Practical Manual
on

Dendrology

Course No. FSA-102 Credit Hrs. 3(2+1)

Dr. Swati Shedage
Dr. Dipika Ayate

2019

College of Horticulture & Forestry
RANI LAKSHMI BAI CENTRAL AGRICULTURAL UNIVERSITY, JHANSI

Dendrology FSA 102 3(2+1)

Practical: Morphological description of plant parts and method of collection of plants. Techniques of preparing herbarium specimens. General study of herbarium. Dissection of flowers- making sketches- construction of floral diagrams of one species of the following families: Annonaceae and Guttiferae, Dipterocarpaceae and Malvaceae, Sterculiaceae and Tiliaceae, Rutaceae and Meliaceae, Sapindaceae and Anacardiaceae, Leguminosae Papilionaceae- Mimosae –Caesalpiniaceae, Rhizophoraceae, Combretaceae, Myrtaceae, Rubiaceae, Sapotaceae, Apocyanaceae and Bignoniaceae, Lamiaceae, Euphorbiaceae, Santalaceae and Casuarinaceae, Orchidaceae, Graminae and Pinaceae.

Name of Students .....

Roll No. .....

Batch .....

Session .....

Semester .....

Course Name : .....

Course No. : ..... Credit .....

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Date: Course Teacher

INDEX

Practical No. 1

Objectives: To study collection of plant specimen

Problem: Write the need of plant specimen collection

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Write name of the Instruments required for collection of plant specimen and draw the diagram

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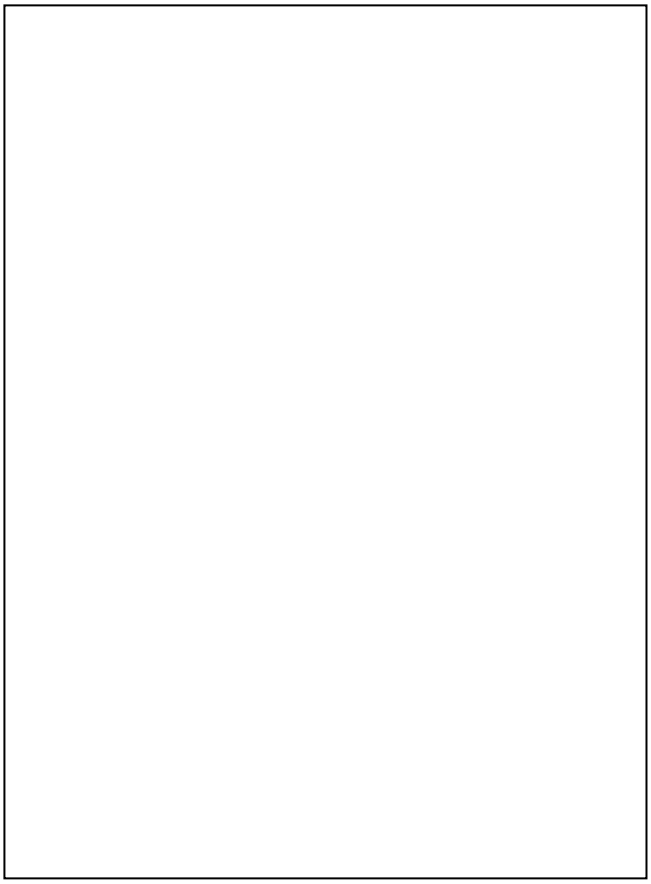

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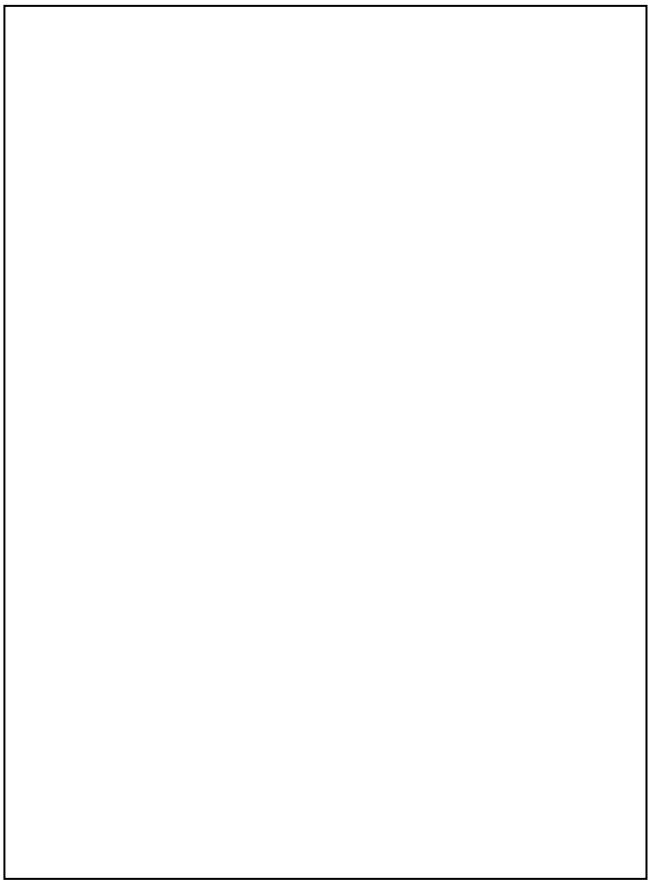

Practical No. 2

Objectives: To study methods of herbarium preparation

Problem: Write down the steps involved in preparation herbarium

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Practical No. 3

Objective: To study morphology of leaf

Problem: Write down different parts of leaf and draw diagram of leaf showing different parts

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Write down the types leaf phyllotaxy and draw diagram with proper labelling

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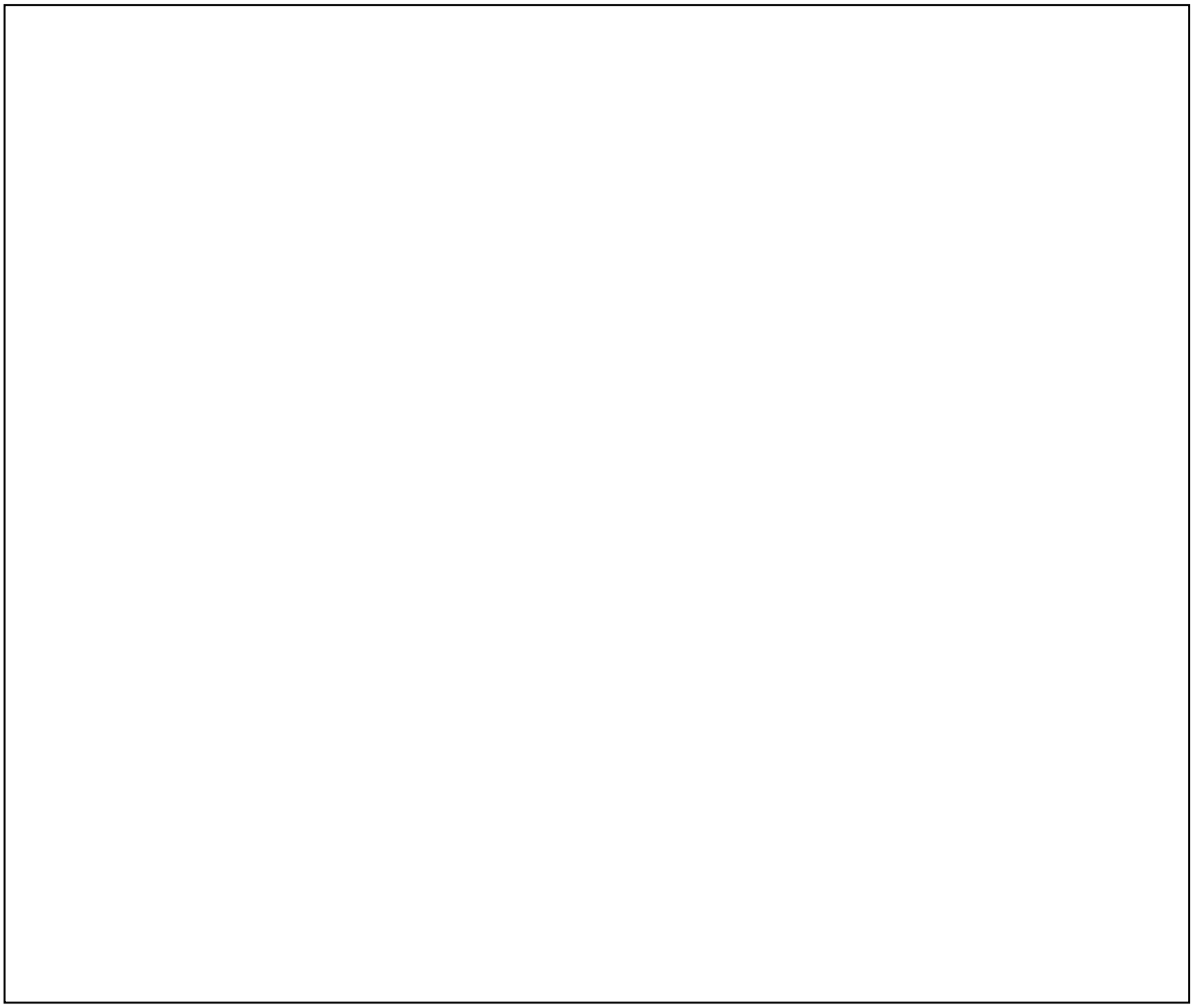

Practical No. 4

Objectives: To study morphology of stem

Problem: Give different forms of stem modification and draw diagram with proper labelling

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Practical No. 5

Objectives: To study morphology of root

Problem: Write down the types of root and draw the diagram with proper labelling

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Write about different **root zones** and draw diagram with proper labelling

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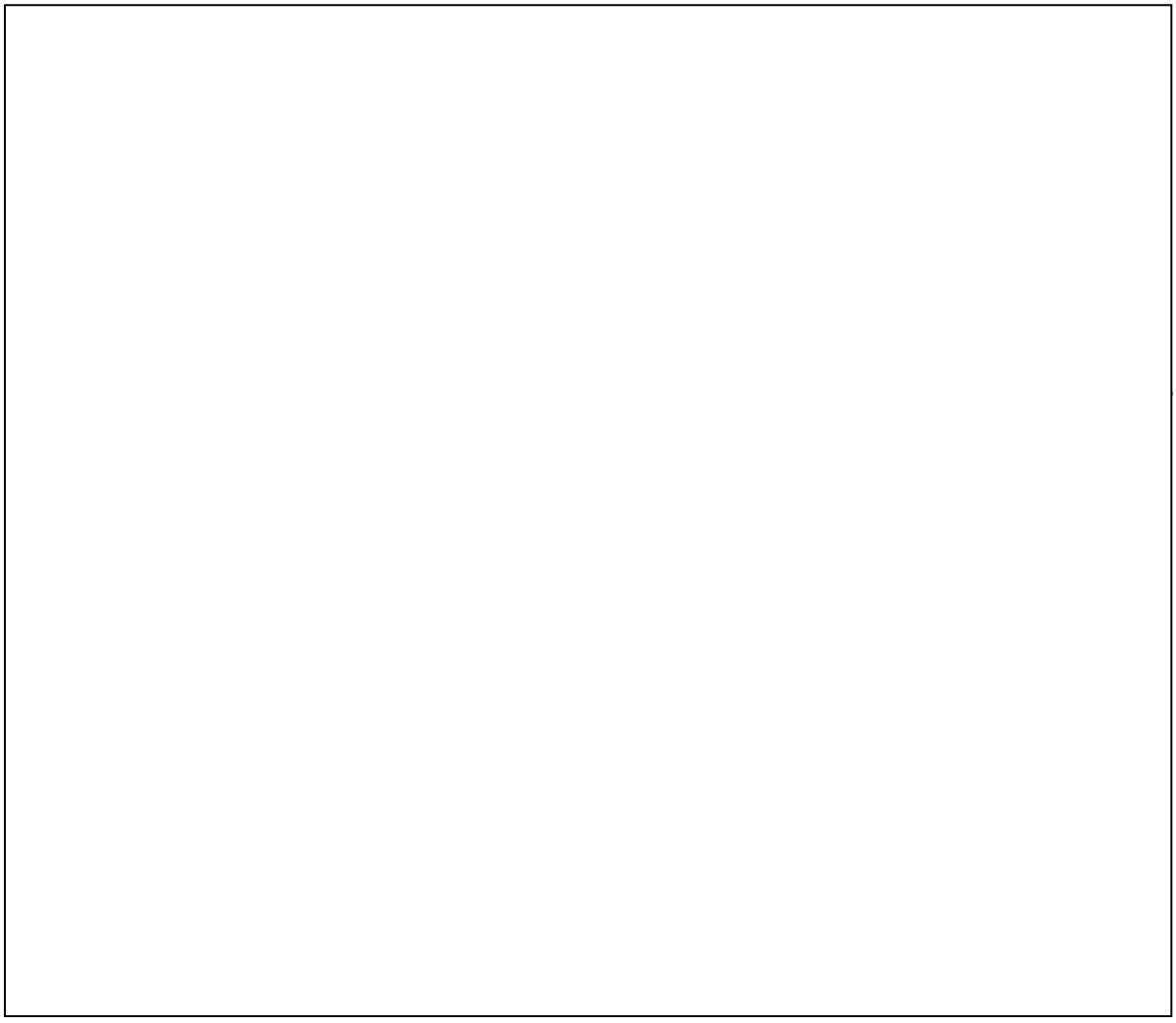

Practical No. 6

Objectives: To study floral morphology of family Annonaceae and Guttiferae

Taxonomic description of tree species of family Annonaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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Taxonomic description of tree species of family Guttifereae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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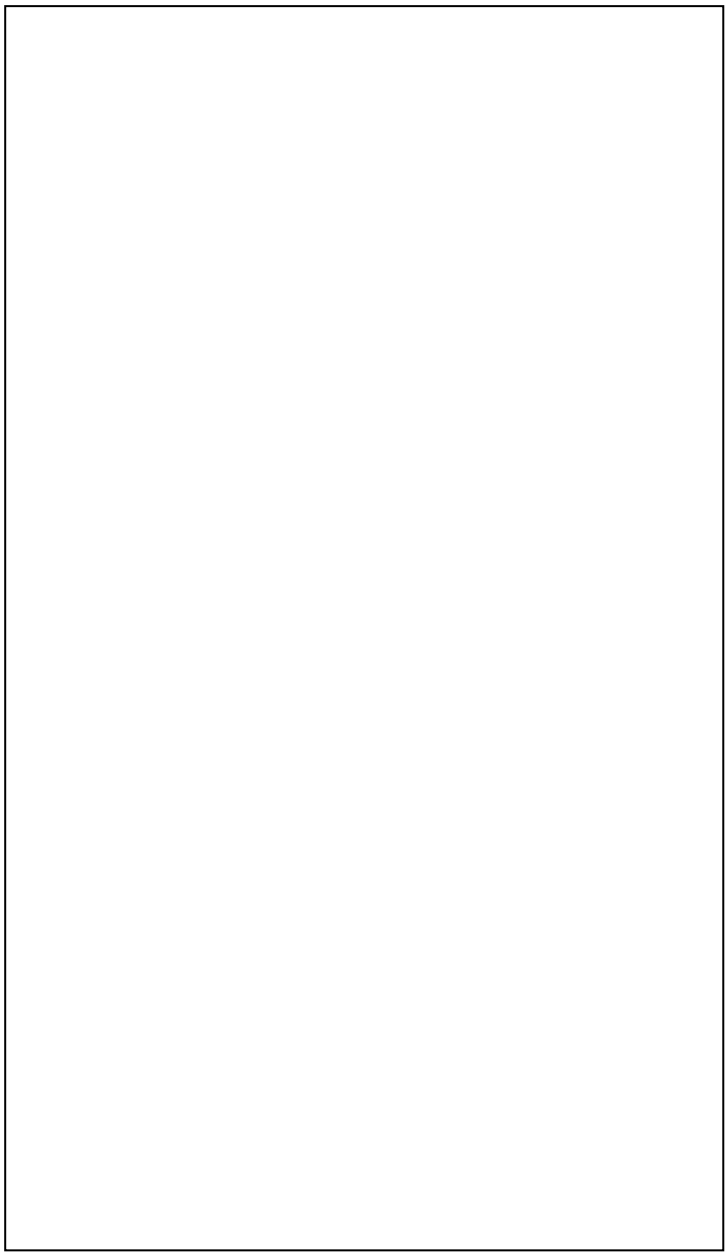

Practical No. 7

Objective: To study the floral morphology of family Dipterocarpaceae and Malvaceae

Taxonomic description of tree species of family Dipterocarpaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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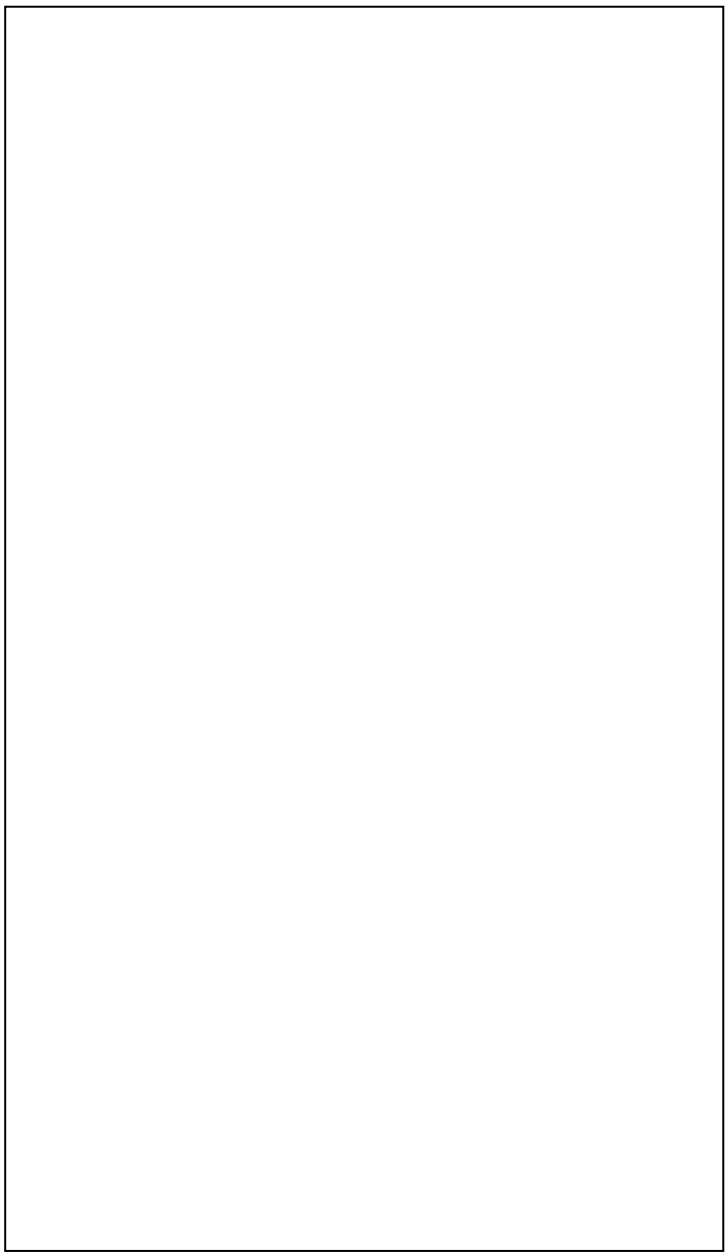

Taxonomic description of tree species of family Malvaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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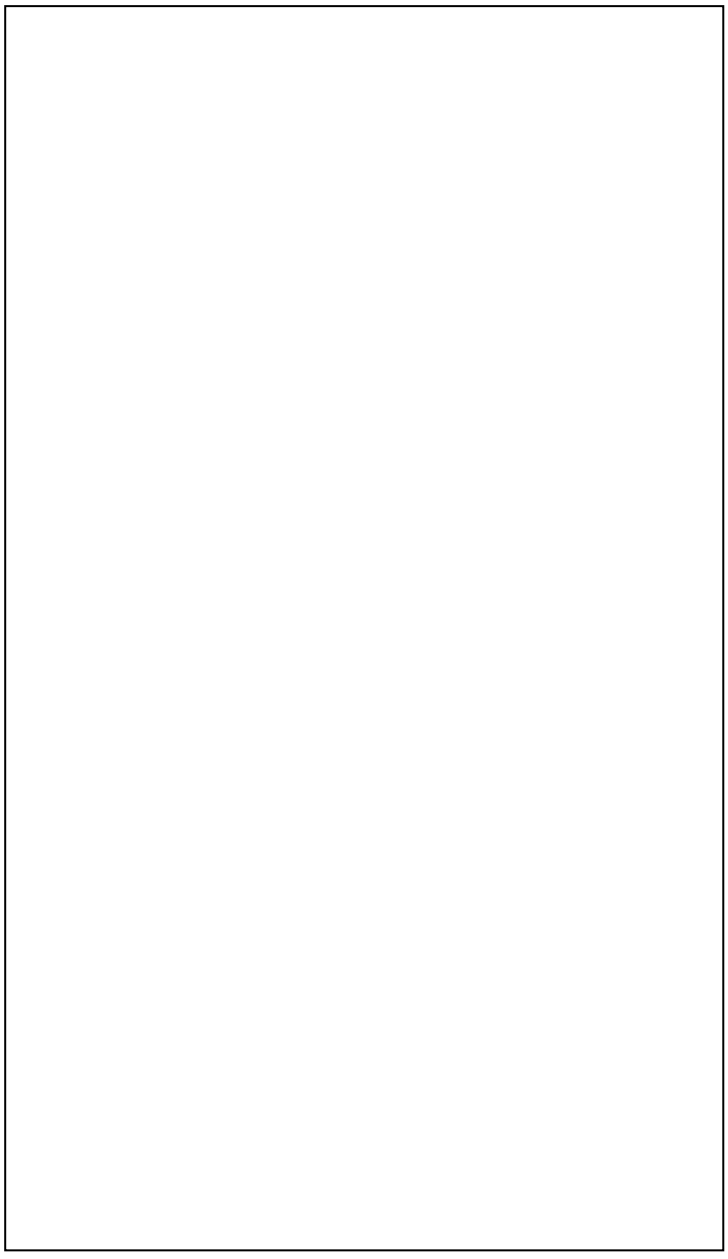

Practical No. 8

Objective: To study the floral morphology of family Sterculiaceae and Tiliaceae

Taxonomic description of tree species of family Sterculiaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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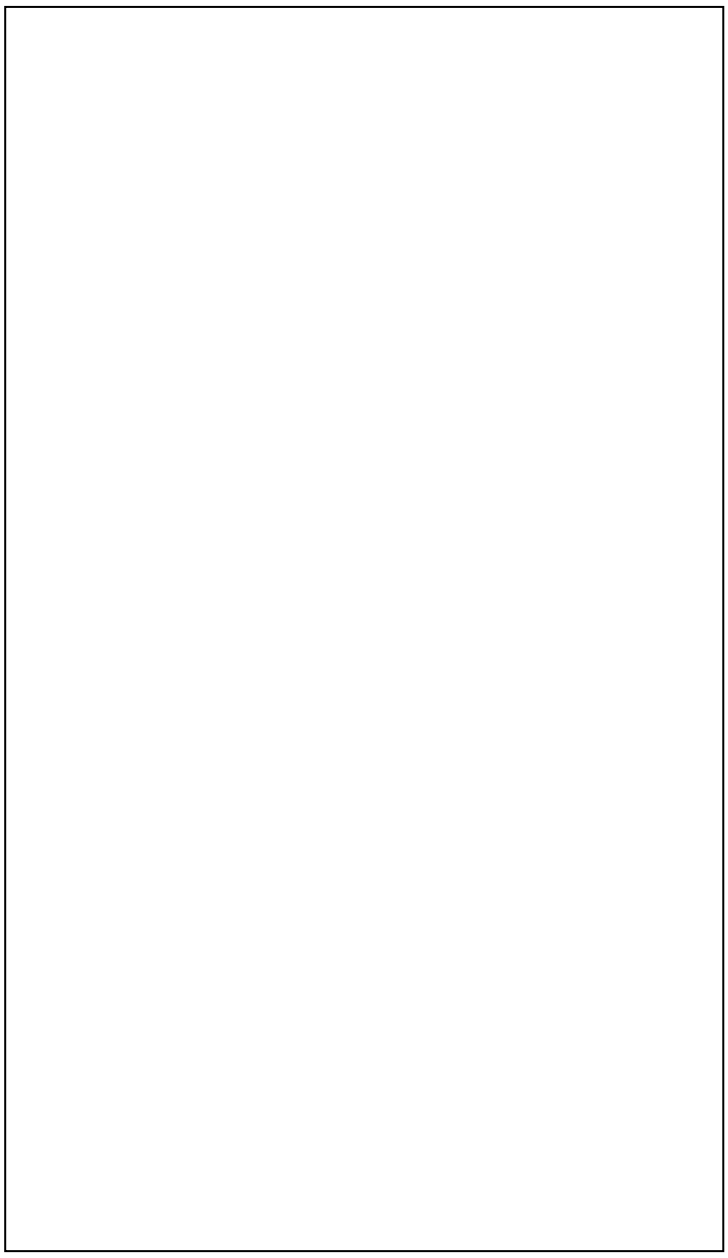

Taxonomic description of tree species of family Tiliaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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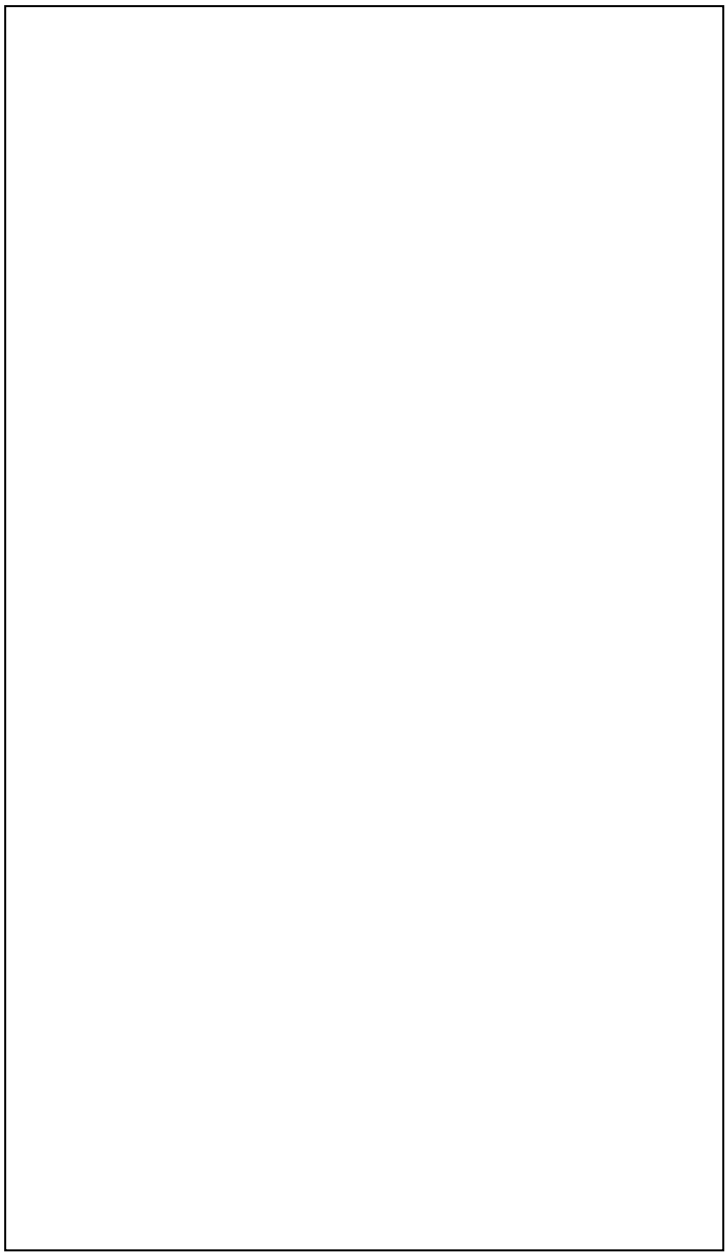

Practical No. 9

Objective: To study the floral morphology of family Rutaceae and Meliaceae

Taxonomic description of tree species of family Rutaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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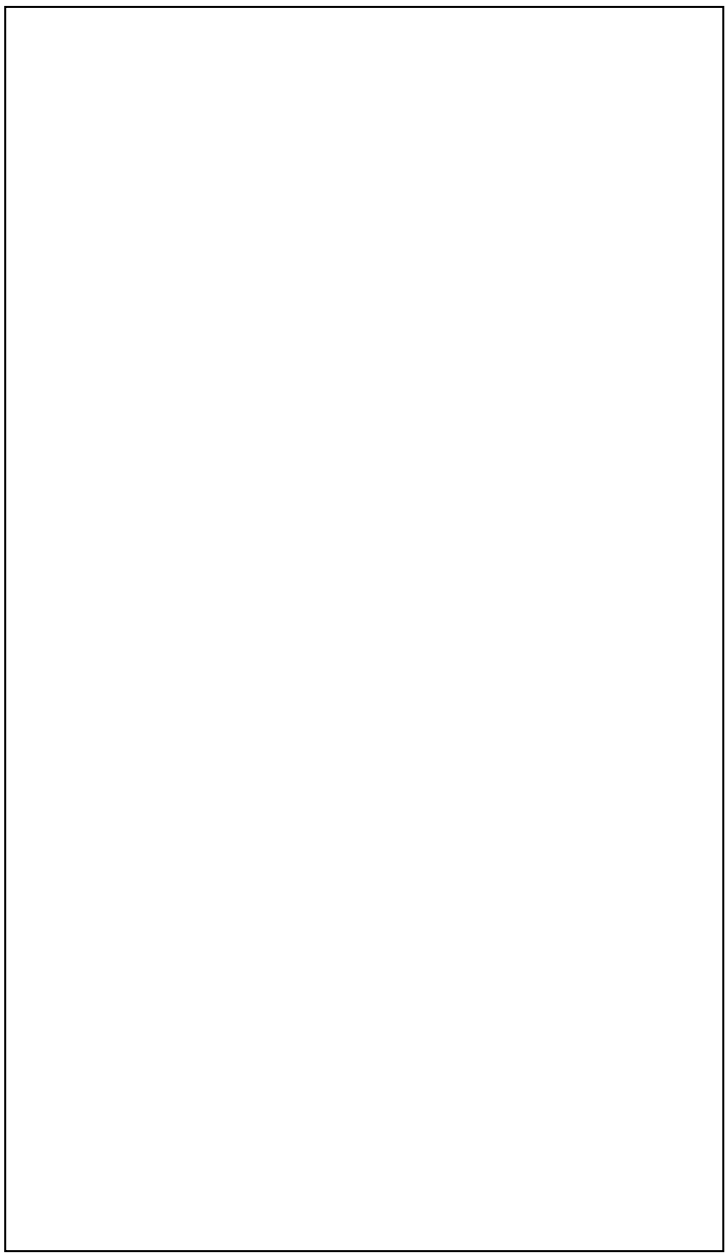

Taxonomic description of tree species of family Meliaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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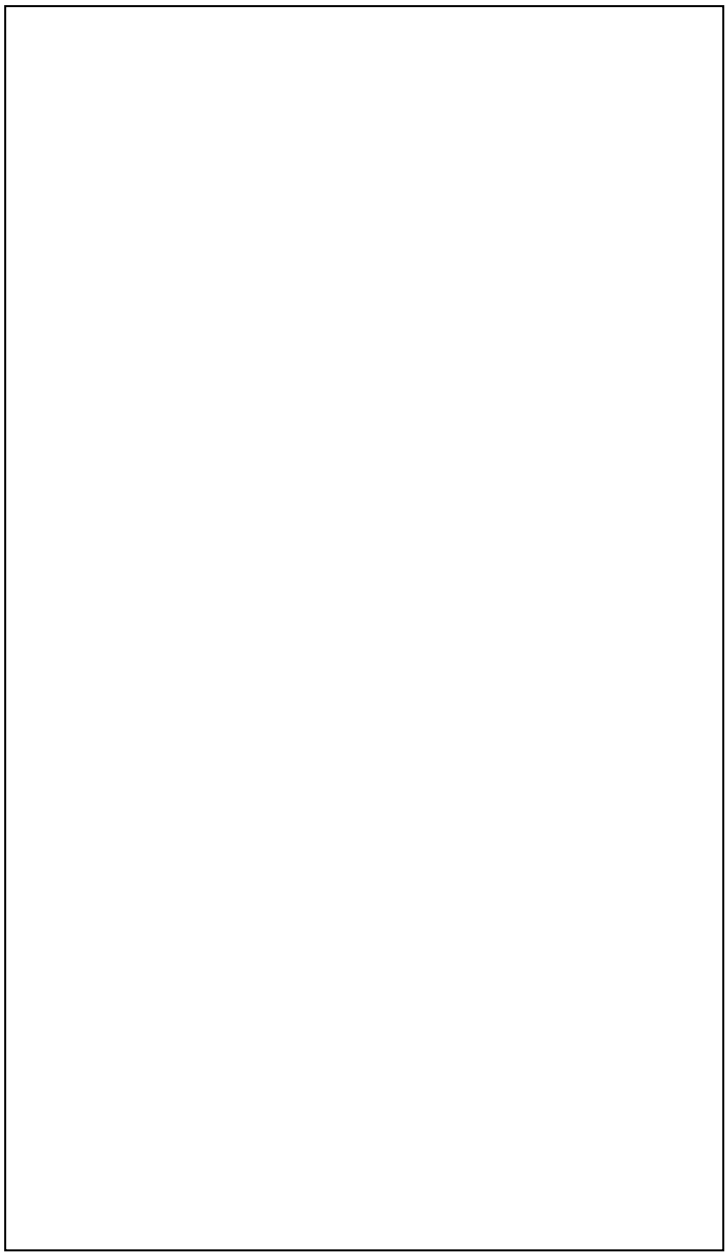

Practical No. 10

Objective: To study the floral morphology of family Sapindaceae and Anacardiaceae

Taxonomic description of tree species of family Sapindaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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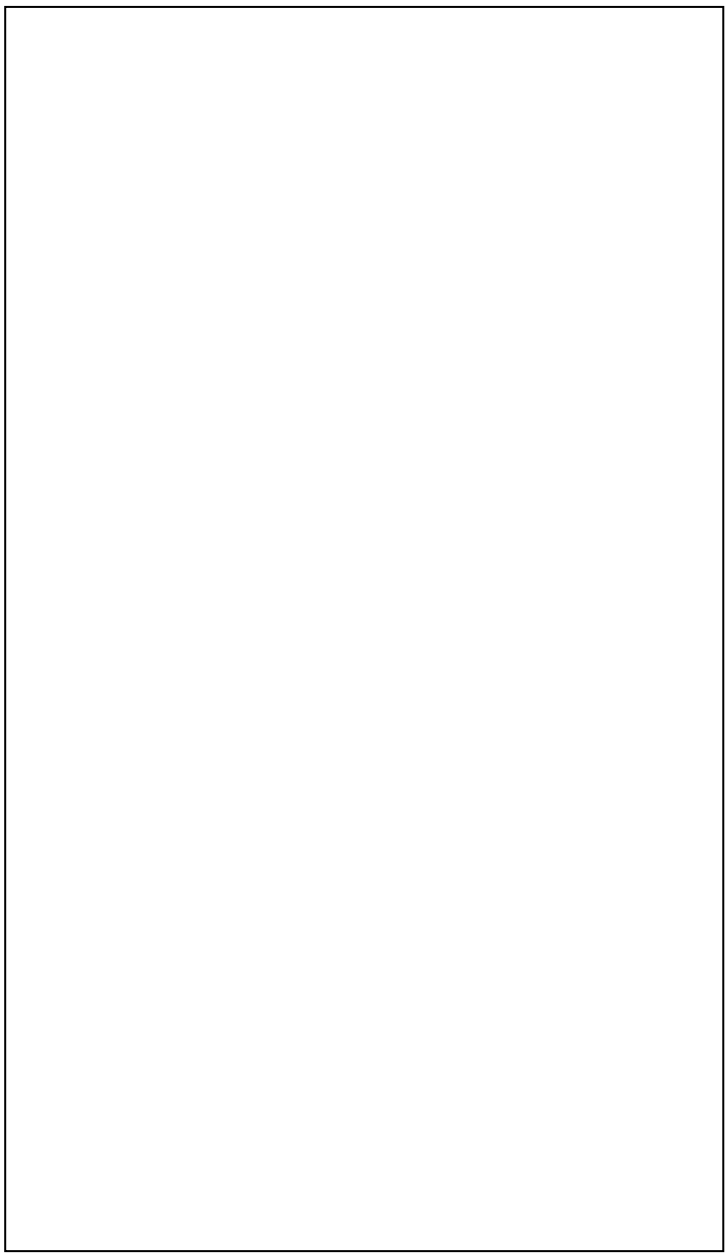

Taxonomic description of tree species of family Anacardiaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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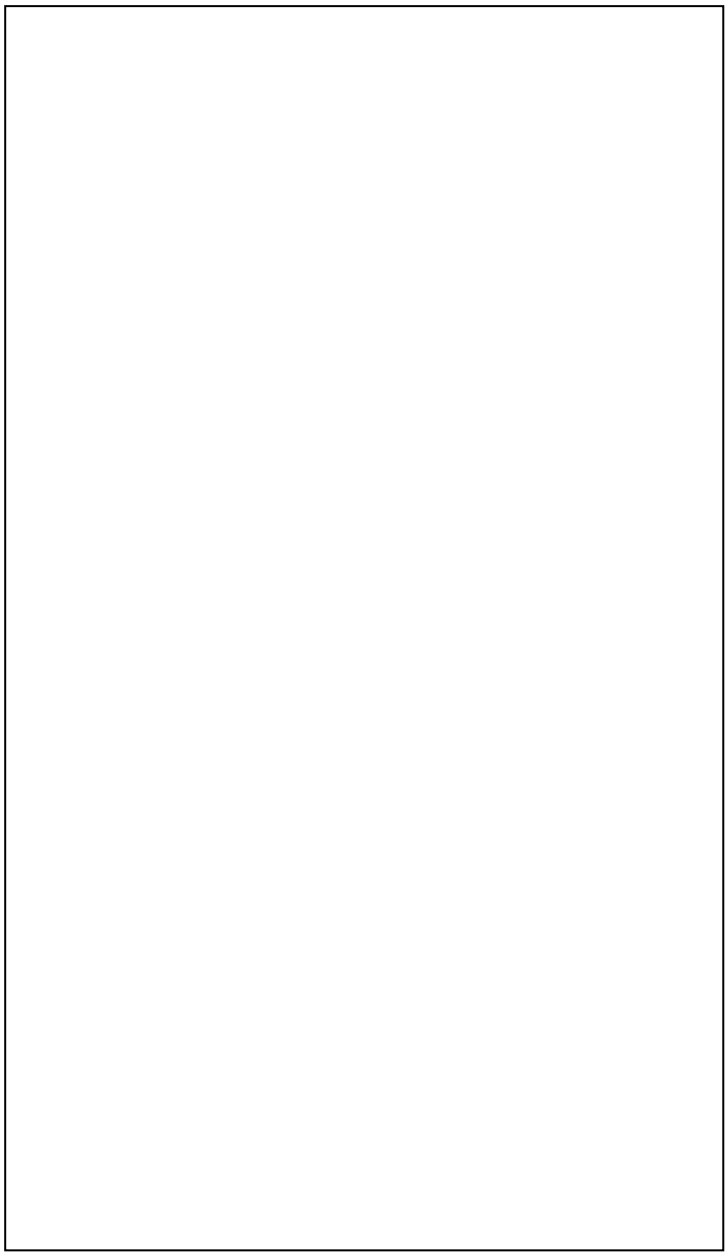

Practical No. 11

Objectives: To study floral morphology of family Leguminoceae and Papilionaceae

Taxonomic description of tree species of family Leguminoceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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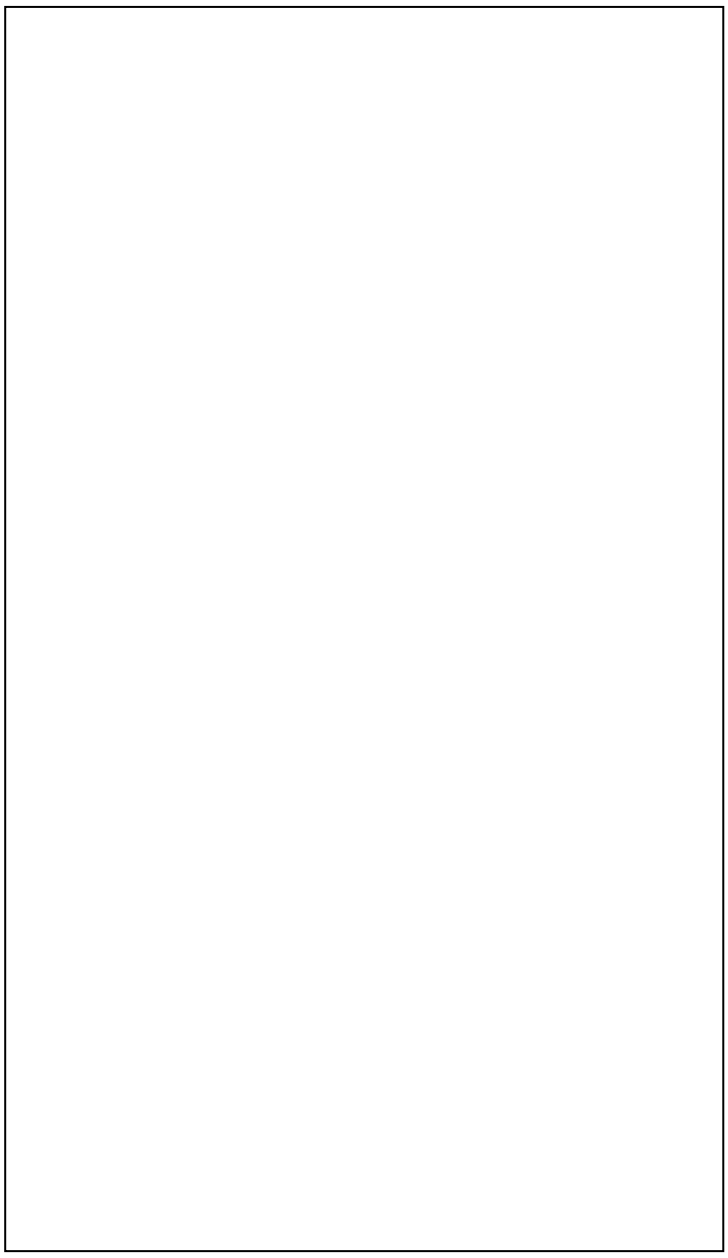

Taxonomic description of tree species of family Papilionaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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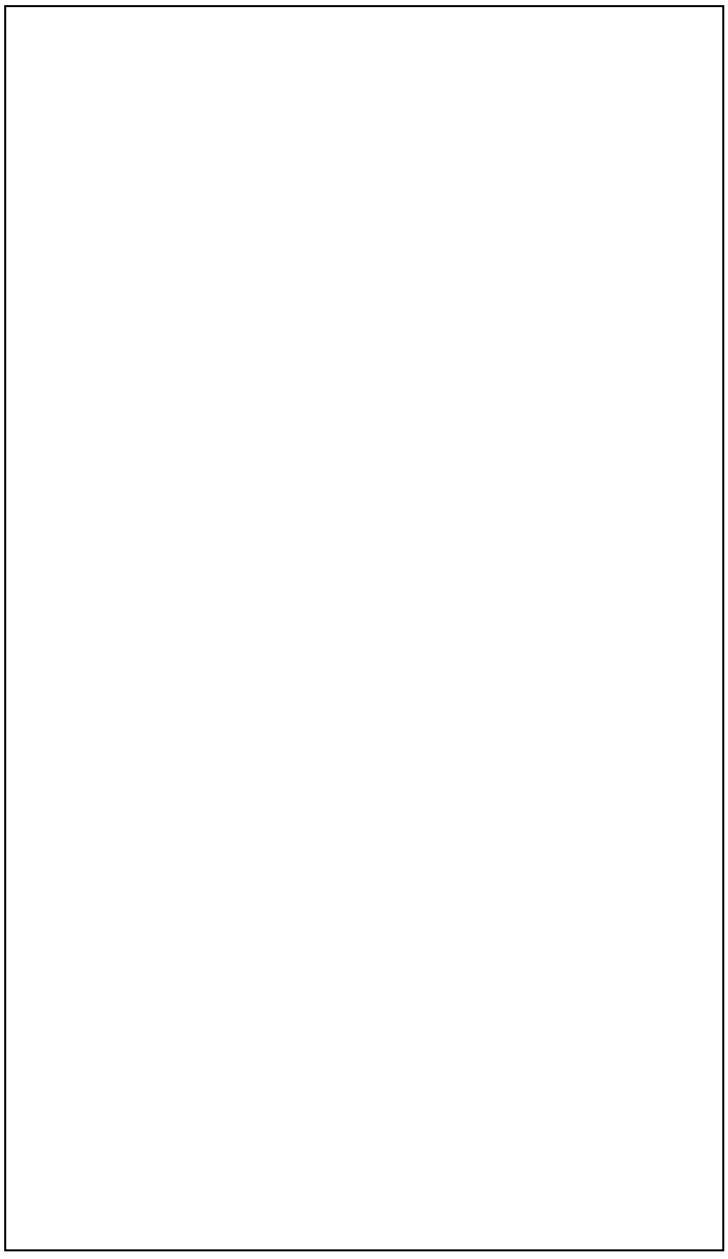

Practical No. 12

Objectives: To study floral morphology of family Mimoseae and Caesalpiniaceae

Taxonomic description of tree species of family Mimoseae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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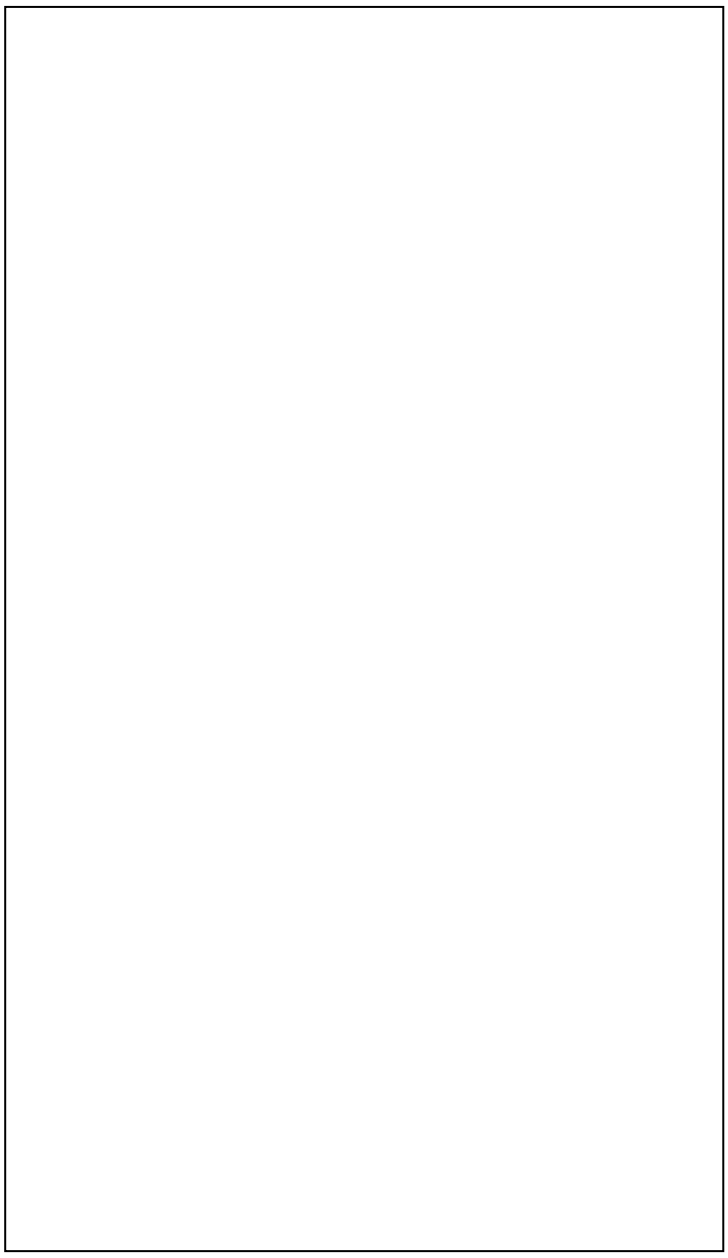

Taxonomic description of tree species of family Caesalpiniaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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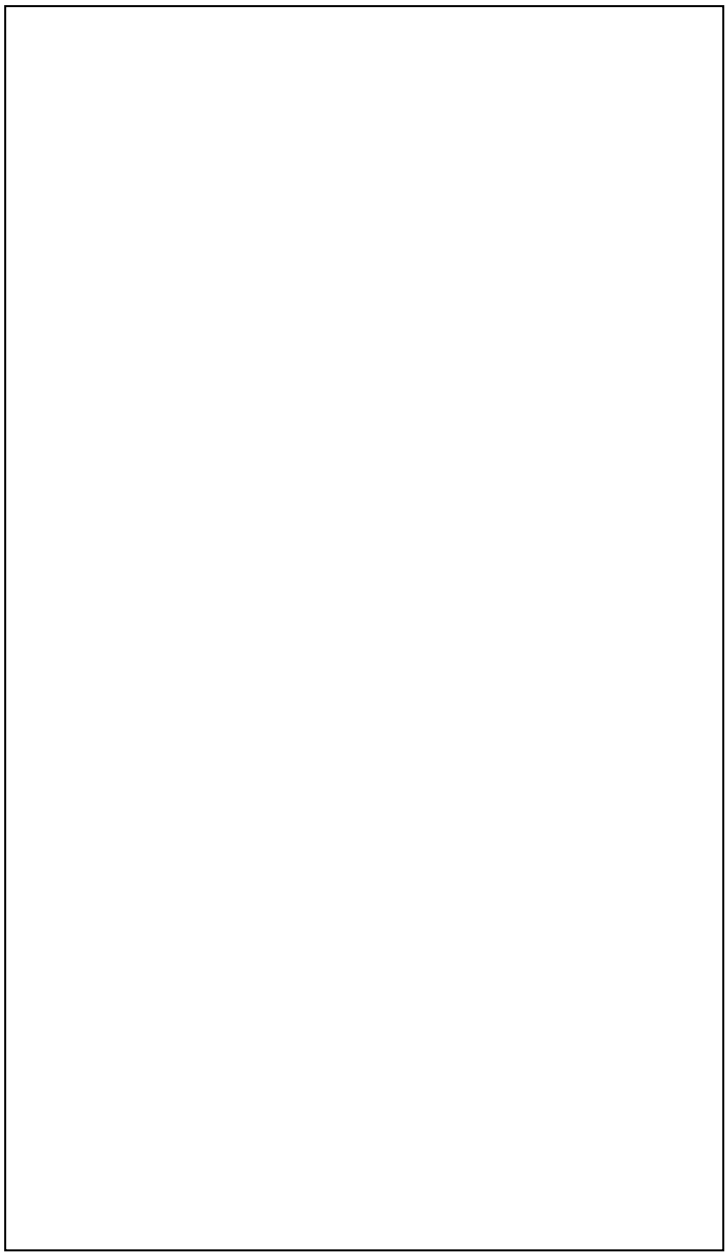

Practical No. 13

Objectives: To study floral morphology of family Rhizophoraceae and Combretaceae

Taxonomic description of tree species of family Rhizophoraceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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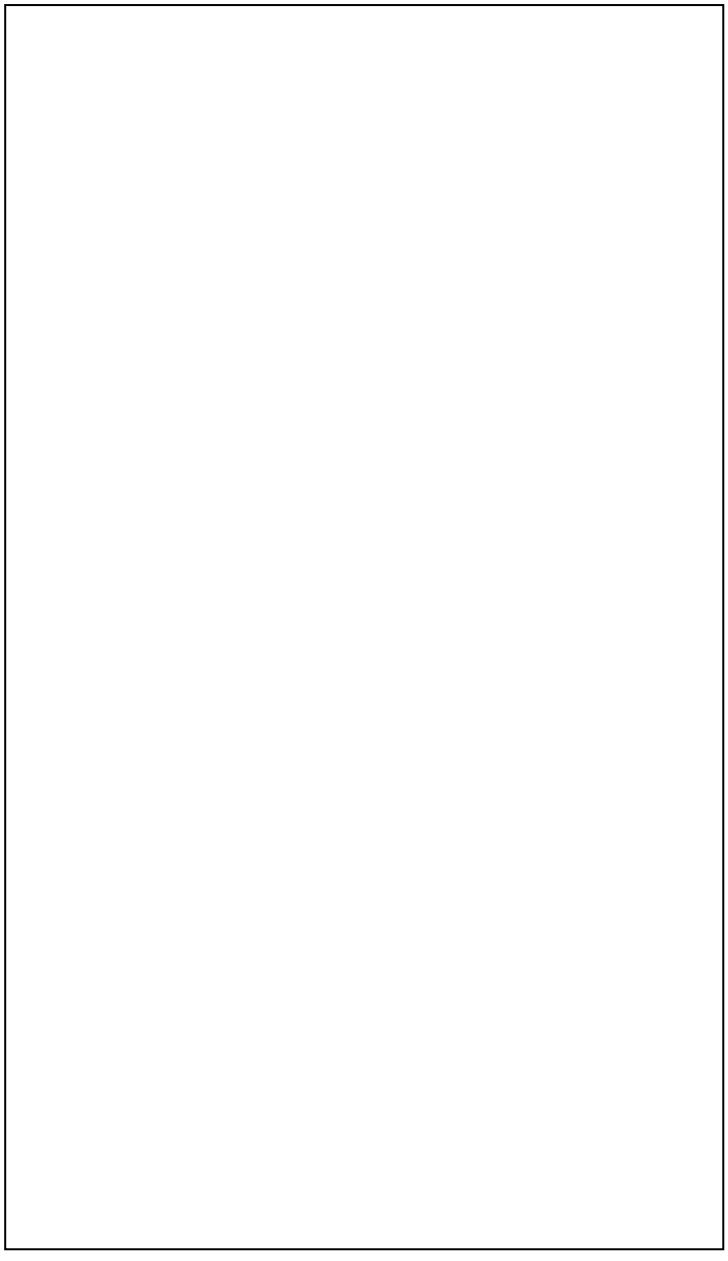

Taxonomic description of tree species of family Combretaceae (Common Name: ……)

Taxonomic Position:

Kingdom ……
Order ……
Sub-Order ……
Family ……
Sub-Family ……
Genus ……
Species ……
Floral Formula ……

Describe of flower parts and draw floral diagram

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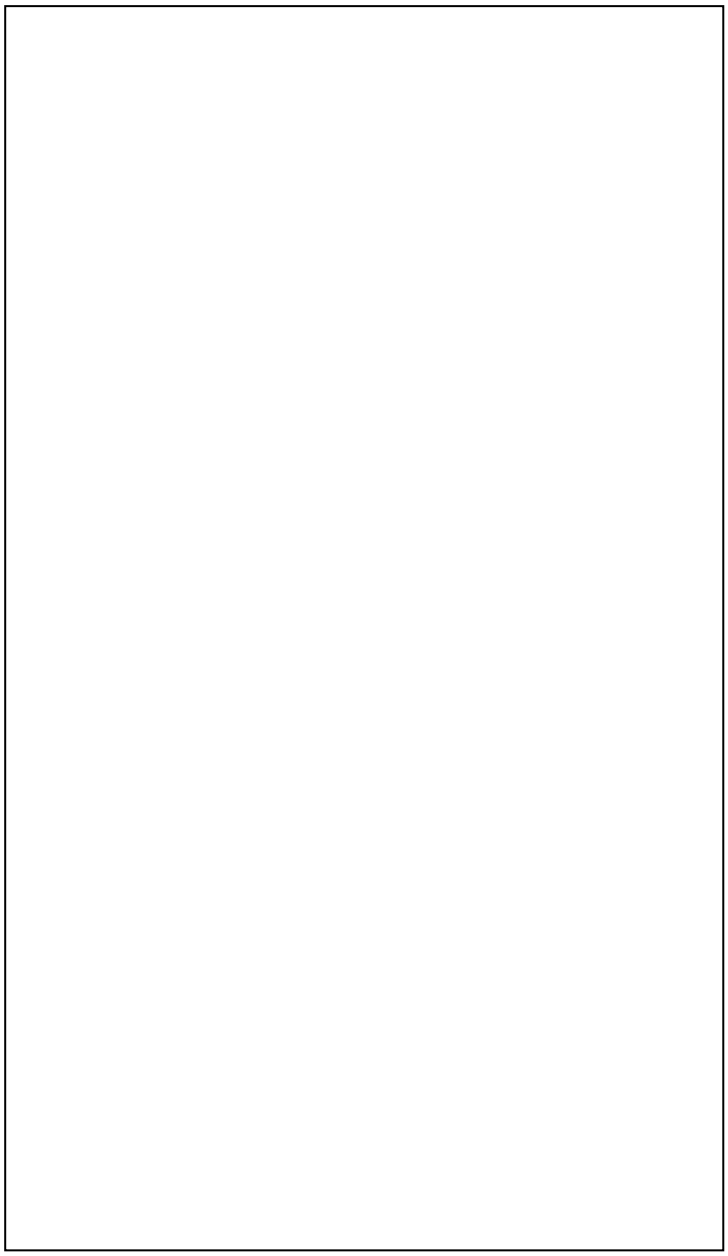

Problem

Practical No. 14

Objectives: To study floral morphology of family Myrtaceae and Rubiaceae

Taxonomic description of tree species of family Myrtaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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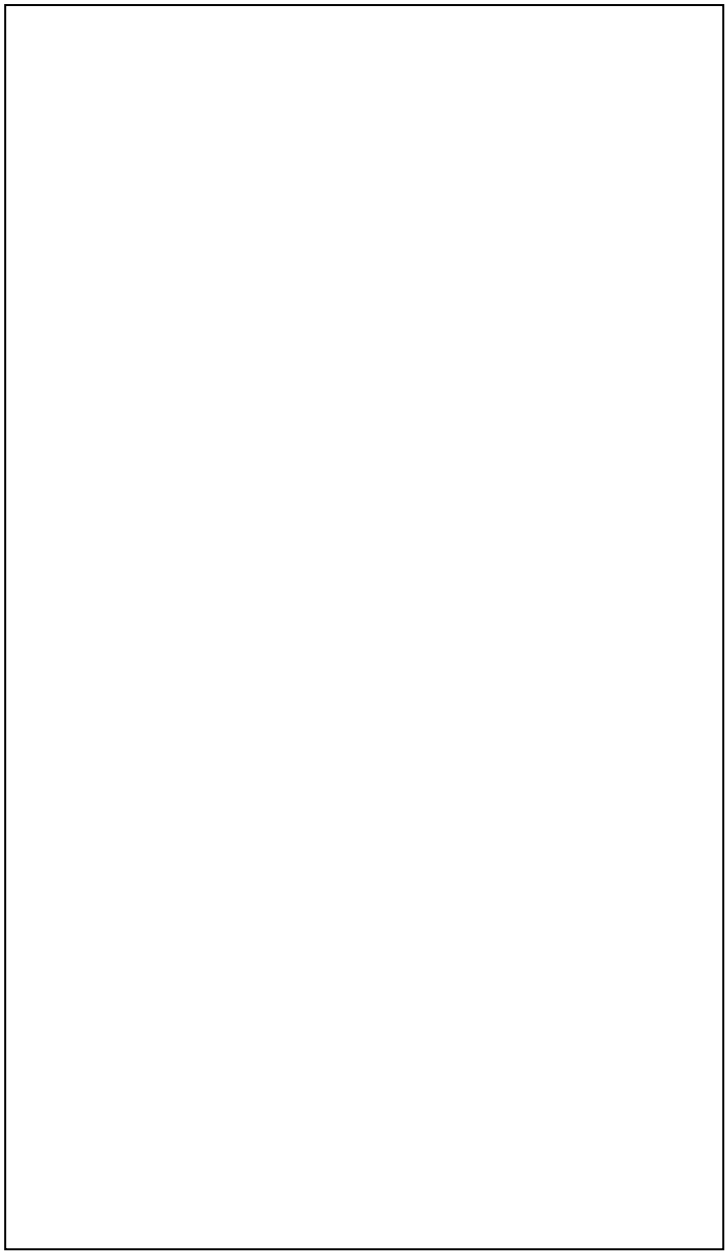

Taxonomic description of tree species of family Rubiaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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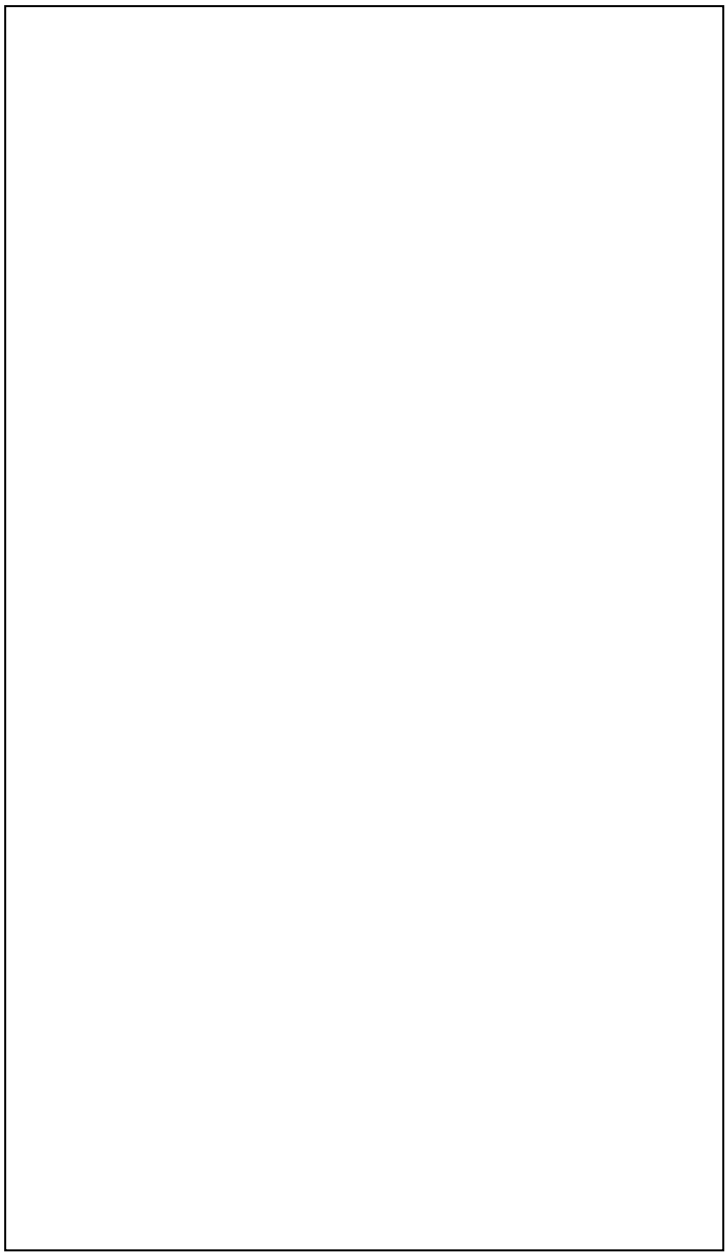

Practical No. 15

Objectives: To study floral morphology of family Sapotaceae and Apocyanaceae

Taxonomic description of tree species of family Sapotaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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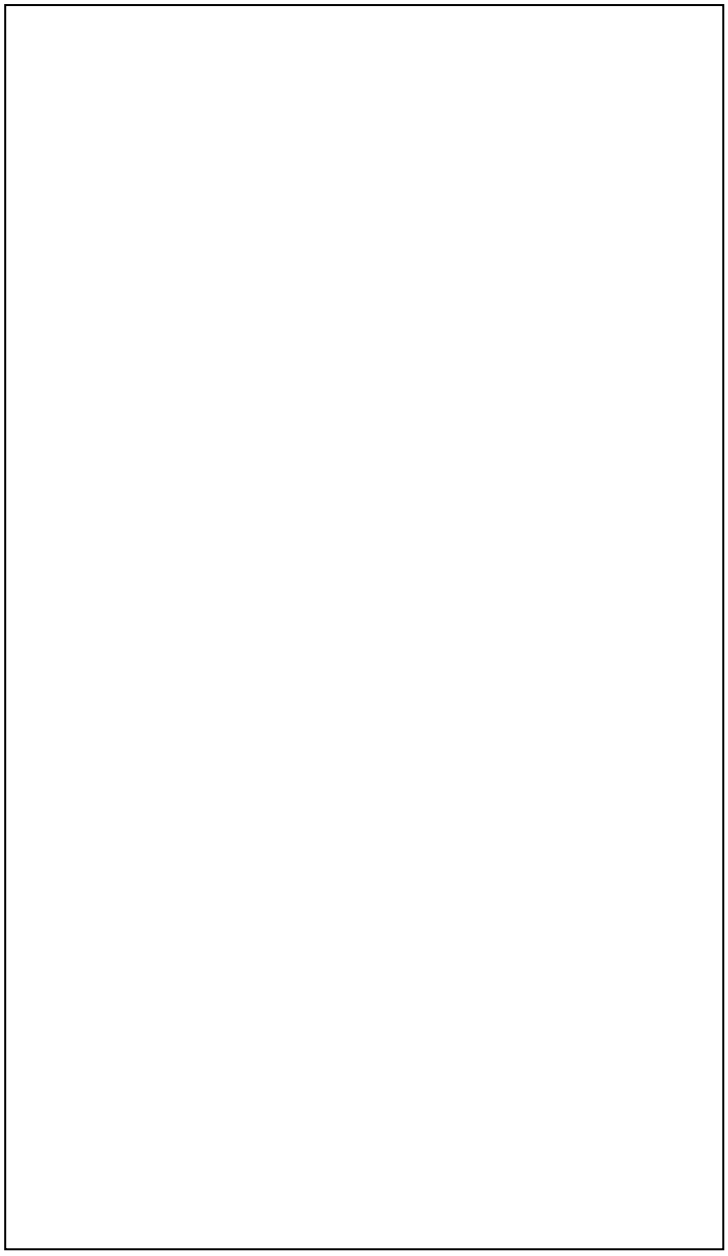

Taxonomic description of tree species of family Apocyanaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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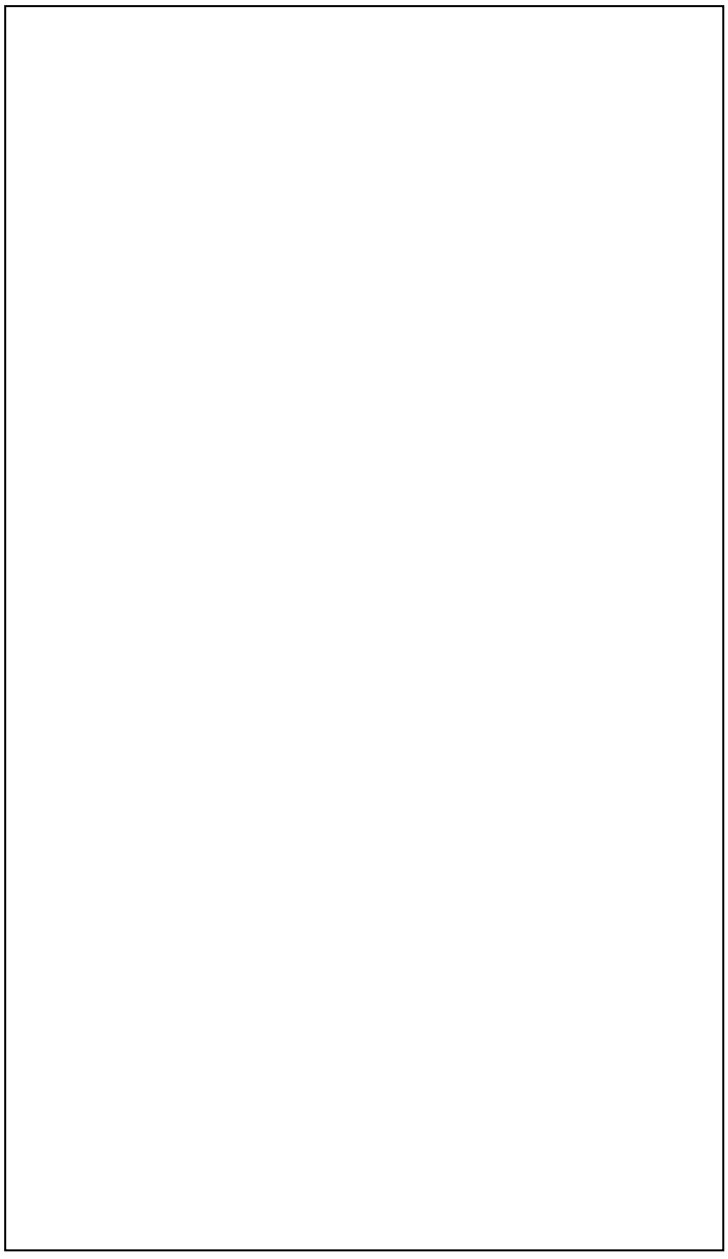

Practical No. 16

Objectives: To study floral morphology of family Bignoniaceae and Lamiaceae

Taxonomic description of tree species of family Bignoniaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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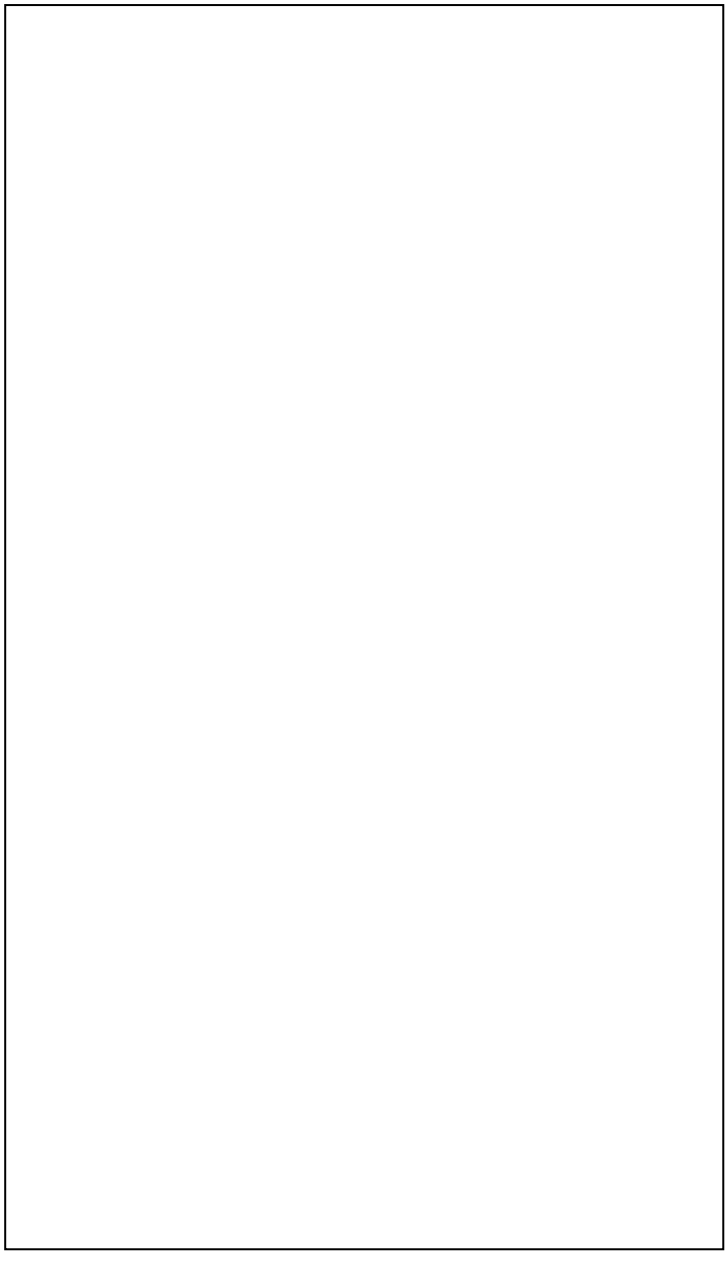

Taxonomic description of tree species of family Lamiaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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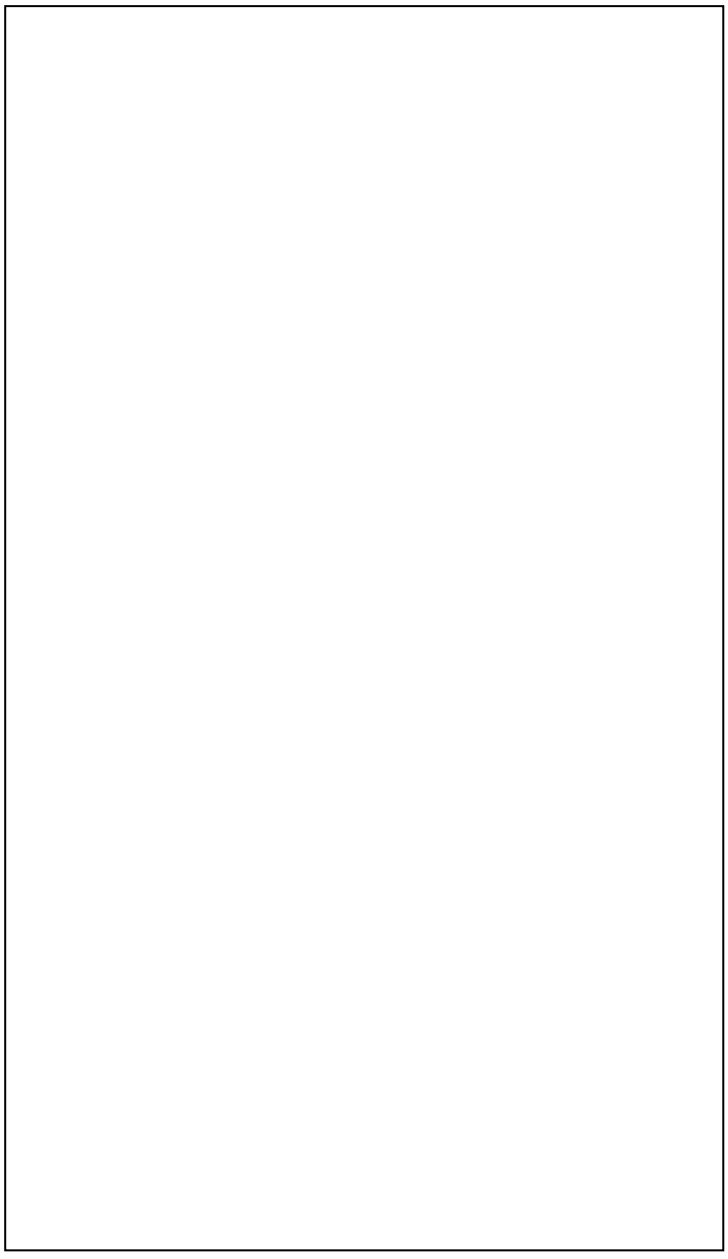

Practical No. 17

Objective: To study the floral morphology of family Euphorbiaceae and Santalanaceae

Taxonomic description of tree species of family Euphorbiaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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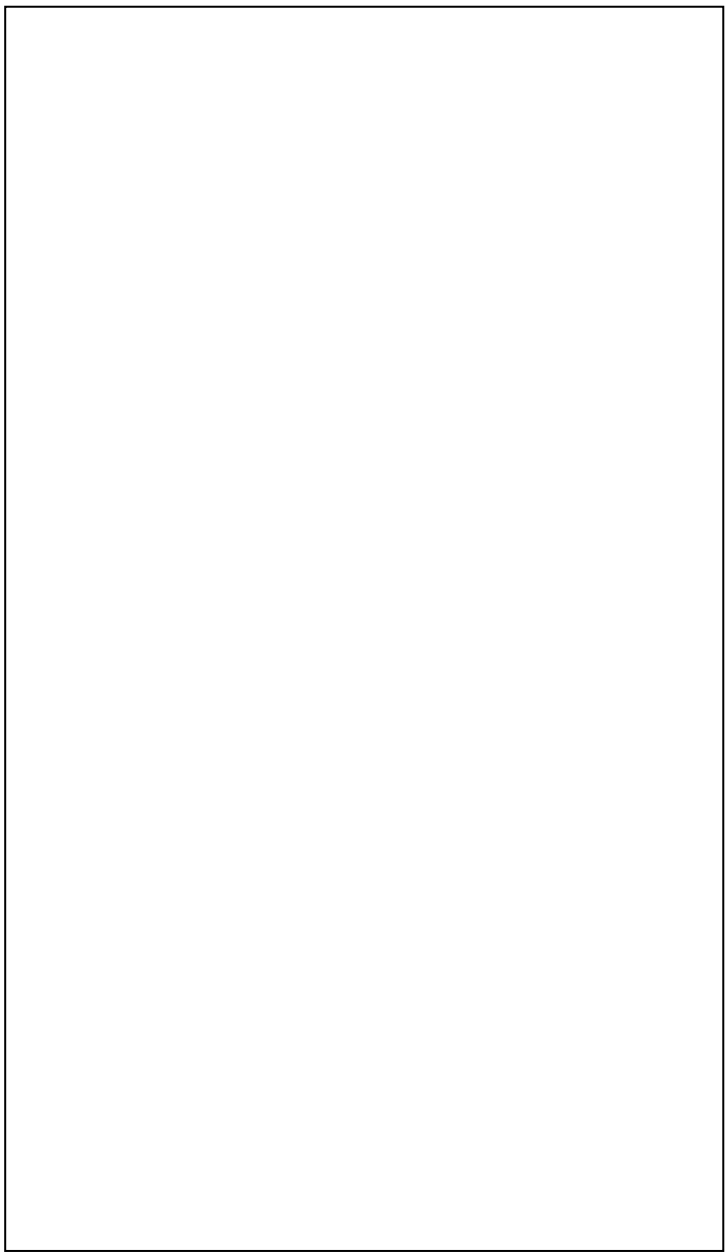

Taxonomic description of tree species of family Santalanaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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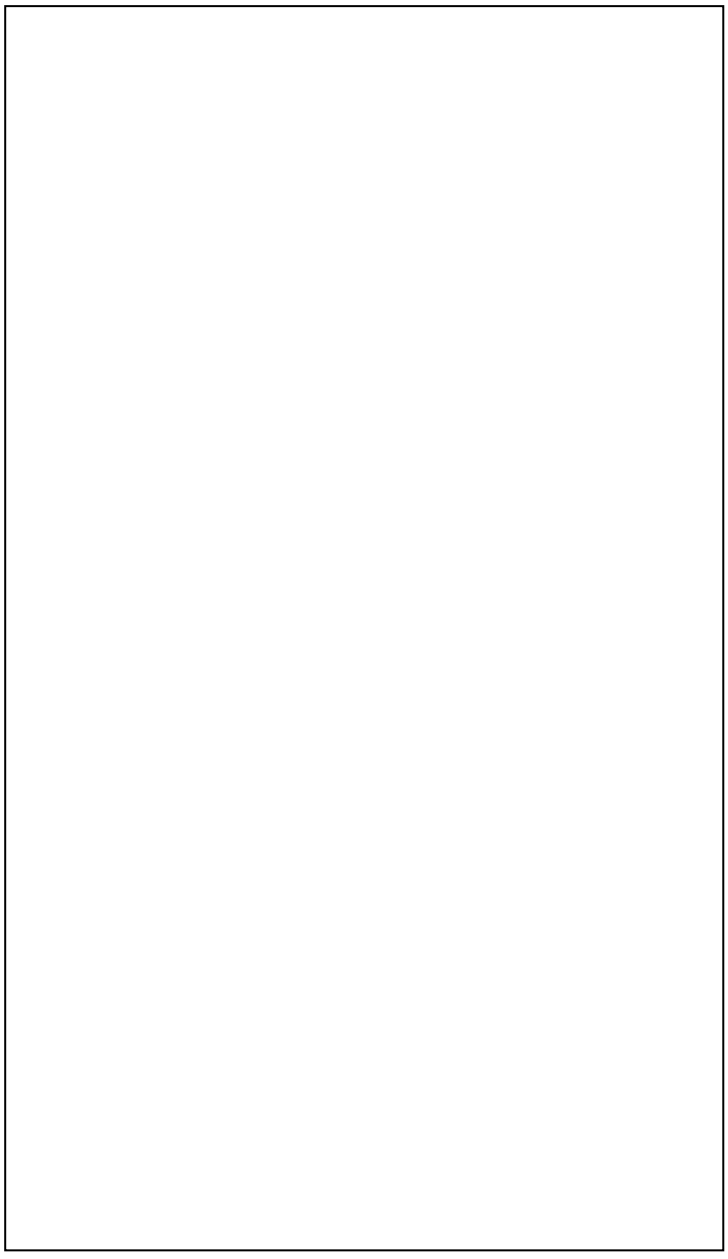

Practical No. 18

Objective: To study the floral morphology of family Casuaranaceae and Orchidaceae

Taxonomic description of tree species of family Casuaranaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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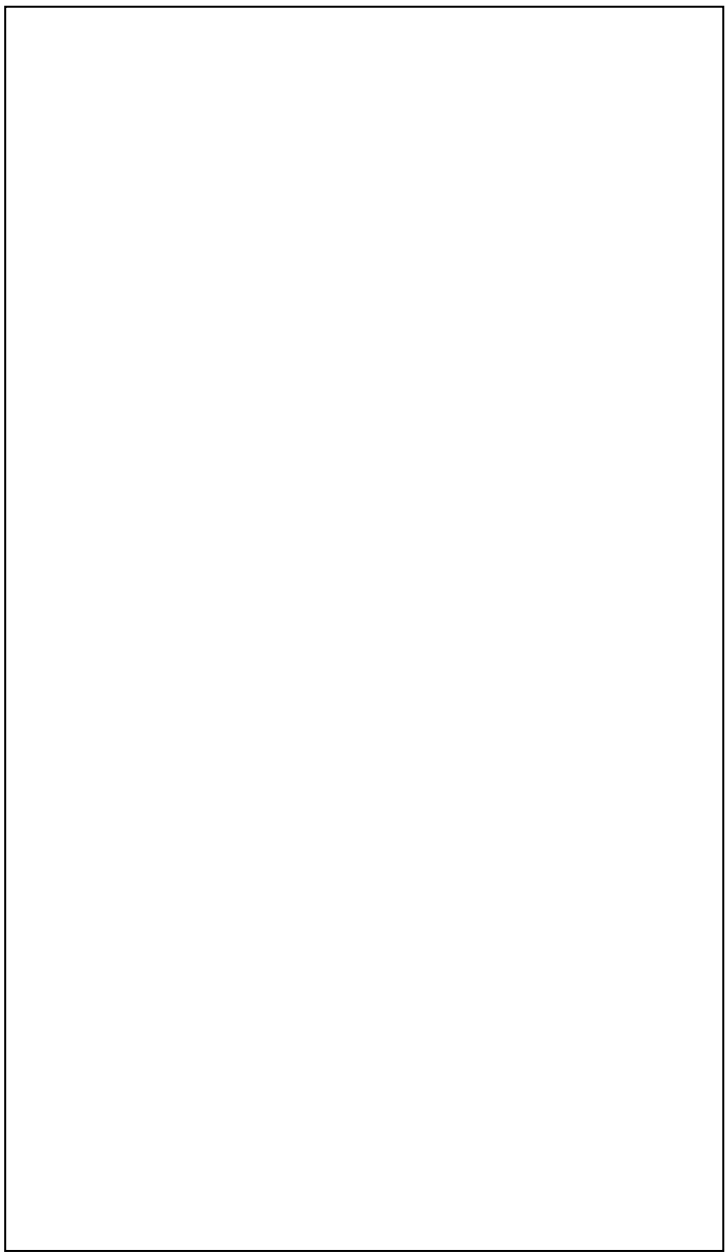

Taxonomic description of tree species of family Orchidaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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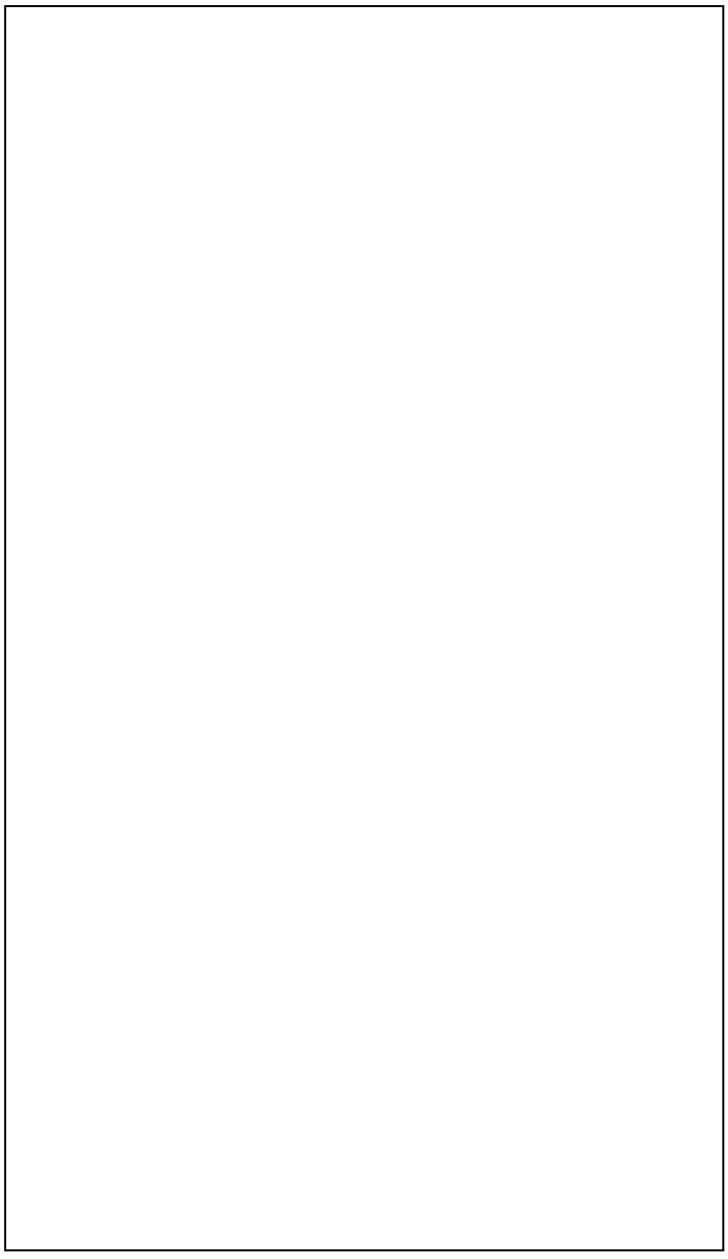

Practical No. 19

Objective: To study the morphological description of family Gramineae and Pinaceae

Taxonomic description of tree species of family Gramineae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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Taxonomic description of tree species of family Pinaceae (Common Name: ……)

Taxonomic Position:

Kingdom	……
Order	……
Sub-Order	……
Family	……
Sub-Family	……
Genus	……
Species	……
Floral Formula	……

Describe of flower parts and draw floral diagram

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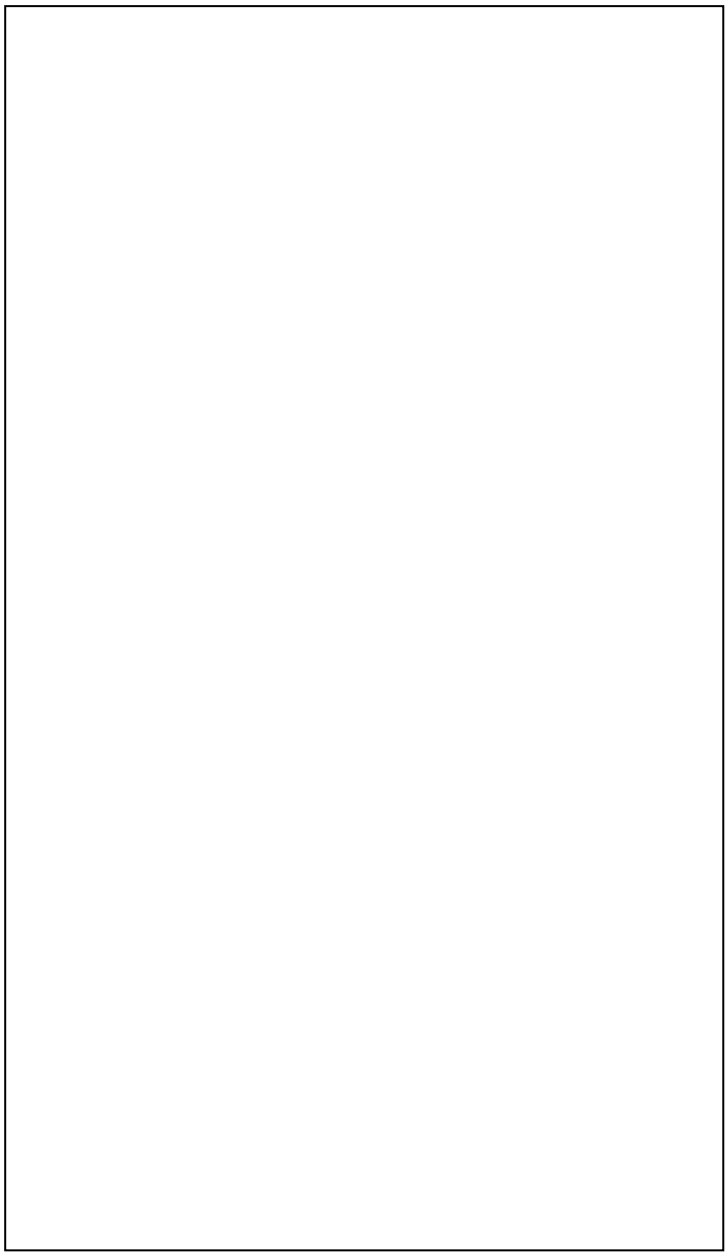


APPENDICES

IMPORTANT TERMS

Tree: A tree is a woody plant with several distinguishing characteristics: Often reaches 15 feet or more in height at maturity, has a single trunk or dominant multiple trunks, has no normal branches on the lower trunk, has at least a partially defined crown, usually larger than other plants and tend to be long-lived

Stem: It is the main trunk of a plant specifically a primary plant axis that develops buds and shoots

Leaf: It is a flattened structure of a higher plant, typically green and blade-like, that is attached to a stem directly or via a stalk. Leaves are the main organs of photosynthesis and transpiration.

Phyllotaxy: It is the pattern of arrangement of leaves on the stem or branches

Leaf tip: The terminal point of leaf

Leaf margin: The leaf margin is the boundary area extending along the edge of the leaf.

Leaf venation: It is the arrangements of veins and veinlets in leaf lamina.

Leaf Petiole: It is the leaf stalk connected blade to the stem

Leaf Stipule: Leaf like appendages, they may protect the young leaf and may be modified in to some other parts

Leaf Blade: Flattened green, expanded portion of leaf

Midrib: The most prominent central vein on a rib

Lateral vein: Secondary veins on a leaf

Sucker: This is the sub-areal branch that arises from the main stem. A plant developed of a from the root at the base or at certain distance of a tree or shrub

Runner: A runner is the stem portion of the plant that tends to grow horizontally as opposed to upright like the main stem. The end tip of the runner can produce buds that develop into new plants that are clones. Adventitious roots are also produced from the buds found on the runner.

Bulb: It is a specialized underground organ made of a short, vertical stem

Tuber: A short fleshy usually underground stem bearing minute scale leaves each of which bears a bud in its axil and is potentially able to produce a new plant

Corm: A corm is a short, thick underground storage stem with thin scaly leaves.

Roots: Roots are the basic portion of plant, develop from the radicle of the embryo that grows underground, they help to absorb water, minerals, nutrients which required for plant growth

Elongation region: This is the zone of root responsible for increase in the length of roots

Meristematic region: This zone situated at lower side of the roots, has meristematic tissues which produces new root cap cells as old ones are rubbed off

Mature region: It is upper zone of the roots; it is the zone where cork begins to replace epidermal cell

Flower: A flower, sometimes known as a bloom or blossom, is the reproductive structure found in flowering plants

Corolla: It is the part of a flower that consists of the separate or fused petals and constitutes the inner whorl of the perianth

Calyx: It is the outer part of a flower formed by the sepals, which covers and protects the petals.

Gynoecium: The gynoecium is the innermost whorl of a flower; it consists of (one or more) pistils and is typically surrounded by the pollen-producing reproductive organs, the stamens, collectively called the androecium.

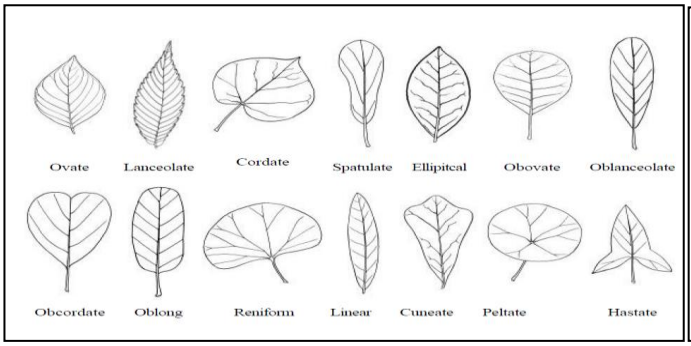
Androecium: It is the third whorl of flower that contains male reproductive structures called stamens

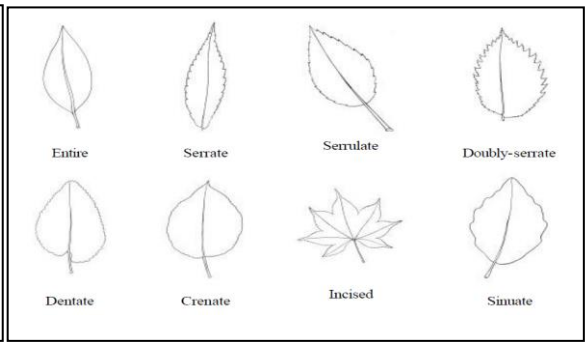
Floral formula: Floral formula is a means to represent the structure of a flower using numbers, letters and various symbols, presenting substantial information about the flower in a compact form. It can represent particular species, or can be generalized to characterize higher taxa, usually giving ranges of organ numbers.

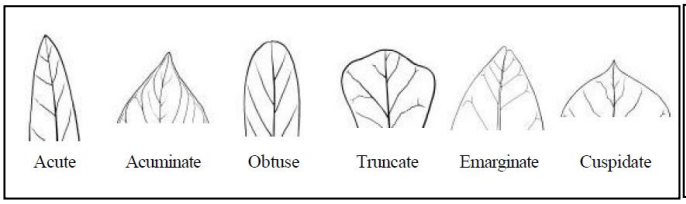
A floral formula consists of five symbols indicating from left to right:

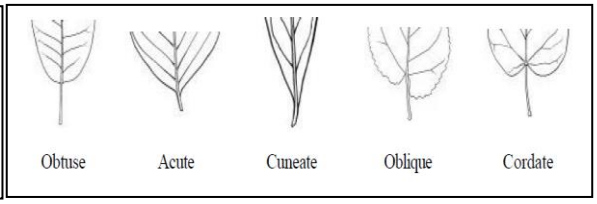
- Floral Symmetry
- Number of Sepals
- Number of Petals
- Number of Stamens (Androecium)
- Number of Carpels (Gynoecium)

Symbol	Description
K	Calyx
$K_{(n)}$	Polysepalous calyx
C	Corolla
$C_{(n)}$	Polypetalous
C $_{(n)}$	Gamopetalous
A	Androecium
G	Gynoecium
G	Superior ovary
$\underline{G}$	Inferior ovary
⊕	Actinomorphic flower
♂	Male flower
♀	Female flower
⚥	Bisexual flower
%	Zygomorphic flower
Br	Bracteate flower
EBr	Ebracteate flower (Bract absent)









LIST OF TREE SPECIES AND THEIR FAMILY

Common Name	Botanical Name	Family
Biba	*Semicarpus anacardium*	Anacadiaceae
Cashue	*Anacadia occidentale*	Anacardiaceae
Charoli	*Buchanania lanzan*	Anacardiaceae
Jinghan	*Lannea coromandelica*	Anacardiaceae
Ramfal	*Annona reticulata*	Annonaceae
Kari	*Miliusa velutina*	Annonaceae
Ashoka	*Polylalthia longifolia*	Annonaceae
Kurraiya	*Holarrhena antidysentrica*	Apocynaceae
Umberla tree	*Schefflera actinophylla*	Araliaceae
Monkey tail tree	*Araucaria araucana*	Araucariaceae
Christmas tree	*Araucaria columnaris*	Araucariaceae
Areka nut	*Areca catechu*	Arecaceae
Tadi/ Palmyra palm	*Borassus flabellifer*	Arecaceae
Coconut tree	*Cocus nucifera*	Arecaceae
Oil palm	*Elaeis guineesus*	Arecaceae
Date palm (wild)	*Phoenix dactylifera*	Arecaceae
Kathsagoan	*Haplophragma adenophyllum*	Bignoniaceae
Jacaranda	*Jacaranda mimosifolia*	Bignoniaceae
Inian cork tree	*Milingtonia hortensis*	Bignoniaceae
Padal	*Stereospermum suaveolens*	Bignoniaceae
Gorakhchinch	*Adansonia digitata*	Bombaceae
Semul	*Bombax ceiba*	Bombaceae
Kapok	*Ceiba pentandra*	Bombaceae
Booch/Glue bery/ Indian chery/	*Cordia dichotoma*	Boranginaceae
Lasol	*Cordia myxa*	Boranginaceae
Amaltas	*Cassia fistula*	Caesalpiniaceae
Bangkok tamarind	*Tamarindus indica*	Caesalpiniaceae
Kareel	*Capparis decidua*	Capparaceae
Casurina local	*Casuarina equisotifolia*	Casuarinaceae
Saru/ Casuarina	*Casurina equisetifolia*	Casuarinaceae
She oak	*Casurina junghuhniana*	Casuarinaceae
Kankera	*Maytenus emarginataus*	Celastraceae
Dhau/ Dhawada	*Anogeuisus latifolia*	Combretaceae

Kanchan	*Bahunia racemosa*	Combretaceae
Asna	*Terminalia alata*	Combretaceae
Arjun	*Terminalia arjuna*	Combretaceae
Behera	*Terminalia belarica*	Combretaceae
Hirda	*Terminalia chebula*	Combretaceae
Asna	*Terminalia tomentosa*	Combretaceae
Jungli Badam	*Terminilia Catappa*	Combretaceae
Cycas	*Cycas circinalis*	Cycadaceae
Parisidhha	*Hardwika binnata*	Detarioideae
Sal	*Shora robusta*	Dipterocarpaceae
Rudraksha	*Elaeocarpus ganitrus*	Ealeocarpaceae
Tendu	*Diospyrus melanoxylum*	Ebenaceae
Ironwood	*Xylia Xylocarpa*	Fabacea
Northern black wattle	*Acacia auriculiformis*	Fabaceae
Khair	*Acacia catechu*	Fabaceae
Kala kikar	*Acacia ferruginea*	Fabaceae
Reunja	*Acacia leucophlea*	Fabaceae
Desi babul	*Acacia nilotica*	Fabaceae
Siris	*Albezia lebback*	Fabaceae
Safed siras	*Albizzia procera*	Fabaceae
Mountain ebony	*Bahunia retusa*	Fabaceae
Kachnar	*Bahunia varigata*	Fabaceae
Kachnar	*Bahunia verigata*	Fabaceae
Burmese Cassia tree	*Cassia renigera*	Fabaceae
Gulmohar	*Delonix regia*	Fabaceae
weeping fig	*Ficus benjamina*	Fabaceae
Giripushpa	*Gliricidia sepium*	Fabaceae
Sandan	*Ougeinia oojeinense/ Desmodium oojeinense*	Fabaceae
Khejri	*Prosopis cineraria*	Fabaceae
Chiokar	*Prosopis spicigera*	Fabaceae
Bijasal	*Ptercarpus marsepium*	Fabaceae
Ashok	*Sarsa asoca*	Fabaceae
Balltree	*Calophyllum inophyllum*	Guttiferae
Kokam	*Garcinia indica*	Guttiferae
Nilambur teak	*Tectona grandis*	Lamiaceae
Jungle Jalegi	*Pithocellium dulce*	Leguminacea
lagistromia spp	*Lagerstromia indica*	Lythraceae
Pride of India	*lagestromia parviflora*	Lythraceae
Salai	*Bowsellia serrata*	Malvaceae
Pula	*Kydia calycina*	Malvaceae
Java olive	*Sterculia foetida*	Malvaceae
Australian mahogani	*Dysoxylum fraserianum*	Meliaceae
Bakain	*Melia azedarach*	Meliaceae
Malbar neem	*Melia dubia*	Meliaceae
Indian red wood	*Soymida fabrifuga*	Meliaceae
Mahogani	*Swietenia macrophylla*	Meliaceae
Fanas/ Jack fruit	*Artocarpus heterophyllus*	Moraceae
Wad	*Ficus bengalensis*	Moraceae
Fig tree	*Ficus carica*	Moraceae
Rubber tree	*Ficus elastica*	Moraceae
Gamar/ Cluster fig	*Ficus glomerata*	Moraceae
Pimpal	*Ficus religiosa*	Moraceae
White mulbery	*Morus alba*	Moraceae
Black Mulbery	*Morus nigra*	Moraceae
Red mulberry	*Morus rubra*	Moraceae
Moringa	*Moringa olerifera*	Moringaceae

Bottle brush	*Callistemon citrinus*	Myrtaceae
Jamun	*Sizygium cumini*	Myrtaceae
Jasmine	*Nyctanthus arborstritis*	oleacea
Olive	*Olea europaea*	Oleaceae
Rose wood	*Dalbergia latifolia*	Papilioidae
Amla	*Embilca officinalis*	phyllanthacea
Khaja/ Kasai	*Bridelia retusa*	Phyllanthaceae
Carabian pine	*Pinus carebiana*	Pinaceae
Stone pine	*Pinus pinea*	Pinaceae
Pine	*Pinus tecunumanii*	Pinaceae
Tropical pine	*Pinus tropicalis*	Pinaceae
Ber	*Zizyphus jujuba*	Rhamnaceae
Taren	*Zizyphus rugosa*	Rhamnaceae
Ghont	*Zizyphus xylopyra*	Rhamnaceae
Rowan	*Sorbus aucuparia*	Rosaceae
Haldu	*Adina cordifolia/Haldinia cordifolia*	Rubiaceae
Bhurkul/Baurang	*Hymenodictyon excelsum*	Rubiaceae
Kem/Phaldu	*Mitragyna parviflora*	Rubiaceae
Kadamb	*Neolmarckia Kadamba*	Rubiaceae
Bel	*Aegle marmelos*	Rutaceae
Bel	*Aigle mirmelos*	Rutaceae
Kawath/Kaitha	*Feronia limonia*	Rutaceae
Kaith	*Limonia acidissima*	Rutaceae
Kataiya	*Flacourica indica*	Salicaceae
Salvodara/Pilu	*Salvedoa oleoides Druce*	Salvodaraceae
Chandan	*Santalum aalbum*	Santalanaceae
Soap nut tree	*Sapindus emarginatus*	Sapindaceae
Mahua	*Madhuca indica*	Sapotaceae
Khirani	*Manilkara hexandra*	Sapotaceae
Maharukh	*Ailanthus excelsa*	Simaroubiaceae
Chiroul	*Holoptlia integrifolia*	Ulmanaceae
Gamar	*Gmelina arborea*	Verbenaceae