

Grass Flora of the Travancore State with special reference to fodder grasses

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Introduction A grass survey of the Travancore State was made by the author between 16th November and 6th December 1941. Though Travancore State is just equal in area to a large district of the Madras Province, the ecological features exhibited are very diverse, ranging from sub-temperate to tropical. The elevation varies from sea level to about 9,000 feet in height at Anamudi which is the highest point in South India. The State forms a narrow strip of country between the sea and the ghats. It has a long coast line on the western side and rises gradually to the Western Ghats which form the eastern boundary. The climate in most parts is humid due to the long coast line, presence of backwaters, lagoons, innumerable canals and rivers and also to the heavy rainfall received in the major portion of the State. The high ranges of the State have a semi-temperate climate. One half of the country is covered with mountains and many rivers take their origin from them and fall into the Arabian Sea on the western side. The soil in most parts of the State is reddish being of laterite formation. Due to the undulating nature of the country the land is subjected to both sheet and gully erosion. The fine particles of the soil are carried away by the rain water to the rivers and deposited in the backwaters and the sea. The land is, therefore, comparatively poor and the soil is deficient in mineral contents. The substratum consists of gneiss while that of the adjoining British Indian districts except Malabar consists of limestone commonly known as *kankar*. The soil is, therefore, further deficient in calcium.

Rainfall The rainfall ranges from 33.6 inches at the Fruit Farm which is only two miles to the north of Cape Comorin, the southernmost point of the State, to 127 inches at Alwaye, the northernmost town in the State. Thus it increases gradually from South to North as seen from the table given below. It goes up even to 380 inches in the high ranges of the State (Peermade, Devicolam, etc.)

Rainfall data of different parts of the State
(Average for 50 years)

	<i>From Cape Comorin</i>	<i>Rainfall in inches.</i>
Fruit Farm	2 miles	33.6
Nagercoil	12 ..	40
Trivandrum	54 ..	67
Quilon	94 ..	92
Kottarakara	100 ..	105

Punalur	110 miles	118 Sub-mountainous tract
Tiruvalla	134 ..	111 ..
Kottayam	150 ..	121 ..
Muvattupuzha	185 ..	132 Do.
Alwaye	207 ..	127 ..
Peermade (Twyford)		266 High Ranges
Munnar (Pettimudi)		380 ..

Grass Flora of low rainfall area The southernmost part of the State for about 40 miles to the North of Cape Comorin receives rainfall below 40 inches and the flora of this part of the State is comparable to the adjoining British Districts like Tinnevely, Madura, Coimbatore, etc. The grass flora of this tract is similar to those of the above mentioned districts with *Iseilema laxum* Hack., *Dactyloctenium aegyptium* Beauv., *Cynodon Dactylon* Pers., *Cynodon Barberi* Rang. and Tad., *Paspalidium flavidum* A. Camus., *Sporobolus diander* Beauv., *Sporobolus tremulus* Kunth., *Apluda aristata* Linn., *Aristida setacea* Retz. *Aristida depressa* Retz., *Tragus biflorus* Schult., *Chrysopogon montanus* Trin., *Amphilophis pertusa* Stapf, *Perotis indica* O. Ktz., *Digitaria marginata* Link., var. *fimbriata* Stapf, *Heteropogon contortus* Beauv., *Brachicria distachya* Stapf, *Andropogon pumilus* Roxb., *Eremopogon foveolatus* Stapf, *Panicum trypheron* Schult., *Trachys muricata* Steud., *Panicum repens* Linn., *Enneapogon elegans* Stapf, *Oropetium Thomaemum* Trin., *Sehima nervosum* Stapf, *Cymbopogon coloratus* Stapf, *Digitaria longiflora* Pers., *Eragrostis unioloides* Nees., *Saccharum spontaneum* Linn., etc., predominating. A good proportion of these species, especially some of the best fodder grasses, viz., *Sehima nervosum* Stapf, *Iseilema laxum* Hack., *Trachys muricata* Steud., *Eremopogon foveolatus* Stapf., *Andropogon pumilus* Roxb., etc., disappear as one proceeds to the north of the State where the rainfall is progressively on the increase. It is the same case with the leguminous forage plants like *Alysicarpus vaginalis* DC., *Alysicarpus monilifer* DC., *Zornia diphylla* Pers., etc.

Grass Flora of high rainfall area The grass flora from Quilon to the northern boundary of the State is typical of the moist evergreen type. The fine grasses are replaced by those having coarse growth. They tend to grow tall producing more woody tissues. These characteristics do not go with good quality fodder species; consequently the cattle suffer. This seems to be one of the reasons for the cattle being poor in this State. Another reason is the lime deficiency in the soil. Consequent on this lime deficiency of soil even the grass flora found here is deficient in this very valuable mineral which is essential for the development of bones in animals. A third reason is the heavy rainfall received during one half of the year necessitating the cattle being kept indoors. Cattle generally are averse to graze grass when it is wet or when water particles are deposited on it. The chief grass species of this part of the State with high rainfall are *Ischoemum aristatum* Linn., *Ischaemum Rangacharianum* C. E. C. Fischer, *Chrysopogon orientalis* A. Camus., *Chrysopogon verticillatus* Trin.,

Themeda cymbaria Hack., *Themeda tremula* Hack., *Apluda aristata* Linn., *Cymbopogon flexuosus* Wats., *Arundinella leptochloa* Hk. f., *Arundinella mesophylla* Nees., *Arundinella holcoides* Trin., *Garnotia stricta* Brogn., *Eragrostis unioloides* Nees., *Heteropogon contortus* Beauv., *Chrysopogon aciculatus* Trin., *Themeda triandra* Forsk., *Alloteropsis cimicina* Stapf, *Vetiveria zizanioides* Nash, *Imperata cylindrica* Beauv., var. *Koenigii* Dur. et Sch., etc.

The grasses of the State may be broadly divided into pasture, hill, aquatic and introduced grasses, and also grass weeds in standing crops.

Pasture grasses The grasses of the pastures in the high rainfall areas are *Ischaemum aristatum* Linn., *Ischaemum Rangocharianum* C. E. C. Fischer, *Chrysopogon aciculatus* Trin., *Pseudanthistria umbellata* Hk. f., *Cynodon Dactylon* Pers., *Cyrtococcum patens* A. Camus (under partial shade), *Eragrostis unioloides* Nees, *Eragrostis plumosa* Link, *Digitaria marginata* Link, *Heteropogon contortus* Beauv., *Digitaria longiflora* Pers., *Sporobolus diander* Beauv., *Perotis indica* O. Ktz., etc. The cattle depend for grazing mainly on these grasses. The pasture grasses of the sandy soils are *Eragrostis plumosa* Link, *Perotis indica* O. Ktz., *Digitaria longiflora* Pers., *Digitaria marginata* Link, var. *fimbriata* Stapf, *Cynodon Dactylon* Pers., *Dactyloctenium aegyptium* Beauv., *Sporobolus diander* Beauv. (in shade), etc.

Hill grasses The hill grasses in the high rainfall areas are generally tall and their stems are often woody. Some of them attain a height of 10—12 feet. The common ones are *Themeda triandra* Forsk., *Themeda tremula* Hack., *Themeda cymbaria* Hack., *Apluda aristata* Linn., *Cymbopogon flexuosus* Wats., *Cymbopogon coloratus* Stapf, *Heteropogon contortus* Beauv., *Cymbopogon verticillatus* Trin., *Cymbopogon orientalis* A. Camus, *Eulalia tristachya* O. Ktz., *Imperata cylindrica* Beauv., var. *Koenigii* Dur. et Sch., *Ottochloa nodosa* Dandy, *Arundinella leptochloa* Hk. f., *Arundinella mesophylla* Nees., *Aristida setacea* Retz., *Garnotia stricta* Brogn., etc. Most of these are not readily grazed by cattle except the new growth that appears after forest fires or at the beginning of monsoons.

Aquatic grasses The main aquatic or semi-aquatic grasses are *Hygrorhiza aristata* Nees, *Saccolipsis interrupta* Stapf, *Saccharum spontaneum* Linn., *Brachiaria mutica* Stapf, *Paspalidium punctotum* A. Cam., *Isachne dispar* Trin., *Oryza sativa* Linn. (wild form), *Phragmites Karka* Trin. etc. Most of them are good fodder grasses.

Grass weeds Grass weeds in standing crops are often the grasses that are found in pastures. The main grasses of this category at Neyyatinkara in the low rainfall area are *Panicum trypheron* Schult., *Dactyloctenium aegyptium* Beauv., *Digitaria marginata* Link., var. *fimbriata* Stapf, *Amphilophis pertusa* Stapf, *Brachiaria ramosa* Stapf, *Urochloa reptans* Stapf, *Alloteropsis cimicina* Stapf, *Oplismenus compositus* Beauv., *Digitaria longiflora* Pers., *Cyrtococcum trigonum* A. Camus., *Panicum repens* Linn.,

etc. The following grasses occur mainly in the high rainfall areas from Quilon to the north:— *Ischaemum Rangacharianum* C. E. C. Fischer, *Ischaemum aristatum* Linn., *Alloteropsis cimicina* Stapf, *Brachiaria distachya* Stapf, *Chrysopogon aciculatus* Trin., *Digitaria marginata* Link., var. *fimbriata* Stapf, *Digitaria longiflora* Pers., *Arundinella leptochloa* Hk. f., *Panicum trypheron* Schult., *Dactyloctenium aegyptium* Beauv., *Perotis indica* O. Ktz., etc. These are often pulled out or cut and fed to cattle. These are also available for sale in towns.

Introduced grasses The following are the common introduced grasses used as fodder for cattle:—Guinea grass (*Panicum maximum* Jacq.), Napier (*Pennisetum purpureum* Schum.), Dry or thin Napier (*Pennisetum purpureum* Schum., var.), Mauritius grass (*Brachiaria mutica* Stapf) locally known as Colombo pullu and Natal grass *Rhynchelytrum roseum* Stapf).

Guinea grass (*Panicum maximum* Jacq.) is grown largely in the Government Grass Farm at Chuliamalai near Nedumangad and by leading planters like Messrs. Kurian John of Kottayam and M. K. Raghavan Pillai of Quilon, as an interplanted crop in coconut topes at Aymanam near Kottayam and Tirucoilvattam near Quilon respectively. It is also grown to a limited extent by ryots at Cnirairambu near Tiruvalla and other places. It is grown as a rainfed crop and 5–8 cuttings are generally taken.

Napier grass (*Pennisetum purpureum* Schum.) is also grown in coconut topes at Aymanam. It gives about six cuttings a year.

Dry Napier (*Pennisetum purpureum* Schum.) is grown at Kottayam by Mr. Kurian John in comparatively poor soils and is thriving well. These fodder grasses are manured with compost.

Mauritius, Colombo, Water or Buffalo grass (*Brachiaria mutica* Stapf) is cultivated at Quilon as a perennial crop in about 15 acres in rice lands for the past 40 years. For the initial planting the stems are laid flat and bulky organic manures, such as house sweepings, municipal refuse, cattle dung, etc., are spread on them. New shoots appear from all nodes. About eight cuttings are taken during the year, five being during the six rainy months. The area is manured four to six times a year especially during summer months. Two coolies manage an acre of plantation, i. e., draining off excess water, application of manure, eradication of weeds, harvest, etc. It stands water logging to a considerable extent and flowers during summer. It is harvested before flowering. About 5,000 lb. (2,000 bundles of 2½ lb. each in weight) of green fodder is the outturn per harvest per acre. The cost of 10 lb. of this fodder is about an anna. The fodder from these 15 acres meets the main fodder requirement of the town. It is relished better than any other grass.

Forage plants. Forage plants other than grasses that are met with in pastures are *Alysicarpus monilifer* DC., *Alysicarpus vaginalis* DC., *Zornia diphylla* Pers., *Desmodium triflorum* DC., (Cherupulladi), *Merremia tridentata* Hallier f. (Thirupan pullu), *Evolvulus alsinoides* Linn., (Krishna

kranthi or *Vishnu kranthi*), *Sebastiania Chamaelea* Muell Arg., etc. The first four are leguminous plants.

Forage trees The forage trees, i. e., the leaves of trees that are grazed by cattle and browsed by goats are *Fterocarpus Marsupium* Roxb. (Vengai), *Artocarpus integrifolia* Linn. (Pila), *Vitex altissima* Linn. f, *Ficus bengalensis* Linn. (goats alone browse), *Erythrina indica* Lam. (goats alone browse), etc. The leaves of the first two are available for sale in bazaars.

Rice crop as fodder At Kottarakara the tops of rice plants wherever there is rank growth are cut to a foot from the ground and fed to cattle. This prevents lodging of the plants when in ears. At Tirucoilvattam near Quilon a variety of rice locally known as Cheraadi or Chepadan which has a duration of a year is grown. Seeds are sown in March and harvested in the succeeding February. During the rainy months (June to October) three or four cuttings are taken and used as fodder. It is a double purpose rice variety and deserves trial in other localities. In these parts horsegram bhoosa (straw) is stacked in alternate layers with paddy straw and fed to cattle as a leguminous mixture.

Economic products of some grasses The following grasses that are not used as fodder are sources of some economic products:

1. *Cymbopogon flexuosus* Wats. Mal: *Vaattu pullu*, *Theruva* at Kothamanoalam; *Gnoruganam* at Perumpazhuthur near Neyyattinkara. It grows wild in the State but is largely cultivated for the essential oil it contains. This oil is commercially known as "Cochin Lemon Grass Oil". The stems with leaves before flowering are cut and distilled and is now a war-time industry in this State. It also yields a fibrous root which is used in the manufacture of the weavers' brushes known as *kuchu* in Malayalam and *pulveri* in Tamil.

2. *Aristida setacea* Retz. Mal: *Oopon pullu*, *Koonthalam pullu*, *Moochvitton pullu*. It is the common *thodappan pullu* of the Tamil country. The strong fibrous roots of this grass which are about a cubit in length are also used for making the weavers' brushes referred to above. It is not cultivated but the plants that are growing wild in light soils at Perumpazhuthur near Neyyattinkara, Kottarakara and other places, are lifted in November towards the end of the North East monsoon. The roots are collected, dried in the sun for a day and rubbed with the hand against the mud floor of houses until the bark and dirt are removed. These are then taken to weaving centres, such as, Colachel, Thazhava and Kallukada in Karunagapalli Taluq, and sold to merchants at about two annas per pound. This industry is common among the poor classes of these places.

3. *Vetiveria zizanioides* Nash. Mal: *Ramacham*. It is cultivated at Perumpazhuthur near Neyyattinkara and other places. It thrives in red gravelly soil. It is lifted generally in the month of "Karkatakam" (August—September). Roots are cut and dried in the sun for a week and then taken to bazaar and sold at about two and a half annas per pound. It is the well

known Khus Khus of commerce and it is used for making chick thatties, mats, fans, etc.

4. *Saccharum spontaneum* Linn. Mal: *Pongal pullu*. Tam: *Viswamitra darbhai*. The horns of bulls and cows during *Pongal* are decorated with the arrows of this grass; hence the local name *pongol pullu*. At Nagercoil and other places the fine spikelets of the arrows are collected for filling pillows. It is said that these pillows have medicinal effect if used by patients suffering from eye diseases. Fresh leaves are cut to a cubit in length and dried by Brahmin *purohits* (priests) to be used in religious ceremonies.

5. *Themeda cymbaria* Hack. Mal: *Ezhum pullu*, *Nan pullu* at Peermade. The new growth that appears after forest fires at the commencement of the monsoon is sometimes grazed by cattle. It is the common thatch grass of this State.

6. *Imperata cylindrica* Beauv., var. *Koenigii* Dur. et Sch. Mal: *Potha*; Tam: *Darbhai pul*. Fresh leaves are cut to a cubit in length and dried by Brahmin *purohits* to be used in religious ceremonies. New growths that appear after forest fires are readily grazed by cattle.

7. *Bambusa arundinacea* Willd. Mal: *Mula*, *Illi*. The culms (stems) are used for building, scaffolding, floating heavy timber, punt-pole, etc. The split culms are woven into mats, baskets, fans, etc. The grain when available is eaten by the poor and also used medicinally. The leaves are eaten by cattle:

8. *Ochlandra travancorica* Gamble. Mal: *Eetto*, *Kaar eetta*; Tam: *Odai*, *Eeral*. The culms (stems) are used for mat and basket making. A coarse paper is also made from it. The leaves are much eaten by elephants.

The Fodder Problem in Travancore Some suggestions towards the solving of the fodder problem in this State.

1. Guinea grass and Napier grass including the thin or dry Napier may be grown in the high rainfall areas as interplanted crop in coconut topes (*Parambu*).

2. Colombo grass (*Brachiaria mutica* Stapf) may be grown in rice lands in the vicinity of towns where there is a demand for fodder.

3. *Sehima nervosum* Stapf may be encouraged to grow in the low rainfall areas in the hill ranges in the grazing areas near Nagercoil by rotational grazing and by providing partial shade by planting some leguminous fodder trees such as *Pterocarpus Marsupium* Roxb. and *Acacia alba* Willd. This grass thrives well under partial shade.

4. The famous Kolukkattai grass (*Cenchrus ciliaris* Linn.), the mainstay of the Kangayam Breed of cattle of Coimbatore District may be tried in the low rainfall areas.

Grasses are rich in protein before flowering and should be allowed to be grazed at this stage.

The low rainfall areas are suitable for cattle breeding.

A full list of grasses collected in the State during the tour is given below with the local names wherever available.

Short botanical descriptions, various local names, uses, etc., of most of the various species of grasses enumerated in this note are already published by the author in one or other of the publications given under reference.

1. *Imperata cylindrica* Beauv., var. *Koenigii* Dur. et Sch. Mal: *Potha* (Peermade), *Darbha* (Nilamel). It is very common in Peermade plateau, hence the plateau goes by the local name Potha medu.

2. *Saccharum spontaneum* Linn. Tam: *Pongalpul* (Velimala near Nagercoil).

3. *Dimeria Thwaitesii* Hack. Mal: *Kuthiravali*, *Kuthira pullu* (Chirairambu near Tiruvalla). A slender annual commonly found on the cuttings in low lying places. Stems are one to one and a half feet high and erect. Cattle graze this readily but the fodder yield is not much.

4. *Dimeria tenera* Trin. A tufted annual commonly found on the cuttings of hill slopes. Stems are 6—12 inches high, slender and erect. It is grazed by cattle but the fodder produced is very little.

5. *Eulalia tristachya* O. Ktz. Mal: *Thakati* (Nilamel). A perennial occurring commonly in hilly places. Stems are 2—4 feet high and erect with leaves of about a foot and a half in length. It is grazed by cattle before flowering.

6. *Ischaemum aristotum* Linn. Mal: *Chenkodi padoppam pullu* (Nedumangad), *Pandam kuththi*, *Koyyala padappan* (Kottarakara), *Nottodiyam pullu* (Varkala), *Kodiyara* (Chirairambu near Tiruvalla), *Kala kombu pullu* (Kozhencheri). It is a moderate fodder and is not considered a good one for milch cows.

7. *Ischaemum timorense* Kunth. Kan.: *Nilamunga hullu*. A widely creeping perennial grass found in hilly parts. Stems are wiry, deep red in colour and rooting at the nodes. Flowering stalks are about nine inches high. It is a good pasture grass.

8. *Ischaemum Ranqacharianum* C. E. C. Fischer Mal: *Chenkodi pullu* (Nedumangad), *Kambi potaththan* (Nilamel), *Eerkkilodiyam*, *Thandan* (Kottarakara), *Odiyan pullu*, *Kattodiyam pullu*, *Moottan pullu* (Varkala), *Chovveli* (Aymanam), *Vrischika pullu* (Muvattupuzha), *Kala kombu pullu* (Kozhencheri). A widely creeping perennial grass commonly found in the pastures throughout the high rainfall areas. Stems are rooting at the nodes. Flowering branches are 1—1½ feet high. It is grazed by cattle but not considered a good fodder at Varkala and other places. The root hairs of the axillary roots that have not struck the ground gather moisture during the cold nights. The tips of these roots resemble ice drops which disappear with the rising of the sun.

9. *Sehima nervosum* Stapf Tam: *Paal pul* (Maruthvimalai near Nagercoil).

10. *Arthroxon Quartinianus* Nash. A slender pasture grass occurring at Peermade and other places. Stems are rooting at the nodes.
11. *Capillipedium Huegelii* Stapf. It is a perennial. Stems are 2—3 feet long and rooting at the basal nodes. Cattle do not graze this readily due to the aromatic nature of the grass.
12. *Amphilophis pertusa* Stapf. Mal: *Vazha pul* (Neyyattinkara).
13. *Vetiveria zizanioides* Nash. Mal: *Ramachcham* (Neyyattinkara).
14. *Chrysopogon aciculatus* Trin. Mal: *Ooppan pullu* (Kottarakara), *Kombullu* (Kozhencheri); Tam: *Ona pullu* (Velimala near Nagercoil).
15. *Chrysopogon verticillatus* Trin. Mal: *Ennanchi pullu* (Nilamel), *Kal potha* (Peermade). A robust perennial occurring in mountainous tracts. Stems are 4—6 feet high and half an inch in diameter at the base, woody and erect. It is a very elegant grass when in flower and grazed by cattle before flowering.
16. *Chrysopogon orientalis* A. Camus. A perennial occurring in hilly parts. Stems are as thick as crow's quill, 2—3 feet high ascending from a short creeping root-stock. It is not grazed by cattle after flowering.
17. *Chrysopogon montanus* Trin.
18. *Heteropogon contortus* Beauv. Mal: *Thokadi* (Kottarakara), *Irumbarappan pullu* (Varkala), *Ooppan pullu* (Quilon); Tam: *Chekkattu pul* (Maruthvimalai near Nagercoil).
19. *Heteropogon oliganthus* Blatter. A dwarf tufted annual found in mountainous places. Stems are 6—8 inches high and slender. It is not considered a fodder grass.
20. *Themeda triandra* Forsk.
21. *Themeda tremula* Hack. Mal: *Mlancholi pullu* (Peermade), *Podi pullu* (Peermade). A perennial found in hilly parts. Stems are one to four feet high ascending from a creeping root-stock. It is not grazed by cattle after flowering.
22. *Themeda cymbaria* Hack. Mal: *Malam pul*, *Ezhum pul* (Nilamel), *Nan pullu* (Peermade); Tam: *Tharuvai* (Velimalai near Nagercoil). A gregarious perennial grass covering extensive areas in mountainous tracts. It is the tallest grass in the State. Stems are 10—12 feet high. The new growth after forest fires is readily grazed by cattle but not touched by them after flowering. It is used as thatch grass.
23. *Iseilema laxum* Hack. Tam: *Kodi pullu* (Nagercoil).
24. *Pseudanthistiria umbellata* Hk. f. Mal: *Chenkodi pullu* (Nedumangad), *Blaavanchil* (Nilamel). It is a slender annual with straggling branches. Branches creep along the ground, rooting at the nodes. Flowering branches ascend and are about a foot high. It is a medium fodder.
25. *Apluda aristata* Linn. Mal: *Mulam pullu* (Neyyattinkara), *Otiyan pullu* (Nedumangad), *Kotta thalavan* (Mundakayam); Tam: *Kula nanal* (Velimala near Nagercoil). It attains a height of 6—8 feet in some parts of the State.
26. *Eremopogon foveolatus* Stapf

27. *Andropogon pumilus* Roxb.
28. *Cymbopogon flexuosus* Wats. Mal: *Vattu pullu* (Neyyattinkara, Kottarakara and Pærmade), *Gnarukanam* (Neyyattinkara), *Chukkunari* (Peermade), *Theruva* (Kothamangalam).
29. *Cymbopogon coloratus* Stapf Tam: *Chukkunari pullu* (Maruthvama near Nagercoil).
30. *Rottboellia exaltata* Linn. f.
31. *Mnesithea laevis* Kunth.
32. *Digitaria marginata* Link. Nature, habit and uses are the same as No. 33.
33. *Digitaria marginata* Link., var. *fimbriata* Stapf Mal: *Cheruthandan* (Chirairambu near Tiruvalla), *Kaala pullu* (Aymanam).
34. *Digitaria longiflora* Pers. Mal: *Padaththi pullu* (Nedumangad), *Ari pataththan* (Nilamel, Varkala), *Nei patoppen* (Kottarakara), *Cherupatappan pullu* (Quilon), *Chengali pullu* (Chirairambu near Tiruvalla). This is considered the best pasture grass of the State.
35. *Alloteropsis cimicina* Stapf Mal: *Pooppa pullu* (Nedumangad), *Koda pullu* (Varkala), *Kola pullu* (Chirairambu near Tiruvalla).
36. *Eriochloa procerus* C. E. Hubb.
37. *Brachiaria distachya* Stapf
38. *Brachiaria mutica* Stapf Mal: *Kulambu pullu* (Quilon). An introduced perennial which grows to four feet in height. For other details please see elsewhere.
39. *Brachiaria armosa* Stapf Mal: *Chama pothaval* (Neyyattinkara).
40. *Paspalum scrobiculatum* Linn. An annual often cultivated for its grain. Stems are $1\frac{1}{2}$ — $2\frac{1}{2}$ feet high, erect and rarely ascending. The spikelets develop hydrocyanic acid at the time of maturity of the seeds and at this stage it is poisonous to stock. It can be grazed by cattle before flowering without any deleterious effect.
41. *Stenotaphrum dimidiatum* Brogn. A perennial pasture grass occurring in rather moist situations. Stems are six to nine inches high, spreading on the ground and rooting at the nodes. It is a good pasture grass.
42. *Paspalidium flavidum* A. Camus
43. *Paspalidium punctatum* A. Camus. It is a perennial aquatic grass. Stems are two to four feet long, prostrating at the often floating base and rooting at the lower spongy nodes. It is a good fodder grass.
44. *Urochloa reptans* Stapf
45. *Echinochloa colona* Link.
46. *Oplismenus compositus* Beauv. Mal: *Patoppa pullu* (Nedumangad), *Vaazhamparaththi* (Mookunni mala near Trivandrum).
47. *Oplismenus Burmannii* Beauv. Tam: *Moogil pullu*. It is a diffusely branched annual. Stems are 6—12 inches long and slender. It is a shade loving grass and is not grazed by cattle readily.

48. *Ottocloa nodosa* Dandy. It is a perennial grass. Stems are creeping and rooting at the nodes. Flowering branches ascend and are about nine inches high. It is grazed by cattle.

49. *Panicum humile* Nees. A caespitose annual found in dry places. Stem is 12–15 inches high. It is grazed by cattle.

50. *Panicum trypheron* Schult. Mal: *Chama pullu* (Mookunni mala near Trivandrum and Nilamel), *Chama pathayam* (Chirairambu near Tiruvalla).

51. *Panicum maximum* Jacq. Guinea grass.

52. *Panicum repens* Linn. Mal: *Inji pullu* (Nilamel, Nedumangad); Tam: *Aana aruku* (Nagercoil).

53. *Panicum brevifolium* Linn. Mal: *Mulam pullu* (Kottarakara). It is a decumbent perennial grass. Stems are rooting at the basal nodes with flowering branches of about one foot high. It is grazed by cattle.

54. *Panicum montanum* Roxb. It is a perennial. Stems are not branched, 3–4 feet high and erect. It is grazed by cattle.

55. *Cyrtococcum trigonum* A Camus Mal: *Valari* (Nedumangad).

56. *Cyrtococcum radicans* Stapf Mal: *Othaval* (Mookunni mala near Trivandrum), *Kaattu pataththan pullu* (Varkala). A perennial thriving in shade. Stems are 1–2 feet long, slender, creeping and rooting at the nodes. Flowering branches are six to eight inches long. It is grazed by cattle.

57. *Saccolipsis interrupta* Stapf Mal: *Kavada*; Tam: *Tandan pillu*; Kan: *Hodikai hullu*. A large perennial grass often floating in water. Stems are 3–6 feet long ascending from a creeping rootstock. Lower nodes produce fascicles of long stout roots clothed with root hairs. It is common in the *Kuttanad* rice area and is readily grazed by cattle.

58. *Saccolipsis indica* Chase. Mal: *Muti pullu* (Kozhancheri), *Maththaambu pullu* (Aymanam). It is an annual thriving in moist situations. Stems are 6–18 inches high and erect. It is grazed by cattle.

59. *Setaria pallidifusca* Stapf et Hubb.

60. *Rhynchelytrum roseum* Stapf et Hubb. Natal grass.

61. *Pennisetum purpureum* Schum. Napier grass.

62. *Isachne dispar* Trin. Mal: *Valari* (Nedumangad), *Vanchi pullu* (Kottarakara). It is a troublesome weed in rice lands at Nedumangad and other places.

63. *Arundinella avenacea* Munro. It is a weak annual straggling among other grasses. Stems are 12–15 inches long, slender and ascending. Cattle nibble this.

64. *Arundinella mesophylla* Nees. It is an annual occurring in mountainous tracts. Stems are 15–18 inches long and erect. It is grazed by cattle before flowering.

65. *Arundinella holcoides* Trin. Mal: *Molam pullu* (Peermade). It is a very hairy annual. Stems are 12–18 inches high. It is a moderate fodder.

66. *Arundinella leptochloa* Hk. f. Mal: *Mulam pullu* (Nedumangad), *Eththakka pullu* (Chirairambu near Tiruvalla). It is a perennial occurring in the high rainfall areas. Stems are as thick as a crow quill and 2-4 feet high with a woody root-stock. It is one of the commonest grasses and a moderate fodder.

67. *Phragmites Karka* Trin. Mal: *Karakam, Kolanjil*. It grows near water courses in large colonies. It is often planted on the sides of bunds and other situations which are subjected to strong currents or waves to prevent soil erosion. It is very common at Alleppey and other places in *Kuttanad*. Stems are erect and 10-15 feet high. These are made into pipes and split stems are plaited into mats.

68. *Aristida depressa* Retz.

69. *Aristida setacea* Retz. Mal: *Koonthalam pullu, Moochvittan pullu* (Neyyattinkara), *Ooppan pullu* (Kottarakara); Tam: *Poonchatta* (Maruthvamaralai near Nagercoil), *Eakkil pullu* (Velimalai near Nagercoil).

70. *Ganotia stricta* Brogn. It is generally perennial but sometimes annual. It is a very variable grass occurring in mountainous tracts and often found growing on rock cuttings. It is not considered a fodder.

71. *Trachys muricata* Steud.

72. *Trachys biflorus* Schult. Tam: *Ottatthi* (Maruthvamaralai).

73. *Pennisetum indica* O Ktz. Mal: *Ooppan pullu* (Varkala).

74. *Sporobolus diander* Beauv.

75. *Sporobolus tremulus* Kunth.

76. *Sporobolus orientalis* Kunth. It is a stoloniferous perennial growing usually in silt soils. Stems are 6-18 inches high with geniculately ascending branches. Leaf tips being spiny it is not grazed by cattle.

77. *Sporobolus piliferus* Kunth. It is a caespitose annual occurring in mountainous places. Stems are 3-12 inches high and erect. It is a moderate fodder.

78. *Eragrostis riparia* Nees.

79. *Eragrostis viscosa* Trin. It is a viscid annual occurring in rather low lying places. Stems are 1½-2 feet high. It is grazed by cattle.

80. *Eragrostis plumosa* Link. Mal: *Naakkotti* (Mookunnimala), *Pooppan pullu* (Chirairambu near Tiruvalla).

81. *Eragrostis unioides* Nees. Mal: *Vatti pullu* (Muvattupuzha), *Kaala moonchi pullu* (Aymanam).

82. *Eragrostis angetica* Steud. It is a tufted perennial occurring in moist situations. Stems are 1-3 feet high. It is readily eaten by cattle.

83. *Eragrostis filosa* Beauv.

84. *Oropetium homaeum* Trin.

85. *Cynodon dactylon* Pers. Mal: *Karuka pullu* (Varkala); Tam: *Aruvan pullu* (Nagercoil).

86. *Cynodon Boeri* Rang. and Tard.

87. *Chloris bartha* Sw.

88. *Eleusine indica* Gaertn. Tam: *Thippa ragi*. It is a tufted annual occurring in low lying places. Stems are 1—2 feet high, slightly compressed and erect. It is readily grazed by cattle.

89. *Doctyloctenium aegyptium* Beauv. Mal: *Koovaragu* (Mookunnimala), *Koda pullu* (Kozhencheri).

90. *Enneapogon elegans* Stapf. It is a perennial. Stems are 3—18 inches high, wiry and erect. It is a moderate fodder.

91. *Oryza sativa* Linn. Mal: *Navara*. It is an aquatic annual occurring commonly in water courses in *Kuttanad* rice area. It is the wild form of the cultivated rice plant. Stems are 2—10 feet long and creeping or floating. It is grazed by cattle. The grain is used medicinally.

92. *Hygrophiza aristata* Nees. Tam: *Valli pullu*. It is a perennial floating grass common in canals in *Kuttanad* rice land area. Stems are 1—2 feet long, spongy with feathery whorled roots at the nodes. It is readily eaten by cattle.

93. *Dendrocalamus strictus* Nees. Mal: *Kallan mula*. It is a spineless bamboo occurring only in the Anjinaad valley in the State, other places being too moist for its growth. A densely tufted bamboo with solid or nearly solid culms growing to a height of 15—50 feet and $1\frac{1}{2}$ —3 inches across near the base. It flowers once in thirty years and dies down after fruiting. The culms (stems) are used for poles, lathies, mat and basket making. The leaves are eaten by cattle.

94. *Bambusa arundinacea* Willd. Mal: *Mula, Illi*. It is thorny and is the commonest bamboo in the State. It occurs in sub- mountainous and mountainous tracts. The culms are hollow and they attain a height of 60—100 feet and 4—7 inches across at the base. It flowers once in 30 years and dies after fruiting. The culms are used for buildings, scaffolding, etc.

95. *Oxytenanthera monadelphica* Alston. (*O. swaitesii* Munro). Mal: *Watta*. It grows gregariously in the evergreen forests at high elevations. The plants are erect, spineless and reed-like. Culms (stems) are 10—12 feet high and one inch across and may be used for fencing and basket making.

96. *Ochlandra scriptoria* C. E. C. Fischer (*O. heedii* Benth.) Mal: *Ottal, Ammei, Kolanjil*. It occurs at low elevations growing in thick clumps on river banks. Culms (stems) are 15—20 feet high and one inch across at the base. It flowers sporadically every year and does not die down after fruiting. The culms (stems) are used for mat and basket making.

97. *Ochlandra scriptoria* C. E. C. Fischer, var. *sivagiriana* Gamble. Mal: *Ottal*. It resembles *O. scriptoria* C. E. C. Fischer in all respects except the leaves and spikelets being longer. It is found at Ponmudi in the Nedumangad Taluq.

98. *Ochlandra travancorica* Gamble Mal: *ttal*; Tam: *Eeral, Odai*. It grows gregariously in evergreen forests throughout the State covering

large areas with dense growth. It flowers at long intervals and dies down after fruiting. Culms are 10—20 feet high and 1—2½ inches across at the base and are in great demand locally for mat and basket making. A coarse paper is also made from it. The leaves are much eaten by elephants.

99. *Ochlandra Wightii* C. E. C. Fischer (*O. Brandisii* Gamble). Mal: *Eetta*. It occurs at low elevations. It is found at Pallode, Kallar, etc., in the Nedumangad Taluq. It resembles *O. travancorica* Gamble and the culms are put to the same use as those of *O. travancorica* Gamble.

Five other species of grasses which are not represented in the Madras Herbarium at Coimbatore were also collected during the tour. They are under study and some of them may prove to be new species. One of these known at Peermade as *Thavala* pullu is a pasture grass thriving in moist situations. It is common on the roadsides at Kottarakara and other places.

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A Note on the Cultivation of Mango Ginger in the Neighbourhood of Anakapalli (Vizagapatam District).

By A. SANKARAM, B. Sc. (Ag.)

Introduction The pickles form an indispensable side-dish in our diet. They are considered to be appetisers and to help in digestion. Of the several kinds of pickles in common use, 'Mango ginger' is a special favourite with the *Andhras* in the Northern Circars. In the preparation of this pickle the addition of an adequate amount of lime juice, besides the required quantities of chillies and salt, is essential to give a pleasing taste.

Mango ginger (*Curcuma Amada* Roxb.) belongs to the family *Zingiberaceae*. Like the other members of the family, the plant is a perennial herb with an underground rhizome and large erect leafy aerial branches. The plant grows wild in Bengal and on the hills.

The cultivation of the crop is mainly concentrated in and around Anakapalli, though recently it is known to have been taken up by a few *ryots* in the villages round about Rajahmundry of the East Godavari District. The details of the cultivation of this crop as practised in the neighbourhood of Anakapalli are presented in this short note.

Soil and Preparatory Cultivation Soils of high fertility with free drainage, e. g. sandy loams, are generally preferred for this crop. In the garden lands the crop is grown in rotation with *ragi* or any vegetable crop like brinjal or *bandai*, etc. The crop is also raised in wet lands with