

Quadrant II – Transcript and Related Materials

Programme	: Bachelor of Science (First Year)
Subject	: Botany
Paper Code	: BOC 102
Paper Title	: Biodiversity II (vascular plants)
Module Name	: Classification and morphology of <i>Pinus</i>

Notes

Classification of *Pinus* by (Coulter and Chamberlain)

Division : Gymnospermae (Seeds not enclosed in the ovary).

Order : Coniferales (comprises of both living and extinct forms).

Family : Pinaceae (tall trees with conical forms, leaves & sporophylls spirally arranged, ovuliferous scales & bract scales in female cone are distinctly differentiated).

Genus : *Pinus*

Pinus is the most important genus of the family Pinaceae with 90-100 species. They form dense and extensive forest of evergreen trees in North temperate regions of the World. *Pinus* is tall, evergreen, perennial and xerophytic plant. Young trees are pyramidal and lose symmetry on maturation.

Pinus is represented by six naturally growing species in India.

1. *Pinus roxburghii* Sarg. (= *P. longifolia* Roxb.) (Chir pine)
2. *Pinus wallichiana* A.B.Jacks (= *P. excelsa*) (Blue pine)
3. *Pinus gerardiana* Wall. ex. Lamb (Chilgoza pine)

4. *Pinus insularis* Endl.(=*P. Khasya* Royle.) (khasi pine)

5. *Pinus merkusii* Jungh. (Teenasserim pine)

6. *Pinus armandi* Franchet. (Armand's pine)

Morphology - The *Pinus* tree is a sporophyte. It is tall, straight, woody and covered with scaly bark. *Pinus* is differentiated into roots, stem and leaves. It has a prominent tap root system. The ectotrophic mycorrhizae are common. The stem is erect, cylindrical with monopodial branching. The plants appear conical due to spiral arrangement of branches.

Root - The primary root persists and forms elongated straight tap root. The tip of root has protective root cap. Root hairs are not well developed. The roots undergo frequent forking forming a cluster of small rootlets. The coralloid masses & ectotrophic mycorrhizae grow to form mycorrhizal roots.

Stem - The branches are of two types: 1. Long branches or branches of unlimited growth. and 2. Short dwarf ones or branches of limited growth.

Long branches or Branches of unlimited growth. - These are the ordinary or normal branches. They continue growth indefinitely by means of apical bud and are covered with brown bud scales. These arise as buds in the axils of scale leaves every year. They occur at regular intervals on the main trunk and become gradually shorter towards the apex giving a pyramidal appearance.

Short branches or Branches of limited growth. - These are borne on ordinary branches in the axil of scaly leaves. It consists of short axis terminating in a cluster of three green needles. It has an ephemeral terminal bud that stops growing and becomes inactive. The dwarf shoot is covered with 10-12 scale leaves or cataphylls.

Leaves - The leaves are of two kinds:

1. *Pinus* or Pine needles.
2. Scale leaves.

1. *Pinus* or Pine needles - long, narrow(acicular), tough, green & smooth surface. They appear only on dwarf shoots in clusters of two/three/five in different species. The dwarf shoots bearing foliage leaves are known as spurs. Depending on number of needles present it is called as trifoliar spur (3), bifoliar (2), monofoliar (1) and pentafoliar (5). A thin, dry membranous sheath surrounds the base of each cluster of needles. The needles are persistent, fall only when the spur is shed as a whole. Hence the pine tree is evergreen. The green leaves are toothed and ridged. The needles are straight on young shoots but spread outwards & drop down in older.

Scale leaves - They are brown, membranous and protective in function. They are borne on the long branches & dwarf shoots that fall off as branches mature. The male cones also arise in the axils of scale leaves on long shoots. The scale leaves are triangular at base & more or less lanceolate above. The scale leaves are called cataphylls and have a distinct midrib. The reduced size and sclerotic character of leaves is a xerophytic character.

Reproductive Structures of *Pinus* - *Pinus* is monoecious. The male and female strobili are present on the separate branches of the same plant. The male cones develop before the female cones. They are present in clusters on long shoots. The female cones arise singly or in cluster (2-4) in the axil of scale leaf.