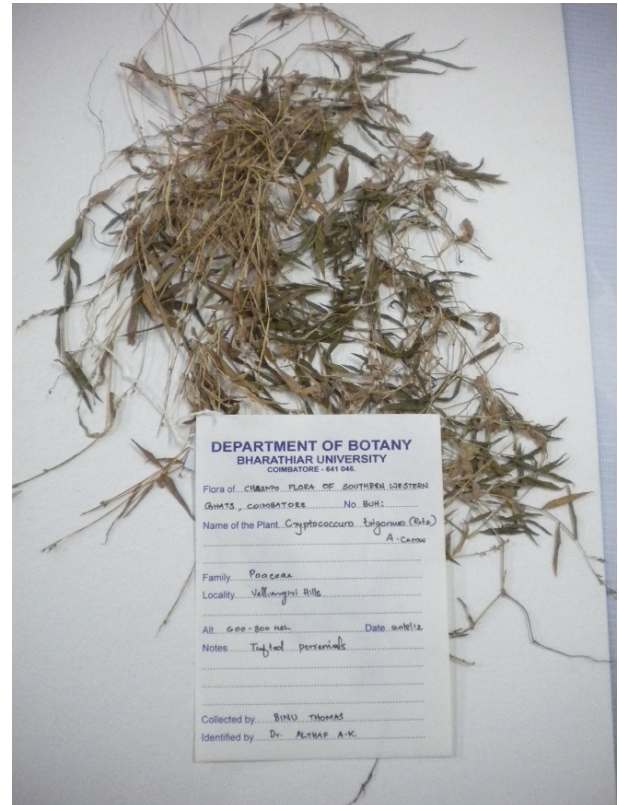


Image 15. *Cryptococcum trigonum* (Retz.) A. Camus

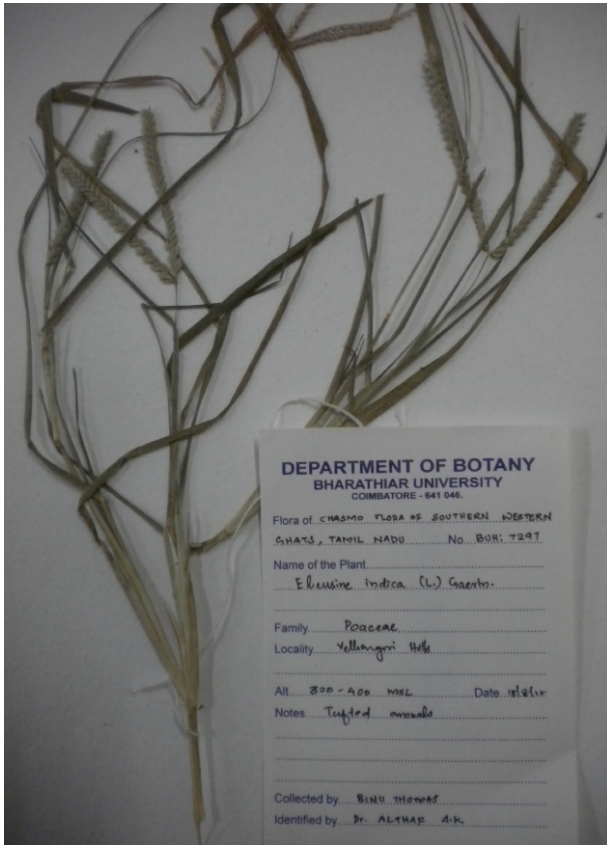


Image 16. *Eleusine indica* (L.) Gaertn.

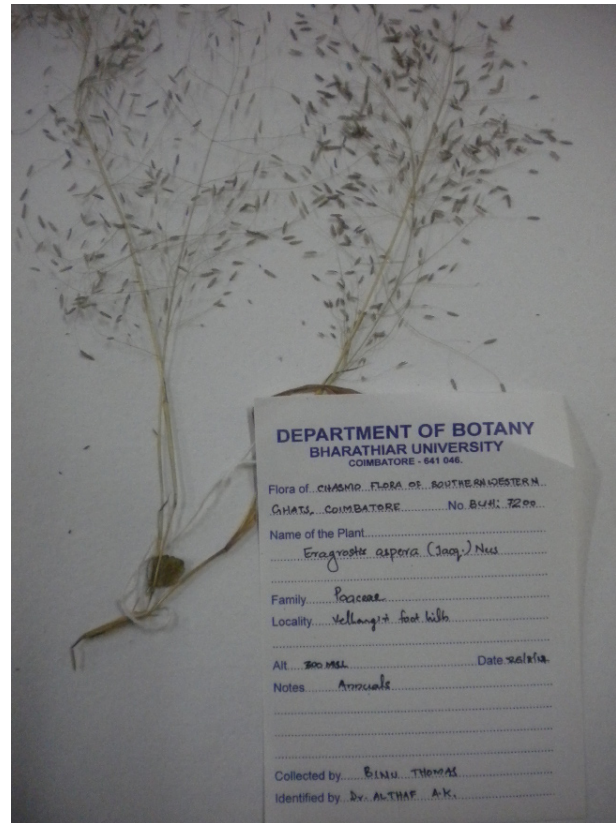


Image 17. *Eragrostis aspera* (Jacq.) Nees

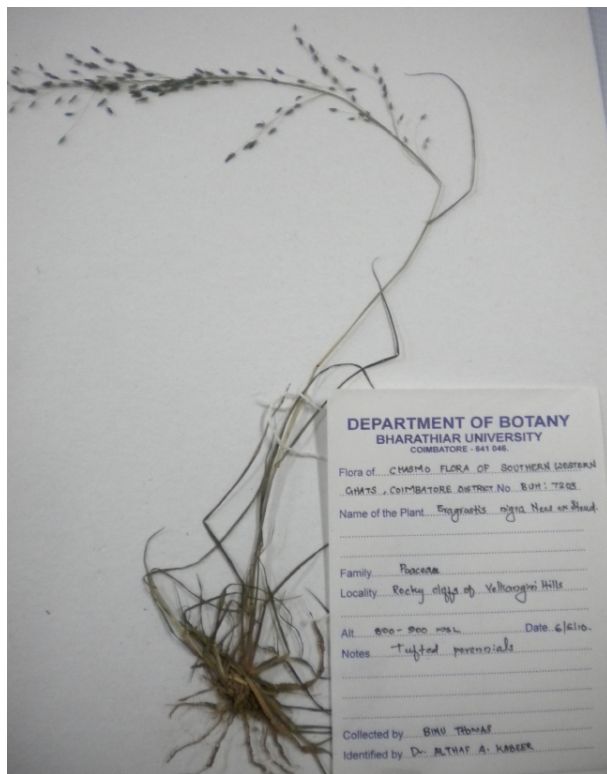


Image 18. *Eragrostis nigra* Nees ex Steud.

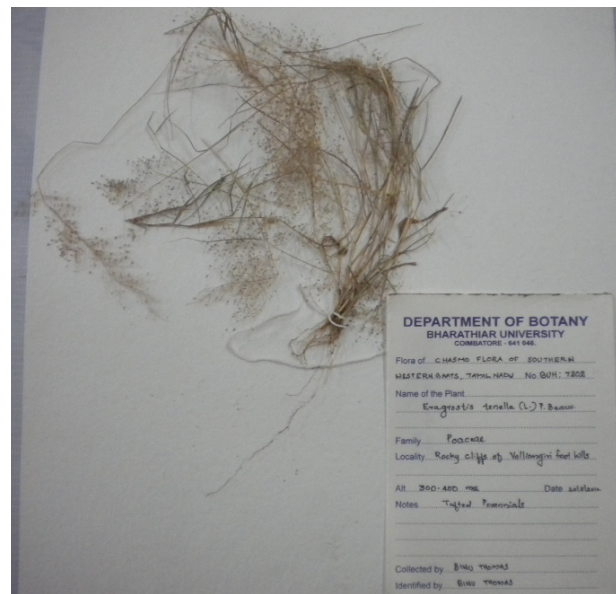


Image 19. *Eragrostis tenella* (L.) P. Beauv.

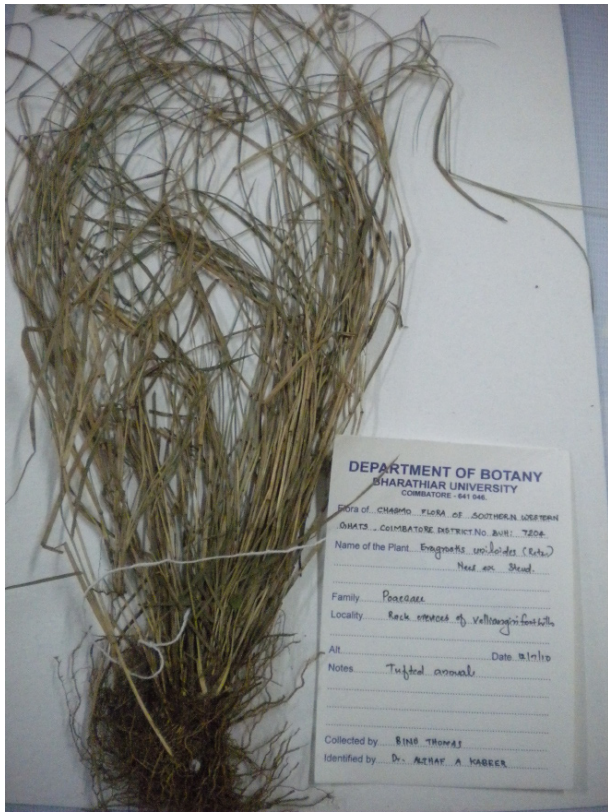


Image 20. *Eragrostis uniloides* (Retz.) Nees ex Steud.

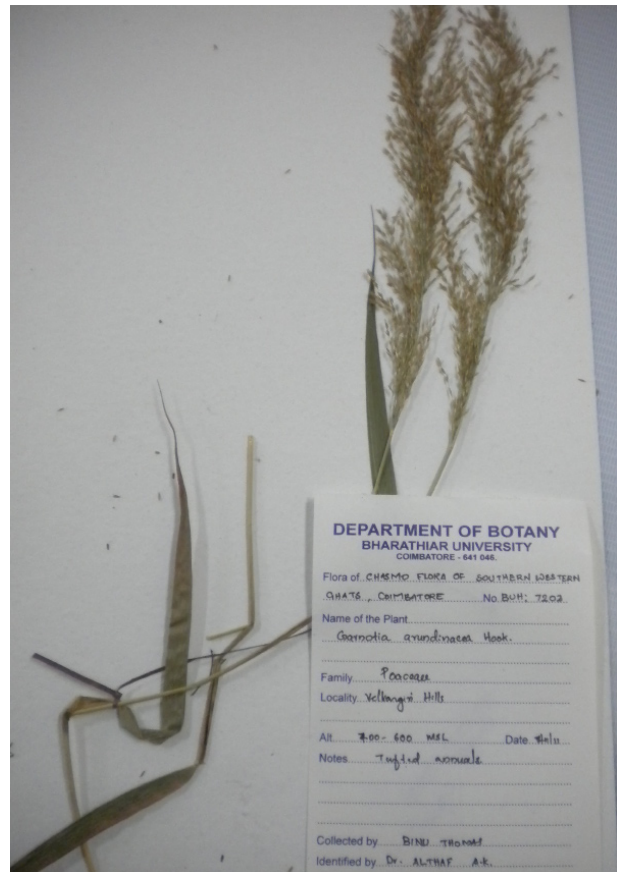


Image 21. *Garnotia arundinacea* Hook.

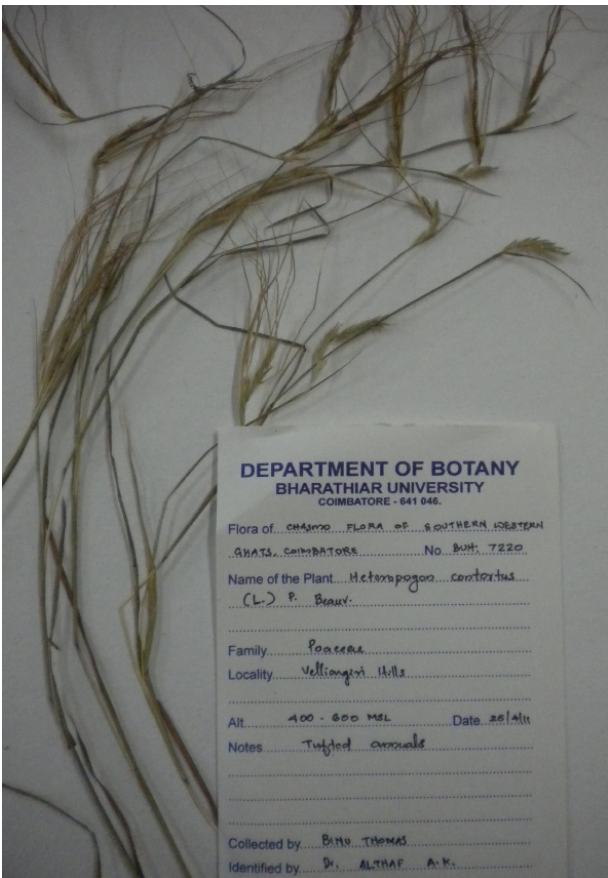


Image 22. *Heteropogon contortus* (L.) P. Beauv.

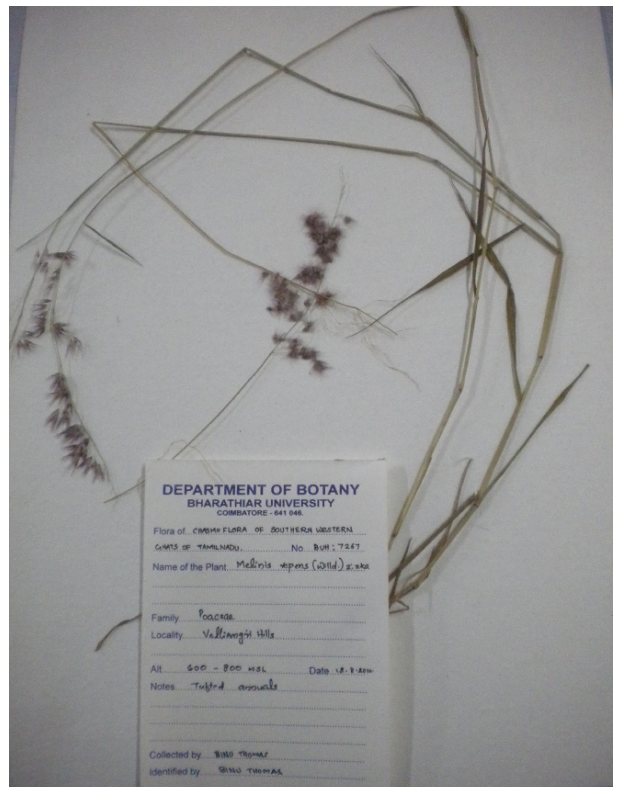


Image 23. *Melinis repens* (Willd.) Zizka

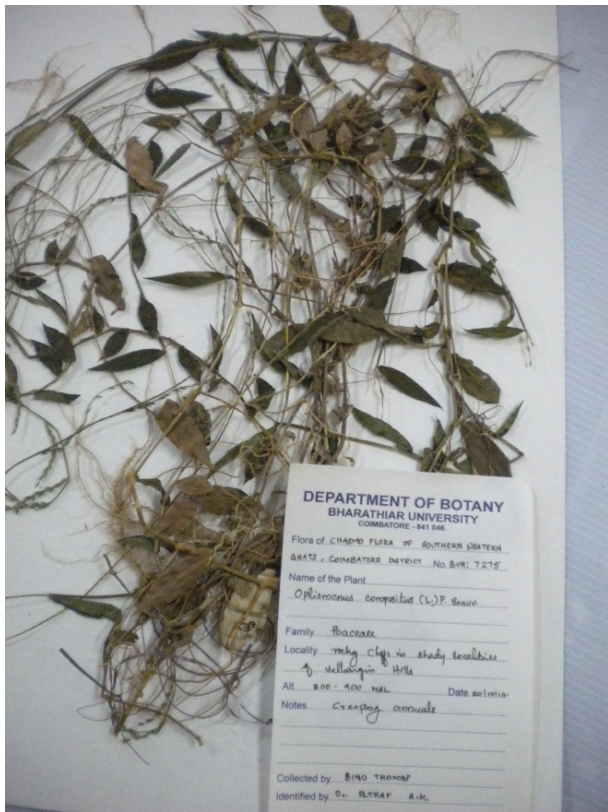


Image 24. *Opismenus compositus* (L.) P. Beauv.

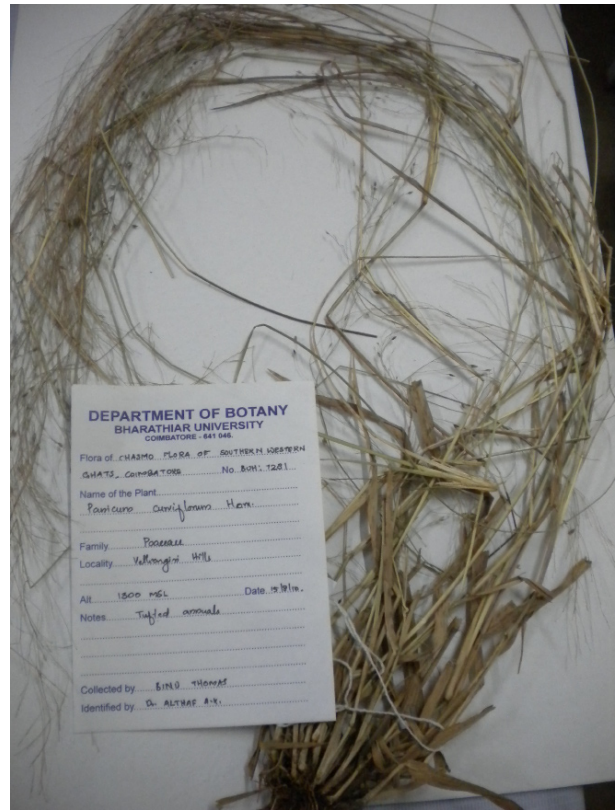


Image 25. *Panicum curviflorum* Hornem.

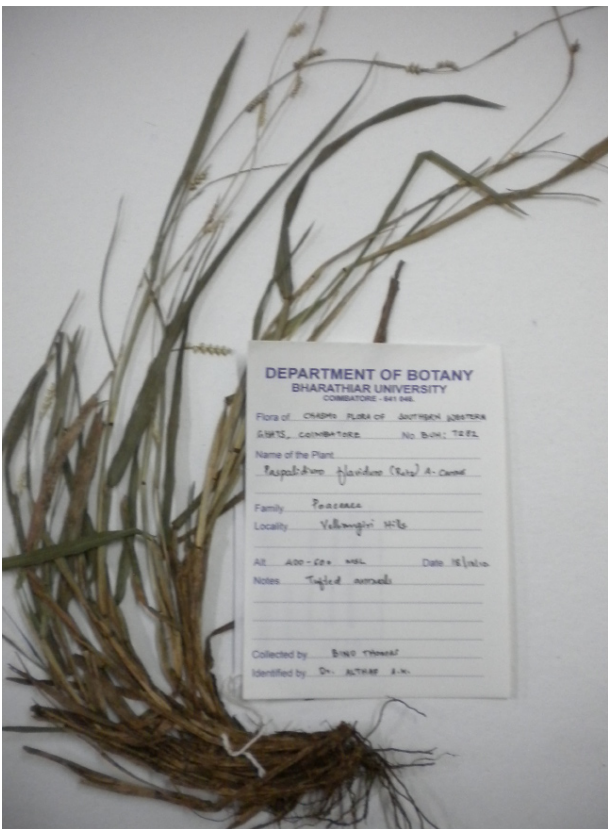


Image 26. *Paspalidium flavidum* (Retz.) A. Camus

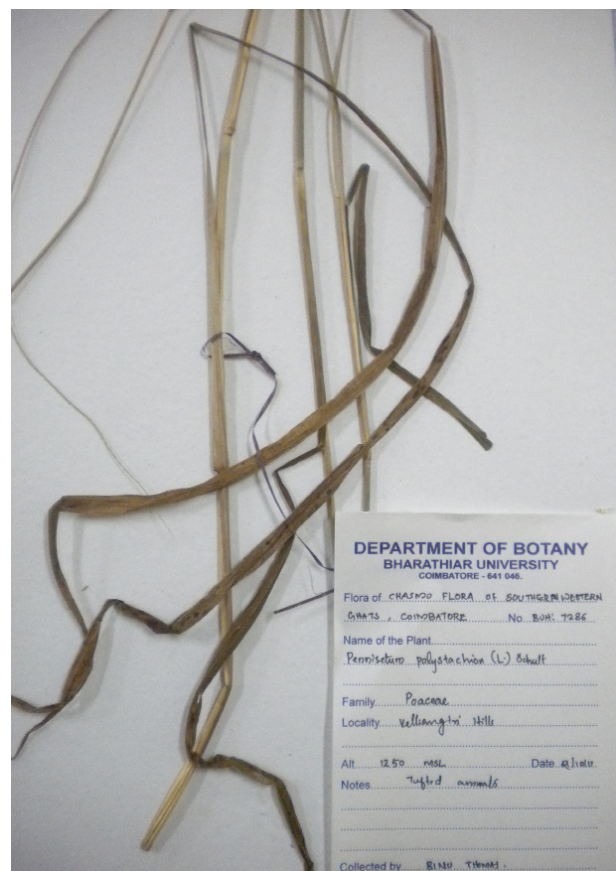


Image 27. *Pennisetum polystachion* (L.) Schult.

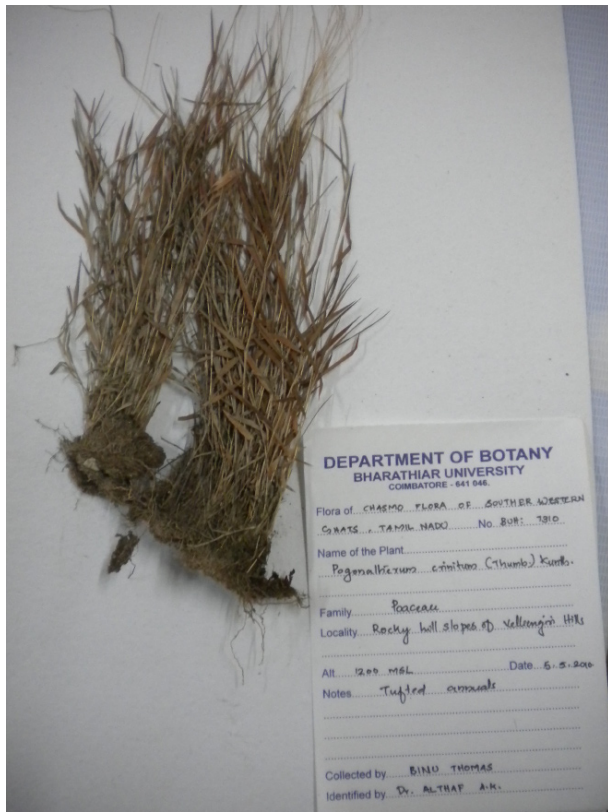


Image 28. *Pogonatherum crinitum* (Thunb.) Kunth.

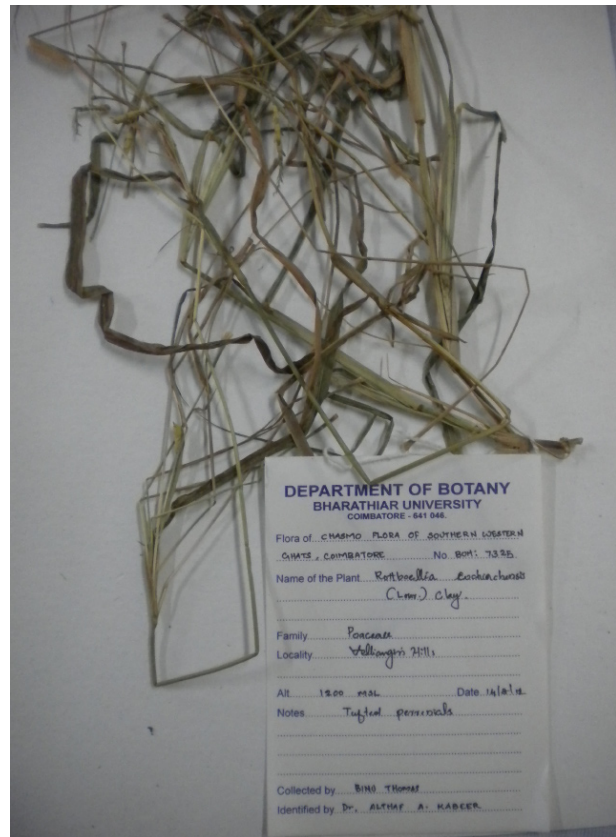


Image 29. *Rottboellia cochinchinensis* (Lour.) Clayton

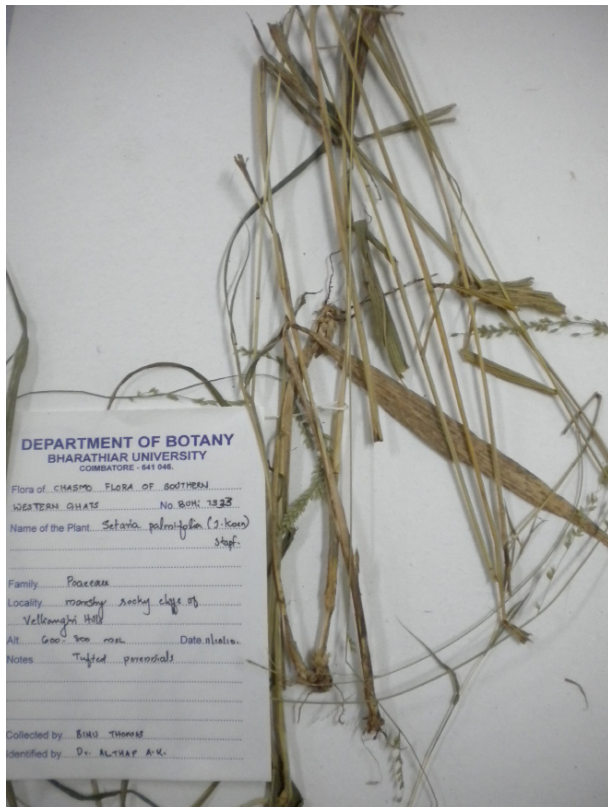


Image 30. *Setaria palmifolia* (J. Koenig) Stapf.

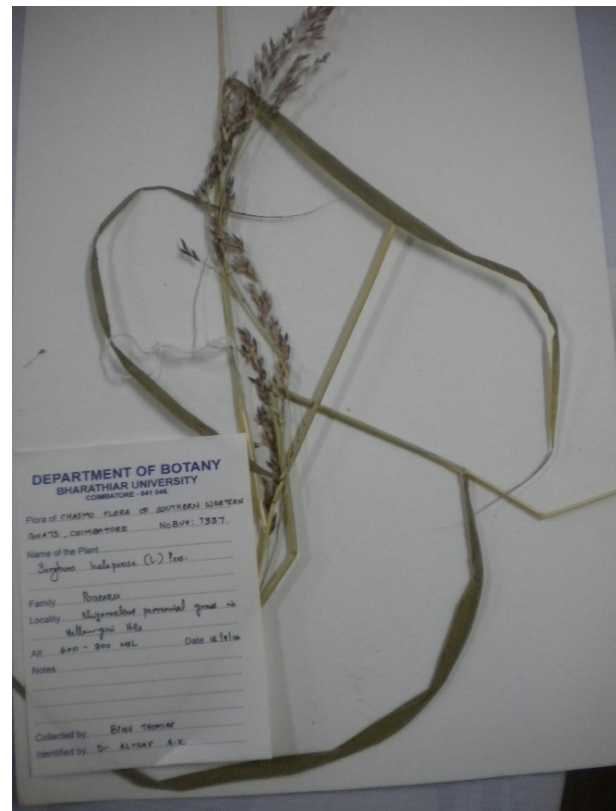


Image 31. *Sorghum halepense* (L.) Pers.

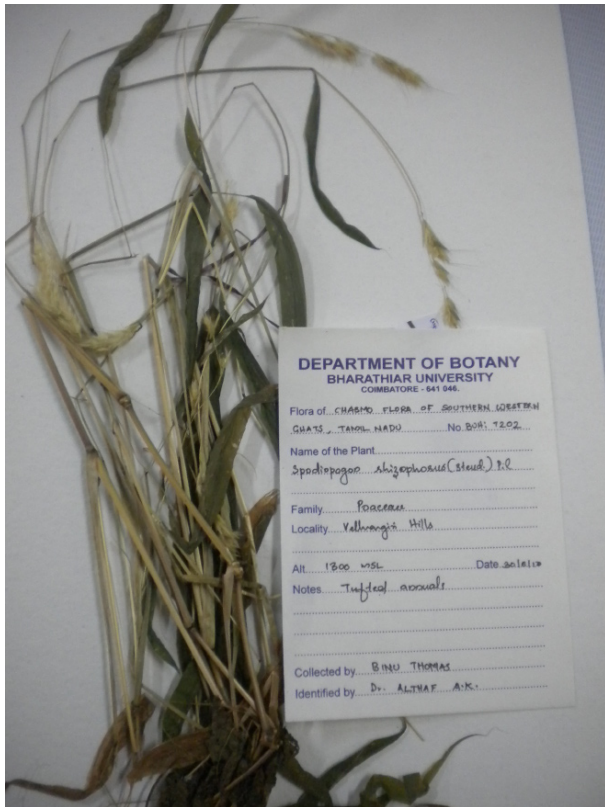


Image 32. *Spodiopogon rhizophorus* (Stued.) Pilger

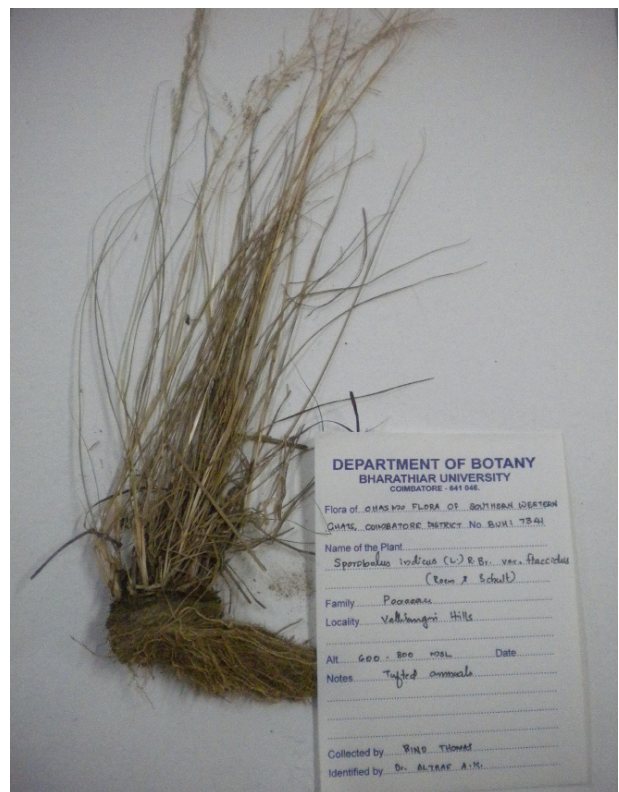


Image 33. *Sporobolus indicus* (L.) R. Br. var. *flaccidus* (Roem. & Schult.)

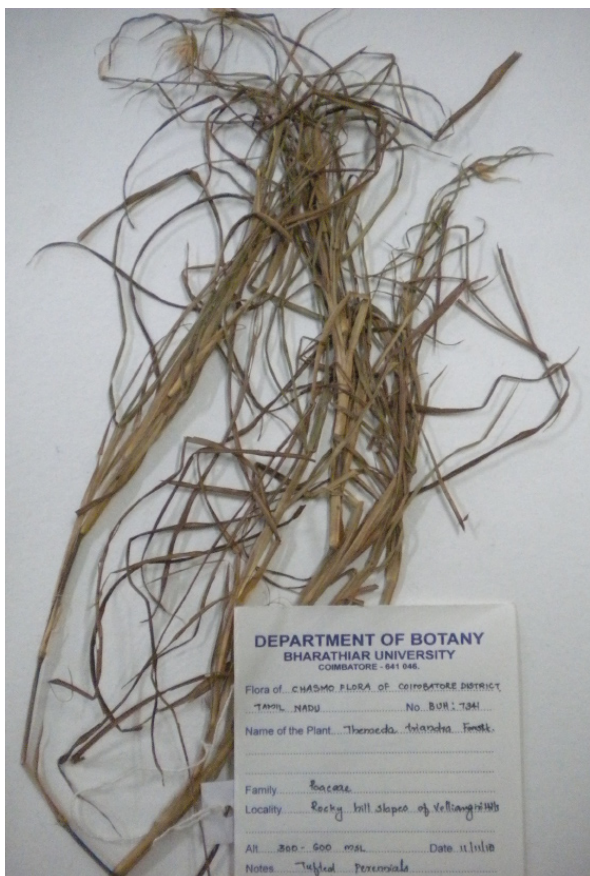


Image 34. *Themeda triandra* Forssk.

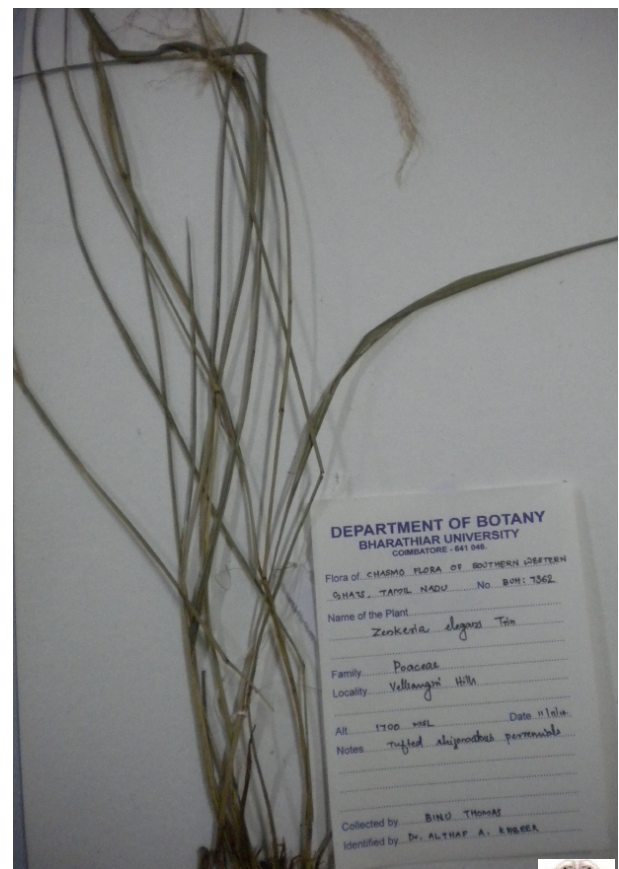


Image 35. *Zenkeria elegans* Trin.

