

A CONTRIBUTION TO THE FLORA OF TUWA IN PANCHMAHAL DISTRICT GUJARAT*

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ABSTRACT

The areas in vicinity of Tuwa village have been intensively explored from 1964-1968. During this period 539 angiosperms were collected of which 409 are dicotyledons and 130 monocotyledons. There are 606 new records for vertebrate Bombay Presidency and one new species. The vegetation is dominantly a scrub forest type but some components of dry deciduous forests are but rarely met with. A comparison of the flora of the present area is made with that of Pavagadh hill with a view to bring out differences between the two areas which are topographically different.

INTRODUCTION

The flora of some forests in the hilly regions of Panchmahal district such as Lonavada (Saxton, 1921), Devgadbaria (Saxton[†]) and Ratanmahal (Chazan and Bedi, 1966; Bedi, 1968) is known to some extent but it is better known for Pavagadh hill (Shah and Inamdar 1965; Chazan and Oza 1966; Bedi, Sainis and Bhatt 1968; Chohan and Shah, in press). However, it seems that no such work is undertaken in the plains of the district. A study of this type would be helpful in comparing the flora of the hilly regions with that of plains. With this end in view the authors studied the flora of Tuwa and its environs. The selection of the area was made as a matter of convenience. Intensive explorations in different seasons of the year were carried out from 1964 to 1968. We have been able to record 5 new plants for the erstwhile Bombay Presidency and 1 new species (Chohan, Shah and Deshpande, 1967; Shah and Deshpande, 1968; Deshpande and Shah, 1968). About 539 species have been listed in this paper of which 409 are dicotyledons and 130 monocotyledons. The nomenclature adopted is the one published in the current authentic, taxonomical literature. The herbarium specimens, which served as a basis for this paper, are housed in the Botany Department, S. P. University, Vallabh Vidyanagar.

GEOGRAPHY AND CLIMATE OF THE AREA

Tuwa is a small village in N. W. part of Panchmahal district in eastern Gujarat, situated 22° 49' N and 73° 27' E at an elevation of about 26 m above Mean Sea Level. It is a small railway station on

Anand-Godhra line of the Western Railway, about 30 km south of Godhra. It is also approachable by the State Transport buses which regularly ply between Anand and Godhra along the highway which runs within the limits of the areas explored, almost parallel to the railway line. Tuwa is also famous in Gujarat for its hot water springs, which are at a distance of only about one kilometre from Tuwa station. Topographically the area is a plain country traversed by three main rivers—Khad, Moro and Bochari and their tributaries. The soil is mostly alluvial, varying in colour from pale to dark brown. The river beds are gravelly or pebbly at some places. The hottest months are March-May, October being a close second. The rainy season starts in the middle of June or beginning of July and lasts till September. The average annual rainfall is about 697.14 mm. The cold season is from November to February but December-January are the coldest months.

SOME ASPECTS OF THE VEGETATION OF THE AREA

The vegetation of the hilly regions of Panchmahal district is of a dry deciduous type (Saxton and Sedgwick, p. 228), but in the present area, it is an open and scrub forest. Even then, some trees like *Butea monosperma* Taub. and *Tectona grandis* L.f. which often form a dominant vegetation in dry deciduous forests, are common. The other members which are also frequent components of such forests are but rarely met with. They are *Bombax ceiba* L., *Buchanania lanzan* Spr., *Brideba squamata* Gehr., *Diospyros melanoxylon* Roth,

*Based on the Ph. D. Thesis approved by S. P. University, Vallabh Vidyanagar.
†Unpublished collection housed in Gujarat College Herbarium, Ahmedabad.

Dolichandrone jalapa var. *boon* Haines, *Gouardia arborea* Roxb., *Leuca brachiata* Roxb., *Mitrasa tomentosa* Sacle, *Mitragyna parvifolia* Korth., *Soyanida febrifuga* A. Juss., *Stereolia urens* Roth, and *Terminalia crinitata* Roth. This may therefore suggest that the vegetation of the present area must have been in the past similar to the one found in the hilly region. However the dominance of thorny trees and shrubs can be attributed to biotic causes operating for the last many years. The local people indiscriminately cut down valuable trees and shrubs for fuel and other domestic purposes. The tree like *Flouca mansueta* Taub., *Tecoma grandis* L. f. etc. are seldom allowed to grow by themselves in many places and, as a result, they remain stunted, only up to 1.5 m tall. Along railway lines vast stretches of land are covered with mixed scattered patches of the stunted forms of these trees. At times *Diospyros melanoxylon* Roxb., *Helicteres antisyriensis* Wall. ex DC., *Mastoum emarginata* Hou, are also found in these patches. Further, the cattle graze at random, causing a number of tree and shrub seedlings and herbs to disappear.

A comparison of the vegetation of the present area with that of the Pavagadh hill will not be out of place. Though the vegetation of the hill is of a dry deciduous type, some members of the scrub forest such as *Acacia robusta* sp. *indica* Brenna, *Balanites aegyptiaca* Del., *Dichrostachya cinerea* W. & A., *Mastoum emarginata* Hou, *Ziziphus nummularia* W. & A. etc., which are common in our area, are also found at the foot and on hilly slopes. The dry deciduous nature of the forests of the hill has been preserved because of very much less, or practically no, biotic interference. Ghazan and Oza (p. 2) have rightly remarked "The area of this isolated hill has been declared 'unworkable area' forest reserve" by the forest department. This is left to the nature and hence the luxuriant growth of the vegetation which as a consequence is not disturbed by fire, ploughing, grazing by sheep and other animals.

Though the area selected by us is rather limited, about 5 km radius from Tawa railway station, covering some neighbouring villages like Vaganjati, Kankapur, Vavadihord, Razapur, Vanjati, Chachpur, Gani and Dhonol, the flora of our area is rich, as can be judged from the following table showing 12 most abundant families in the present area and their relative positions in the flora of

Pavagadh. The numbers in parenthesis stand for the number of species represented in a family.

S.No. Name of the family	Flora of Pavagadh hill above 2000 ft. sea level 26 m	Pavagadh hill, elevation 720 m above sea level 26 m
1. Leguminosae	1(29)	1(8)
2. Gramineae	2(79)	2(78)
3. Cyperaceae	3(12)	—(1)
4. Compositae	4(8)	4(35)
5. Convolvulaceae	5(25)	5(25)
6. Malvaceae	6(17)	7(19)
7. Euphorbiaceae	7(11)	5(27)
8. Scrophulariaceae	8(18)	11(2)
9. Acetosaceae	9(14)	—(2)
10. Anacardiaceae	10(12)	10(6)
11. Labiaceae	11(11)	8(15)
12. Umbelliferae	12(9)	9(14)
Total number of plants in the present area	—	519
Total number of plants in Pavagadh (to be repeated or known)	—	500
Cultivated plants in the present area	—	20 approximately 3.7%
Cultivated plants in Pavagadh flora	—	20 approximately 3.7%

From the above table it will be seen that the first eleven most abundant families represented in Pavagadh flora are also comparatively better represented in our area, but the differences in the number of species in each family are obviously due to topography of the two areas and the biotic influence in the present area. For example the less number of grasses in Tawa and its environs may be due to indiscriminate grazing by cattle. On the other hand the Cyperaceae and the other hydrophytes are very well represented in Tawa but poorly so at Pavagadh. This is because the plain country of Tawa and its environs is traversed by rivers, temporary ponds, puddles, ditches which support a good number of cyperaceous plants, along with other hydrophytes. Some of the noteworthy hydrophytes are: submerged *Sponogeron natense* Engl., *Ceratophyllum demersum* L., *Hydrilla verticillata* Royle, *Najas minor* All., *N. guineensis* Rendle, *Potamogeton pectinatus* L. and *Pallisneria spiralis* L.; floating *Ipomoea aquatica* Forst., *Lemnaphyton obtusatum* Miq., *Ludwigia adyroides* Hara, *Nepenthes oliverae* Lour., *Nymphaeaceae* members, *Nymphoides cristatum* O.K., *N. indicum* O.K. etc. A number of amphibious plants including Cyperaceae were noted. A comparison of the flora of Tawa with that of Pavagadh hill will also show that most of the plants are common in both the areas but some of them occurring in our

has not been reported from Pavagada and vice versa.

ENUMERATION

ANNONACEAE

- Annona squamosa* Linn.
Millettia tomentosa (Roxb.) Sinclair

MENISPERMACEAE

- Cissampelos pareira* Linn.
Caeculea hirsuta (Linn.) Dalr.
Tinospora cordifolia (Willd.) Miess. ex Hook. f. & Thoms.

NYMPHAEACEAE

- Nelumbo nucifera* Gaertn.
Nymphaea nouchali Burm. f.
N. stellata Willd.

PARAVERTEBRATAE

- Argemone mexicana* Linn.

BRASSICACEAE CRUCIFERAE

- Brassica juncea* Cass.
B. nigra (Linn.) Koch.
Lepidium sativum Linn.
Raphanus sativus Linn.

CAMPARACEAE

- Canthia fruticosa* (Linn.) Druce
Capparis decidua (Forsk.) Edgew.
C. septaria Linn.
Cleome brachycarpa Vahl ex DC.
C. gynandra Linn.
C. simplicifolia (Camb.) Hook. f. & Thoms.
C. visosa Linn.
Mesua oblongifolia A. Rich.

VIOLACEAE

- Rhynchosia aurea* (Linn.) F. Muell.

STALACTURACEAE

- Flacourtia indica* (Burm. f.) Merr.

POLYGALACEAE

- Polygala chinensis* Linn.
P. triptera DC.

CARYOPHYLLACEAE

- Polycarpon corymbosa* (Linn.) Lamk.
Polycarpon prostratum Aschers. & Schweinf.
Spergula arvensis Linn.
Vaccaria pyramidata Medic.

PORTULACACEAE

- Portulaca oleracea* Linn.
P. quadrifida Linn.

TAMARICACEAE

- Tamarix ericoides* Roth.

FLATINACEAE

- Bergia ammannioides* Roxb.
B. odorata Edgew.
Elatine ambigua Wt.

MALVACEAE

- Abelmoschus esculentus* (Linn.) Moench.
A. ficulneus (Linn.) Wt. & Arn.
A. manihot (Linn.) Medic.
Abutilon indicum (Linn.) Sw.
Gossypium herbaceum Linn.
Hibiscus cannabinus Linn.
H. lobatus (Mill.) O. Kuntze
H. ovalifolius (Forsk.) Vahl.
H. sabbatia Linn.
H. vitifolius Linn.
Pavonia zeylanica (Linn.) Cav.
Sida cordifolia Linn.
S. spinosa Linn.
S. veronicifolia Lamk.
Thespesia populnea (Linn.) Solms. ex Cou.
Urena lobata Linn.

BOMBACACEAE

- Bombax ceiba* Linn.

STERCULIACEAE

- Helicteres isora* Linn.
Melochia corchorifolia Linn.
Sterculia urens Roxb.
Waltheria indica Linn.

TILIACEAE

- Corchorus aestuans* Linn.
C. capsularis Linn.
C. fuscicularis Lamk.
C. olitorius Linn.
Grewia flavescens Juss.
Triumfetta pentandra A. Rich.
T. rhomboidea Jacq.
T. rotundifolia Lamk.

LINACEAE

- Linum usitatissimum* Linn.

ZYGOPHYLLACEAE

- Tribulus terrestris* Linn.

OXALIDACEAE

- Biophytum sensitivum* (Linn.) DC.

RUTACEAE

- Aegle marmelos* (Linn.) Corr.
Citrus limon (Linn.) Burm. f.

- Feronia limbata* (Linn.) Swingle
Murraya koenigii (Linn.) Spreng.
 SIMARUBACEAE
Ailanthus excelsa Roxb.
 RALIANIACEAE
Balaaites aegyptiaca (Linn.) Del.
 MELIACEAE
Azadirachta indica A. Juss.
Soyimida febrifuga A. Juss.
 CELASTRACEAE
Celastrus paniculata Willd.
Maytenus emarginata (Willd.) D. Hoer.
 RILAMINACEAE
Zizyphus mauritiana Lamk.
Z. nummularia (Burtt. f.) Wt. & Arn.
Z. oenoplia (Linn.) Mill.
Z. xylopyrus (Retz.) Willd.
 VITACEAE
Ampelocissus latifolia (Roxb.) Planch.
Cayratia carnosu (Lamk.) Gagnep.
 SAPINDACEAE
Cardiospermum halicacabum Linn.
 ANACARDIACEAE
Buchananian lamarz Spreng.
Lannea coromandellica (Hornb.) Merr.
Mangifera indica Linn.
 MORINGACEAE
Moringa concanensis Nutt.
M. oleifera Lamk.
 PAPILIONACEAE
Abrus precatorius Linn.
Acetynomene indica Linn.
Alysicarpus huplenifolius (Linn.) DC.
A. longifolius (Rott. ex Spreng.) Wt. & Arn.
A. mollifer (Linn.) DC.
A. procumbens (Roxb.) Schindl.
A. scariosus Griseb. ex Thw.
A. tetragonolobus Edgew.
A. vaginalis (Linn.) DC.
Arachis hypogaea Linn.
Atylosia platycarpa Benth.
A. scarabaeoides (Linn.) Benth.
Butea monosperma (Lamk.) Taub.
Cajanus cajan (Linn.) Millsp.
Canavalia gladiata (Jacq.) DC.
Cicer arietinum Linn.
Clitoria ternatea Linn.
Crotalaria albida Heyne ex Roth.
C. barbata Benth. Hauss. ex Benth.
C. juncus Linn.
C. linifolia Linn. f.
C. medicaginea Lamk.
C. retusa Linn.
Cyamopsis tetragonoloba (Linn.) Taub.
Desmodium dichotomum (Willd.) DC.
D. gangeticum (Linn.) Willd.
D. trillorum (Linn.) DC.
Dolichos lablab Linn.
Eliciotis monophylla (Burm. f.) DC.
Heylandia latebrosa DC.
Indigofera astragalina DC.
I. cordifolia Heyne ex Roth.
I. glandulosa Willd.
I. linifolia Rott.
I. linnaei Ait.
I. oblongifolia Forsk.
I. tinctoria Linn.
I. trita Linn. f.
Medicago sativa Linn.
Melilotus indica All.
Mucuna pruriens Hook. f.
Phaseolus aconitifolius Jacq.
P. angularis (Willd.) Wt.
P. radiatus Linn.
P. trilobus Ait.
Pongamia pinnata (Linn.) Pierre
Pueraria tuberosa (Roxb. ex Willd.) DC.
Rhynchosia minima (Linn.) DC.
R. aurea DC.
Seibania hispidosa (Jacq.) W. F. Wight
Tephrosia purpurea (Linn.) Pers.
T. villosa (Linn.) Pers.
Teramnus labialis (Linn. f.) Spreng.
Trigonella foenum-graecum Linn.
Vigna unguiculata (Linn.) Walp.
Zornia gibbosa Span.
 CAESALPINIACEAE
Bauhinia racemosa Lamk.
Cassia absus Linn.
C. auriculata Linn.
C. occidentalis Linn.
Cassia pumila Lamk.
C. siamea Lamk.
C. tora Linn.
Delonix elata (Linn.) Gamble
Tamarindus indica Linn.
 MIMOSACEAE
Acacia jacquemontii Benth.
A. leucophloea (Roxb.) Willd.

Acacia nilotica (Linn.) Del. sp. *indica* (Benth.) Bicaan
A. prunata (Linn.) Willd.
A. senegal Willd.

Albizia lebbek (Linn.) Benth.
Dichrostachys cinerea (Linn.) W. & A.
Mimosa hamata Willd.
Neptunia oleracea Lour.
Pithecellobium dulce (Roxb.) Benth.
Prosopis cineraria (Linn.) Druce
P. juliflora (Sw.) DC.

VABIACEAE

Vahla digyna (Retz.) O. Kuntze

COMBRETACEAE

Anogeisus sericea Brandis
Combretum ovalifolium Roxb.
Quisqualis indica Linn.
Terminalia bellirica (Gaertn.) Roxb.
T. catappa Linn.
T. crenulata Roth

MYRTACEAE

Eucalyptus sp.
Psidium guajava Linn.
Syzygium heynanum Wall. ex Gamble

LYTHRACEAE

Amantia baccifera Linn.
A. multiflora Roxb.
A. senegalensis Lamk.
Lawsonia inermis Linn.
Woodfordia fruticosa (Linn.) Kuntz

PLINACEAE

Punica granatum Linn.

ONAGRACEAE

Ludwigia ascendens (Linn.) Hara
L. octovalvis sp. *sessiliflora* (Michx.) Raven
L. perennis Linn.

TRAPACEAE

Trapa natans Linn. var. *hispidosa* (Roxb.) Makino

GARICACEAE

Carica papaya Linn.

CUCURBITACEAE

Citrullus colocynthis (Linn.) Schrad.
Coccoloba grandis (Linn.) Voigt
Cucurbitis cerasiformis (Stocks) Hook. f.
Cucumis callosus (Roth) Cogn. ex Cogn. & Harms
Lagenaria leucantha (Duch.) Rusby
Luffa acutangula (Linn.) Roxb.
L. cylindrica (Linn.) M. J. Roem.
Momordica dioica Roxb. ex Willd.
Mukia maderaspatana (Linn.) M. Roem.

Trichosanthes bracteata (Lamk.) Voigt
T. cucumerina Linn.

UAGIACEAE

Opuntia elatior Mill.

ALIZOACEAE

Triadema portulacastrum Linn.
T. triquetra Roth. ex Willd.

MOLLUGINACEAE

Glinus lotoides Linn.
G. oppositifolius (Linn.) DC.
Mollugo nudicaulis Lamk.

APIACEAE (UMBELLIFERAE)

Anethum graveolens Linn.
Coriandrum sativum Linn.
Foeniculum vulgare Mill.

ALANULACEAE

Alangium salviolium (Linn. f.) Wang.

RUBIACEAE

Borreria articularis (Linn. f.) F. N. Will.
B. stricta (Linn. f.) Schum.
Dentella repens (Linn.) Furt.
Gardenia resinifera Roth
Ixora brachiata Roxb.
Mitragyna parviflora Koenig.
Morinda tomentosa Heyne ex Roth.
Oldenlandia corymbosa Linn.
Xerophis spinosa (Thunb.) Keay
X. aligiosa (Retz.) Maheshw.

ASTERACEAE (COMPOSITAE)

Acanthospermum hispidum DC.
Amberboa ramosa (Roxb.) Jaisi
Bidens biternata (Lour.) Merr. & Sherif
Blainvillia acmella (Linn.) Phil.
Blumea bifoliata DC.
B. ciantha DC.
B. membranacea DC.
B. obliqua (Linn.) Druce
B. oxydonta DC.
Caesulia axillaris Roxb.
Dicoma tomentosa Cass.
Echinops echinatus Roxb.
Eclipta prostrata (Linn.) Linn.
Emilia sonchifolia (Linn.) DC.
Glossocardia bosvallea (Linn. f.) DC.
Gnaphalium indicum Linn.
G. polvinatum Del.
Grangea maderaspatana Poir.
Laggera aurita (Linn. f.) Sch-Bip.
Launaea fallax (Jaub. & Spach.) O. Kuntze

Sonchus asper (Linn.) St. Hil.
Sphaeranthus indicus Linn.
Tridax procumbens Linn.
Vernonia cinerea (Linn.) Less.
Vicoa indica (Willd.) DC.
Xanthium strumarium Linn.

LOBELIACEAE

Lobelia alsinoides Lamk.

PRIMULACEAE

Anagallis arvensis Linn. var. *caerulea* Gren. & Godr.

SAPOTACEAE

Madhuca indica J. F. Gmel.
Manilkara hexandra (Roxb.) Hubb.

EBENACEAE

Diospyros melanoxylon Roxb.

SALVADORACEAE

Salvadora oleoides Decne.

S. persica Linn.

APOCYNACEAE

Cariaca congesta Wt. & Arn.
Catharanthus pusillus G. Don
C. roseus (Linn.) G. Don
Holarthra antidysenterica (Linn.) Wall. ex A. DC.
Nerium indicum Mill.
Thevetia peruviana (Pers.) Merr.
Wrightia tinctoria R. Br.

ASCLEPIADACEAE

Calotropis procera (Ait.) R. Br.
Ceropegia bulbosa Roxb.
Dregea volubilis (Linn. f.) Benth. ex Hook. f.
Leptadenia reticulata (Retz.) Wt. & Arn.
Pentstemon spiralis (Forsk.) Decne.
Pergularia daemia (Forsk.) Chiov.
Telosma pallida (Roxb.) Craib.

PERIPLOACEAE

Hemidesmus indicus (Linn.) Schult.

GENTIANACEAE

Canscora diffusa (Vahl) R. Br.
Elaeostema hyssopifolium (Willd.) Vecd.
Excoecum pedunculatum Linn.
Hopaea dichotoma Willd.
Nymphoides cristatum (Roxb.) O. Kuntze
N. indicum (Linn.) O. Kuntze

HYDROPHYLLACEAE

Hydrolea zeylanica (Linn.) Vahl

BORAGINACEAE

Heliotropium marifolium Retz.
H. marifolium Retz. var. *laxiflora* Cooke

H. ovalifolium Forsk.
H. subulatum Hochst. ex DC.
H. sopinum Linn.
Trichodesma amplexicaule Roth
T. zeylanicum (Burm. f.) R. Br.

EHRETACEAE

Coldenia procumbens Linn.

Ehretia aspera Roxb.

E. laevis Roxb.

CONVOLVULACEAE

Convolvulus microphyllus (Roth) Sieb.
Evolvulus alsinoides (Linn.) Linn.
Hewittia sublobata (Linn. f.) O. Kuntze
Ipomoea aquatica Forsk.
I. batatas (Linn.) Lamk.
I. dichroa (Roem. & Schult.) Choisy
I. eriocarpa R. Br.
I. muricata (Linn.) Jacq.
I. nil (Linn.) Roth
I. obscura (Linn.) Ker-Gawl.
I. pes-tigridis Linn.
I. quamoclit Linn.
I. sepiaria Koen. ex Roxb.
I. indica Stapf
I. sinensis (Desr.) Choisy
I. triloba Linn.
Merremia aegyptia (Linn.) Urb.
M. gangetica (Linn.) Cufod.
M. tridentata (Linn.) Hall. f.
Opecculina turpethum (Linn.) Silva-Mansô
Rivea hypocrateriformis Choisy

CUSCUTACEAE

Cuscuta chinensis Lamk.

C. reflexa Roxb.

SOLANACEAE

Capsicum annuum Linn. var. *acuminatum* Fingerh.
Datura metel Linn.
Lycopersicon lycopersicum (Linn.) A. Shaw
Nicotiana tabacum Linn.
Physalis minima Linn.
Solanum melongena Linn.
S. nigrum Linn.
S. surattense Burm. f.
Withania somnifera (Linn.) Dun.

SCROPHULARIACEAE

Bacopa monnieri (Linn.) Penn.
Dopatrium junceum (Roxb.) Buch-Ham. ex Benth.
Glossostigma diandrum (Linn.) O. Kuntze
Limnophila indica (Linn.) Druce

Linnophila sessiliflora (Vahl) Blume
Lindenbergia muraria (Roxb.) P. Bruhl
Lindernia ciliata (Colem.) Penn.
L. crustacea (Linn.) F. Muell.
L. oppositifolia (Retz.) Muk.
L. parviflora (Roxb.) Haines
Sopubia delphinifolia (Roxb.) G. Don
Stemodia viscosa Roxb.
Striga angustifolia (Don) Sald.
S. gesneroides (Willd.) Vatke var. *minor* Sant.
Verbascum chinense (Linn.) Sant.

OROBANCHACEAE

Orobanche cernua Loefl. var. *nepalensis* DC.

LENTIBULARIACEAE

Utricularia inflexa Forsk. var. *stellaris* Taylor

BIGNONIACEAE

Dolichandrone falcata SCERL. var. *lawii* (Scerl.)
 Haines

Millingtonia hortensis Linn. f.

PEDALIACEAE

Sesamum indicum Linn.

MARTYNIACEAE

Martynia annua Linn.

AGANTHACEAE

Azhatoda vasica Nees

Barleria prattensis Sant.

B. prionitis Linn.

Blepharis maderaspatensis (Linn.) Roth

B. repens (Vahl) Roth

Dicliptera verticillata (Forsk.) Christen.

Dipteracanthus prostratus (Poir.) Nees

Elytaria acutis (Linn. f.) Lindau

Hemidaphne polysperma Nees

Hypophila auriculata (Schumacher) Heine

Lepidagathis trinervis Wall. ex Nees

Neuracanthus sphaerostachyus (Nees) Dalz.

Peristrophe bicalyculata (Retz.) Nees

Rungia repens (Linn.) Nees

VERBENACEAE

Clerodendrum multiflorum (Burm. f.) O. Kuntze

Gmelina arborea Roxb.

Lantana camara Linn. var. *aculeata* (Linn.) Mold.

Phyla nodiflora (Linn.) Greene

Vetonia grandis Linn. f.

Vitex negundo Linn.

LAMIACEAE (LABIATAE)

Anisomeles indica (Linn.) O. Kuntze

Hyptis suaveolens (Linn.) Poit.

Leucas aspera (Willd.) Spreng.

L. biflora R. Br.

L. longiflora Benth.

Moschosoma polystachyum (Linn.) Benth.

Ocimum basilicum Linn.

O. canum Linn.

O. sanctum Linn.

NYCTAGINACEAE

Boerhavia chinensis (Linn.) Druce

B. diffusa Linn.

Bougainvillea glabra Choisy

AMARANTHACEAE

Achyranthes aspera Linn.

Aerva lanata (Linn.) Juss.

Alternanthera sessilis (Linn.) DC.

Amaranthus hybridus Linn. sp. *eruentus* (Linn.)

Thell. var. *paniculatus* (Linn.) Thell.

A. spinosus Linn.

A. tricolor Linn.

A. viridis Linn.

Celosia argentea Linn.

Digera muricata (Linn.) Mart.

Gomphrena celosioides Mart.

Notholaena brachiata (Linn.) Wt.

Pupalia lappacea (Linn.) Juss.

CHENOPODIACEAE

Chenopodium album Linn.

C. murale Linn.

POLYGONACEAE

Polygonum plebeium R. Br.

LORANTHACEAE

Dendrophthoe falcata (Linn. f.) Etting.

EUPHORBIACEAE

Acalypha indica Linn.

Bridelia squamosa (Muell.-Arg.) Gehrm.

Chrozophora prostrata Dalz.

Euphorbia hirta Linn.

E. nerifolia Linn.

E. orbiculata H. B. K.

E. parviflora Linn.

E. prostrata Ait.

E. thymifolia Linn.

E. tirucalli Linn.

Jatropha curcas Linn.

J. gossypifolia Linn.

Kirganelia reticulata (Poir.) Bail.

Phyllanthus fraternus Webster

P. simplex Retz.

Ricinus communis Linn.
Securinega virosa (Roxb. ex Willd.) Pax & Hoffm.

ULMACEAE

Holoptelea integrifolia (Roxb.) Planch

MORACEAE

Ficus amplissima Son.
F. benghalensis Linn.
F. hispida Linn. f.
F. racemosa Linn.
F. religiosa Linn.
Streblus asper Linn.

CERATOPHYLLACEAE

Ceratophyllum demersum Linn.

HYDROCHARITACEAE

Hydrilla verticillata (Linn. f.) Royle
Vallisneria spiralis Linn.

HYPOXIDACEAE

Cutculigo orchioides Gaertn.

DIOSCOREACEAE

Dioscorea bulbifera Linn.

LILIACEAE

Allium cepa Linn.
A. sativum Linn.
Aloe barbadensis Mill.
Asparagus gonocladus Bak.
A. racemosus Willd. var. *javanicus* (Kunth) Bak.
Asphodelus tenuifolius Cav.
Gloriosa superba Linn.

RONTEDERACEAE

Monochoria vaginalis (Burm. f.) Presl

COMMELINACEAE

Commelina benghalensis Linn.
C. diffusa Burm. f.
C. forskalaei Vahl
C. haenkii Clarke
C. kurzii Clarke
Cyanotis axillaris (Linn.) Schult.
Murdannia nudiflora (Linn.) Britton
M. semiteres (Dalt.) Sant.

ARACEAE (PALMAE)

Borassus flabellifer Linn.
Phoenix sylvestris Roxb.

TYPHACEAE

Typha angustata Bory & Chaub.

LEMNACEAE

Lemna paucicostata Hegelm.
Wolffia arhiza (Linn.) Wimm.
W. microscopica (Griff.) Kütz.

ALISMACEAE

Linnophyton obtusifolium (Linn.) Miq.
 NAJADACEAE

Najas minor All.
N. kurziana Rendle

APONOCETONACEAE

Aponogeton natans (Linn.) Engl. & Krause

BUTOMACEAE

Tenagocharis latifolia (D. Don) Buchen.

ERIOCAULACEAE

Eriocaulon eiconorae Fyson

CYPERACEAE

Bulbostylis barbata (Roth.) Kunth
Cyperus alopecuroides Roth.
C. bulbosus Vahl
C. compressus Linn.
C. difformis Linn.
C. iria Linn.
C. laevigatus Linn.
C. michelianus (Linn.) Link. sp. *pygmaeus* (Roth.)
 Aschers. & Gracbn.
C. nufans Vahl var. *cleusinoides* (Kunth) Haines
C. pangorei Roth.
C. pseudokyllingoides Kükenth.
C. pumilus Linn.
C. pumilus Linn. var. *membranaceus* (Vahl) Clarke
C. rotundus Linn.
C. squarrosus Linn.
C. tenuispica Steud.
C. triceps (Roth.) Endl.
Eleocharis atropurpurea Kunth
E. dulcis (Burm. f.) Trin. ex Henschl.
E. geniculata (Linn.) Roem. & Schult.
Fimbristylis argentea (Roth.) Vahl
F. dichotoma (Linn.) Vahl
F. fasciata (Vahl) Kunth
F. ferruginea (Linn.) Vahl
F. littoralis Gaud.
F. millacea (Linn.) Vahl
F. ovata (Burm. f.) Kern
F. schoenoides (Retz.) Vahl
F. siberiana Kunth
F. tenera Roem. & Schult.
Fuirena ciliaris (Linn.) Roxb.
F. tuwensis Deshpande & Shah
Scirpus articulatus Linn.
S. brachyceras Hochst. ex A. Rich
S. kyllingoides Boeck.
S. lateriflorus Gmel.
S. littoralis Schrad. var. *subulatus* (Vahl) Chiov.

Scirpus maritimus Linn.
S. rigidi (Nees) Parker
S. squarrosus Linn.

POACEAE (GRAMINEAE)

Alloteropsis cimicina (Linn.) Stapf
Aploata mutica Linn.
Aristida adscensionis Linn. var. *adscensionis*
Brachiaria ramosa (Linn.) Stapf
Capillipodium hugetii (Hack.) Stapf
Cenchrus biflorus Roxb.
Chloris barbata (Linn.) Sw.
C. dolichostachya Lagas.
Cymbopogon martinii (Roxb.) Wats.
Cynodon dactylon (Linn.) Pers.
Dactyloctenium aegyptium (Linn.) P. Beauv.
D. indicum Boiss.
Dumetostachya bipinnata (Linn.) Stapf
Dianthium annulatum (Forsk.) Stapf
Dinchora retroflexa (Vahl) Panz.
Echinochloa colozum (Linn.) Link.
E. trumentacea Link.
Eragrostis cilianensis (Linn.) Vig.-Lut.
E. ciliaris (Linn.) R. Br. var. *brachystachya* Boiss.
E. ciliaris (Linn.) R. Br. var. *clarkii* Stapf ex Hook. f.
E. diarbena (Schult.) Steud.
E. japonica (Thunb.) Trin.
E. pilosa (Linn. f.) P. Beauv.
E. tremula (Linn.) P. Beauv. ex Roem. & Schult. var. *tremula*
E. tremula Hackst. ex Steud.
Eriopogon foveolatus (Del.) Stapf
Falala trispicata (Schult.) Henr.
Hackelochloa granularis (Linn.) O. Kuntze
Heteropogon contortus (Linn.) Beauv. ex Roem. & Schult.
Ischaemum rugosum Salisb.
Melanocenchris jaquemontii Jauh. & Spach.
Oryza nivara Sharma & Shastri
O. sativa Linn.
Panicum antidotale Retz.
P. miliareum Linn.
P. pilopodium Trin.

Paspalidium flavidum (Retz.) A. Camus
P. geminatum (Forsk.) Stapf
Paspalum scrobiculatum Linn.
Pennisetum typhoides (Burm. f.) Stapf & Hubb.
Perotis indica (Linn.) O. Kuntze
Phragmites kurka (Retz.) Trin. ex Steud.
Pseudoraphis spinescens (R. Br.) Vickary
Saccharum officinarum Linn.
S. spontaneum Linn.
Setaria glauca (Linn.) P. Beauv.
S. tomentosa (Roxb.) Kunth
S. verticillata (Linn.) P. Beauv.
Sorghum vulgare Pers.
Sporobolus coromandelianus (Retz.) Kunth
S. diander (Retz.) P. Beauv.
Tetrapogon tenellus (Roxb.) Chav.
Themeda quadrivalvis (Linn.) O. Kuntze var. *quadrivalvis*
Tragus biflorus (Roxb.) Schult.
Triticum aestivum Linn.
Vetiveria zizanioides (Linn.) Nash
Zea mays Linn.

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