

Key for description of Angiospermic plant species of Vidarbha region; Maharashtra, India

AN Deore

Asso. Prof., Dept. of Botany, S.S.S.K.R. Innani MV, Karanja Lad Dist Washim (MS), India

ABSTRACT

Vidarbha is one of the region of Maharashtra, it has 11 districts. The climate is hot and dry. "Floristic survey of Washim district" conducted during 2002-2010. During this survey 690 species were collected. Field notes like habit, habitat height of plants, colour of flowers and special characters like aroma, latex, underground parts were not seen in herbarium, so that while describing Angiospermic plants many difficulties were faced in order to solve these problems. A key was prepared for description of Angiospermic plant species.

Key Words: Floristic Survey, Herbarium, Angiosperm.

Introduction

Key for description of Angiospermic plants

(A) **Habitat:** The place where plants grow.-cultivated or wild

- a) **Hydrophyte:** Plants grow in water.
- b) **Xerophyte:** plants grow in desert area.
- c) **Mesophyte:** Plants grow in normal condition on land..
- d) **Epiphyte:** Plants which grow on other plants.
- e) **Parasite:** Plants grow on other plants and depend for food.
- f) **Saprophyte:** Plants which grow on dead organic matter.
- g) **Insectivorous:** Plants which depend on insect.

(B) **Habit:** Bodily appearance of an organism.

- a) **Herb:** Plants with soft, thin stem
- b) **Shurb:** Plants with woody stem where many branches arises from the ground.
- c) **Tree:** A perennial woody plant with singal trunk.
- d) **climber:** Plant which grow by taking the support having some special devices for e.g. tendril.
- e) **Twiner:** The stem which twin around the neighboring object.
- f) **Lianas:** It is woody twiner

(C) **Root:** Root is a part of plant which absorb water and minerals It is of two types.

- a) **Tap Root:** A root which develop from radical of embryos.
- b) **Adventitious Root:** Root which develop from any part of plant other than radicle e.g. grasses.

(D) **Stem:** It is the part of plant which develop from plumule of embryo.

- a) **Herbacious:** The stem is green delicate and soft.
- b) **Woody:** The stem is woody, hard and rough.
- c) **Aerial:** Stem which grow above the ground. It is of following type
 1. **Erect:** A rigid and strong stem holding upright position.
 2. **Weak:** Stem which is not strong and do not keep itself in upright position.

(d). **Underground:** Stem lies below the ground.

I) Rhizome II) bulb III) Corm IV) Tuber

1. Specialised Stem

- a) **Phylloclade:** It is a green flattened stem having many internode with feebly develop leaves Ex-opuntia.
- b) **Cladode:** It is a phyllocade of one internode ex-Asparagus.

2. External Shape

- a) Cylindrical b) Angular

3. Surface

- a) Glabrous - Smooth surface.
- b) Hairy - Surface of stem covered with hair.
- c) Spiny.
- d) Waxy.
- e) Shiny.
- f) Prickly.

4. Branching

- a) Branched – A stem with many lateral shoot.
- b) Unbranched - Without branches.

5. Interior

- a) **Solid:** A stem having filled interior.
- b) Hollow.
- c) **Fistular:** The stem hollow & jointed ex. Bamboo.

(E) **LEAF:** Leaf is a organ of limited growth arises from stem

- 1) **Phyllotaxy:** It is the arrangement of leaves on stem. It is following type.
 - a) **Alternate** - When leaves arranged alternate on stem.
 - b) **Opposite** - The leaves arises in pair at each node and arrange opposite.
 - c) **Whorls** - More than two leaves at each node arrange in circle.

Opposite Phyllotaxy Divided Into Following Type:

- a) **Superposed** - When the leaves of successive node arrange in one angle one above other.
- b) **Decussate** - When the leaves of successive node arranging Right angle.

2) **Stipule:** It is an appendage.

- a) Stipulate- Leaves having stipule.
- b) Exstipulate – Leaves without stipule.

3) **Petiole:** It is a stalk of leaf by which leaf attaches to stem.

- a) Petiolate - Leaves with petiole.

b) Sessile - leaves without petiole.

4) Types of leaves

- a) **Simple** – A leaf which may be entire or slightly dissected.
 b) **Compound** – A leaf which is divided into many lobes or leaflets.

It is of ten types as follows

1) **Palmately compound** – In compound leaves the leaflets attached to the tip of petiole.

- a) **Unifoliate**: A leaf with single leaflets.
 b) **Bifoliate**: A leaf with two leaflets.
 c) **Trifoliate**: A leaf with three leaflets.
 d) **Quadri foliate**: A leaf with four leaflets
 e) **Pentafoliate**: A leaf with five leaflets.
 f) **Multifoliate**: A leaf with many leaflets.

2) **Pinnately Compound**: A compound leaf where leaflets arranged along the side of rachis. It is of following type

A) **Unipinnate**: A pinnately compound leaves bearing leaflets directly in the rachis. It is of two types.

1. **Paripinnate**: A unipinnate leaf with even no's of leaflets.

2. **Imparipinnate**: A unipinnate leaf with odd no's of leaflets.

B) **Bipinnate**: A pinnately compound leaf where leaflets arranged on secondary rachis.

C) **Tri-pinnate**: Leaflet arranged on tertiary rachis.

D) **Decomound**: A compound leaf where leaflet arranged on more than three rachis.

5) **Shape of the leaf**: It is of following type:

- a) **Linear**: Long and narrow
 b) **Lanceolate**: Lance shape
 c) **Orbicular**: Circular in shape
 d) **Ovate**: Egg shape
 e) **Obovate**: Reverse of ovate
 f) **Spathulate**: spoon shaped
 g) **Oblique**: unequal sided
 h) **Reniform**: kidney shape
 i) **Cordate**: Heart shaped
 j) **Sagittate**: arrow shaped
 k) **Acicular**: Needle shape
 l) **Falcate**: sickle shaped
 m) **Lyrate**: Lyre shaped
 n) **Oval**: elliptic shaped, egg shape
 o) **Oblong**: longer than broad with margins parallel for base to apex

6) **Leaf Margins**: It is of following type:

- a) **Entire**: Smooth Margins
 b) **Dentate**: with sharp arrows
 c) **Serrate**: with sharp teeth pointing forward
 d) **Crenate**: Consisting rounded tooth
 e) **Lobed**: Consisting many large lobes.
 f) **Spiny**: Covered by spines.

7) **Leaf apex**: It is the following types:

- a) **Obtuse**: blunt or rounded
 b) **Acute**: Sharp or pointed.
 c) **Retuse**: Apex with shallow notch
 d) **Acuminate**: Apex drawn into long tail like
 e) **Emarginate**: apex with the deep notch
 f) **Mucronate**: rounded apex with sharp, short, flexible point

8) Leaf Surface

- a) **Glabrous**: Smooth surface
 b) **Rough**: rough surface
 c) **Spiny**: surface with spine
 d) **Hairy**: Surface with hair
 e) **Glaucous**: Shining surface due to waxy coating. e.g. Calotropis.

9) Leaf Texture

- a) Herbaceous
 b) Coriaceous (thick & leathery) e.g. nerium
 c) Succulent (fleshy) Aloe

10) Venation

Arrangement of the vein and veinlets in the lamina is called venation.

It is following types

- a) **Reticulate**: Network venation
 1. **Unicostate**: having only single mid vein
 2. **Multicostate**: lamina with many veins
 b) **Parallel**: Veins are parallel to each other It is also unicostate or multicostate.

F) **Inflorescence: Cluster of flower i.e arrangement of flowers on axis. It is of following type**

1) **Racemose**: growth of main axis continuous (indefinite) arranged in acropetal succession. It is of following type

a) **Raceme**: Inflorescence with stalked flowers, older flowers at the base and younger toward the apex.e.g. gold-mohur

b) **Spike**: Inflorescence with sessile flowers. e.g. Adhatoda

c) **Panicle**: Racemose inflorescence with many branches. e.g. mango

d) **Catkin**: A pendent spike consisting unisexual flowers. e.g. mulberry

e) **Spadix**: A spike consisting fleshy or thick axis. e.g. banana

f) **Corymb**: Inflorescence where a lower flowers have long pedicel than the upper flower appearing all flowers in same level. e.g. candytuft

g) **Umbel**: Inflorescence where all flowers have equal length of pedicel arising from same point. e.g. coriander

h) **Capitulum**: A inflorescence of sessile flowers clustered on a common receptacle. e.g. sunflower

2) **Cymose**: Inflorescence where growth of main axis checked or stop It is of following types.

a) **Uniparous**: (monochacial) main axis of inflorescence end in a flower. Main axis ending into flower producing only one lateral branch. It is of two type.

1. **Scorpioid:** In which lateral branches develop alternate side showing ZIG-ZAG manner.
 2. **Helicoid:** In which lateral branches develop successively on one side.
 - b) **Biparous:** (Dichasial) In which main axis end into flower which producing two lateral branches.
 - c) **Multiparous:** (Polychasial) In which many lateral branches bearing younger flowers.
- 3) **Special Type: It is of following type**
- a) **Cyathium:** It is a inflorescence consisting cup shape involucre with Nectory and encloses single female flower in the center and many male flowers around it. e.g. Euphorbia.
 - b) **Verticillaster:** it consist of several node and internode at each node there is a cluster of many sessile or stalk flowers. e.g. Ocimum
 - c) **Hypanthodium:** A fleshy receptacle form cuplike hollow cavity with opening called ostiole and bearing flower on inner wall of cavity. e.g. Ficus

Flower: It is modified shoot for reproduction

1. **Bract:** A leafy str, arise from the base of pedicel.
2. **Epicalyx:** bracts born from liry axis of an pedicelates.
3. **Ebracteate:** without bract.
4. **Bracteate:** with bract.
5. **Bracteolate:** with bracteoles.
6. **Involucre:** whorl of bracts produce at the base of calyx.
7. **Sessile:** Flower without stalk.
8. **Pedicellate:** Flower with stalk.
9. **Complete:** Flower with four whorls. i.e. Calyx, Corolla, Androecium, gynoecium.
10. **Incomplete:** Flower lack one/more whorls.
11. **Actinomorphic:** Flowers which can be bisected in to similar halves along to or more planes.
12. **Zygomorphic:** Flowers which can be bisected into similar halves in only one plane.
13. **Hermaphrodite (Bisexual):** Flower with two sexes.
14. **Unisexual:** Flower with one sex.
15. **Pistillate:** Unisexual flower consisting female sex organs.
16. **Dimereous:** Flower part present in two no.
17. **Trimerous:** flower part found in three no.
18. **Tetramerous:** Flower part found in four no.
19. **Pentamerous:** Flower part found in five no.
20. **Hypogynous:** Flower in which ovary is superior and other parts are inferior.
21. **Perigynous:** Ovary and other parts are half superior and half inferior.
22. **Epigynous:** Ovary is inferior and remaining organs are superior.
23. **Anthophore:** Elongated protion of thalamus between the calyx and corolla.
24. **Androphore:** Elongates protion of thalamus between the corolla and androecium.
25. **Gynophore:** Elongates portion of thalamus between androecium and gynoecium.
26. **Androgynophore:** Gynophose associated with androphose.

27. **Anthophore:** elongated portion of thalamus between calyx and corolla

G) **Calyx: It is outer and 1st whorl of flower. The unit of calyx called sepal.**

Polysepalous: sepals are free.

Gamosepalous: sepals are fuse.

1. **Aestivation:** Arrangement of sepal in bud condition it is of following type.

- a) **Valvate:** Sepal are meet by their edges.
- b) **Twisted:** when one margin of sepal or petal overlaps that of the next one third one external.
- c) **Imbricate:** Out of the 5 sepals one are external one is internal and remaining three are twisted.
- d) **Quincunciate:** out of the five two are ext are external two are internal and one twisted.
- e) **Vexillary:** In which one are external two are twisted and one margin of two sepals overlapped.

Persistent: Calyx remain persistent after fertilization.

Cauducous: Calyx falls easily.

H) Corolla

Gamopetalous: Petals fuse.

Polypetalous: Petals free

I) SHAPE OF COROLLA

1. **Cruciform:** 4 free petal arranged on crosswise manner. Each differented into claw and limb.
2. **Campanulate:** (Bell shape) Petal fusesd forming bell shape str.
3. **Tubular:** Fused petal from tube like structure.
4. **Infundibuliform:** Funnel shape carolla
5. **Rotate:** Wheel shape corolla.
6. **Papilionaceous:** Butter fly shape carolla consisting one standard Petal two latral wings petal and two small keel petals.
7. **Bilabilate:** Fused petals from two lips.

Appendages of corolla

1. **Nectary:** A nector secreting gland.
2. **Corona:** An appendages that arise between the corolla and stamen.

K) **Perianth: Fused calyx and corolla called perianth unit of perianth called tepal**

Polytepalous: tepals free.

Gamotepalous: tepals fuse.

Sepaloid: Green colour (sepal like).

Petaloid: Various colour (petal like)

L) **Androcium: It is a male sex organ of flower, the unit of androecium is called stamen.**

1. **Staminode:** Sterile stamen

2. Cohesion (fusion) of stamens

a) **Polyandrous:** Androecium consisting free stamen.

b) **Adelphous Stamens:** Filament fuse and anther free.

1. **Monadelphous Stamens:** Stamen are fuse in one group. (filament fuse anther free) - Hibiscus

2. **Diadelphous Stamens:** Stamen united in two bundle. – Pisum
3. **Polyadelphous Stamens:** Stamen united in many bundles. - Bombax
4. **Syngenesious Stamens:** anther fused and filament free - Sunflower
5. **Synandrous Stamens:** anthers as well as filaments are united.

3) Adhesion of Stamen

1. Fusion of stamen with another whorls or parts
 - a) **Epipetalous:** Stamens fused with petal.
 - b) **Gynandrous:** Stamens are fused with gynoecium. E.g. Calotropis

2. Length of Filaments

- a) **Didynamous:** Out of 4 stamens two are long and two are short.
- b) **Tetradynamous:** Out of 6 stamen 4 are long and 2 are short.

3. Number of locule

- a) **Monotheous:** One cell anther.
- b) **Ditheous:** Two cells anther.

4. Attachment of Anther to the Filament

- a) **Basifixed:** Filament attach to the base of anther.
- b) **Adnate:** Filment attach along the length of anther.
- c) **Dorsifixed:** Filament attach to the back of anther
- d) **Versatile:** It is attached to the back of the anther at one point only. E.g. Grasses.

5. Opening of anther

- a) **Introse:** Anther facing towards the centre.
- b) **Extrose:** Anther facing towards the periphery.

M) Gynoecium: It is a female sex organ, unit of gynoecium called carpel.

Pistilloide: A sterile carpel present in some staminate flower.

Carpel: It is unit consisting single ovary, style and stigma

1) No. of carpel:

- a) **Monocarpellary:** Gynoecium consisting single carpel.
- b) **Bicarpellary:** Consisting two carpel.
- c) **Tricarpellary:** Consisting three carpel.
- d) **Tetracarpellary:** Consisting four carpel.
- e) **Polycarpellary:** Consisting many carpel.

Cohesion of Carpel.

1. **Apocarpous:** Carpel Free.
2. **Syncarpous:** Carpel Fuse.

2) Position of Ovary.

- a) **Superior:** When ovary occupies at highest position on thallamus Stamen petal sepal are situated below.
- b) **Seminferior:** thalamus grow around the ovary to form a cup Sepal petal and stamen situated on edges as margin of it.
- c) **Inferior:** When thallamus completely covers the ovary and sepal petal and stamen situated on the top of ovary.

3) No. of Locule: Locule is a chamber or compartment of ovary.

- a) **Unilocular:** With one chamber.
- b) **Bilocular:** With two chamber.
- c) **Trilocular:** With three chamber.
- d) **Multilocular:** With many chamber.

4) Placentation: Arrangement of Placentae and ovule within ovary.

Ovule: It is a egg like bodies in the ovary.

1. Types of Placentation.
 - a) **Marginal placentation:** Placentae develop along margin of ventral suture ovary always monocorpellry.- Leguminosae
 - b) **Axile placentation:** Placenta develop on central axis of ovary, ovary is 5 polycarpellary.
 - c) **Parietal placentation:** Placental develop on inner wall of Ovary is 3 polycarpellary but uniloculer.- Cucurbitaceae.
 - d) **Basal placentation:** Ovules are few and reduce to one and born at the base of ovary, placentae e.g. Compositae.

2. Style: It is elongated part of gynoecium.

- a) **Terminal style:** Style arises from the tip of ovary.
- b) **Lateral style:** Style arises from the lateral side of ovary.
- c) **Gynobasic style:** Style arises from the base of ovary.
- d) **Stylopodium:** A disc like enlargement at the base of the style.

3. Stigma: Pollen receiving organ of gynoecium.

- a) **Capitate:** Like a globose head.
- b) **Discoid:** disc shaped.
- c) **Linear:** Long and narrow.
- d) **Bifid:** Forked into two lobe.
- e) **Knoblike:** Knot like.
- f) **Sticky:** Stigma producing Sticky liquid.

N) Fruit: It is ripened ovary of the flower. It is following type.

1. Simple Fruit: A single Fruit develop from single ovary.

- a) **Dry Fruit:** Fruit becomes dry at maturity.

A. Dehiscent Fruit: Fruit which automatically burst and discharge the seed.

- a) **Legume:** This is a dry fruit developing from superior unilocular ovary which open along both sutures. e.g. pea
- b) **Follicle:** A fruit which open along ventral suture only.e.g. calotropis
- c) **Siliqua:** A dry fruit develop from bicarpellary, syncarpous superior ovary open by both suture from below upward and seed remain attached to the replum. e.g. Mustard
- d) **Capsule:** Many seeded fruit developing from polycarpellary multilocular ovary. E.g. Datura

B. Indehiscent fruit: which do not dehiscent at maturity.

- a) **Caryopsis:** A small dry indehiscent one seeded fruit developing from monocarpellary superior ovary with pericarp fuse with testa or seed coat. e.g. maize

- b) **Achene:** A small indehiscent one seeded fruit developed from monocarpellary superior ovary in which pericarp free from testa. e.g. Mirabilis
- c) **Cypsela:** A dry indehiscent one seeded fruit develop from bicarpellary syncarpous inferior ovary where pericarp free from testa. e.g. sunflower
- d) **Nut:** A dry dehiscent one seeded fruit develop from bicarpellary or polycarpellary superior ovary in which fruit wall hard stony or woody at maturity. e.g. marking nut

A. Schizocarpic fruit: It is intermediate between dehiscent and indehiscent type of fruit, breaks into one seeded segments.

- a) **Lomentum:** A schizocarpic fruit break into one seeded segment. e.g. Acasia
- b) **Cremocarp:** A schizocarpic fruit divide into two mericarp. e.g. coriander
- c) **Regma:** A schizocarpic fruit divide into three cocci or the seeds. e.g. caster

B. Fleshy Fruit: Fruit which remain fleshy at maturity.

- a) **Drupe:** Fleshy one seeded fruit with pericarp differentiated into three layers epicarp mesocarp,(fleshy and edible) and endocarp (hard and stony).e.g.mango
- b) **Pome:** A fleshy fruit which surrounded by fleshy thalamus.e.g.apple
- c) **Berry:** A fleshy many seeded fruit pericarp divisible thick fleshy mosocarp and pulpy endocarp.e.g.tomato
- d) **Pepo:** It is many seeded berry type of fruit develop form inferior ovary.e.g.cucumber
- e) **Hesperidium:** A fleshy fruit develop from polycarpellary ovary in which pericarp, divided into epicarp, mesocarp, endocarp. epicarp and meoscarp are fuse with each other while endocorp projection filled with watery juice.e.g.Citrus

1. **Aggregate fruit:** A fruit develop from a flower having no of free carpels all of which together form fruit.

- a) **Etaerio of drupe:** An aggregate of drupe.
- b) **Etaerio of follicle:** An aggregate of follicle.
- c) **Etaerio of berries:** an aggregate of berries.

2. Multiple or composite type fruit:

Multiple fruit is that which developed from a number of flowers or from an inflorescence forming one body of fruit at maturity.

- a) **Sorosis:** This is a multiple fruit developing from a spike or spadix. The flowers fuse together by their succulent sepals & axis becomes fleshy or woody. e.g pineapple, jack fruit, mulberry.
- b) **Syconus:** A fruit develop from hypanthodium inflorescence.

Reference

SYMBOLS

1. Bracteate: Br
2. Ebracteate: Ebr
3. Actinomorphic: ⊕

4. Zygomorphic: %

5. Bisexual: + 

6. Male flower: ♂ 

7. Female flower: ♀ 

8. Calyx: K

9. Corolla: C

10. Androecium: A

11. Gynoecium: G

12. Perianth: P

13. Cohesion: ()

14. Adhesion: ∩

15. Superior ovary: $\underline{\underline{G}}$

16. Inferior ovary: $\overline{\overline{G}}$

17. infinite: ∞