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Course name :

**Crop Production Technology-II
(ASAG 2204)**

Course credit :

(2-1-0)

Lecture 1

Topic: Wheat



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1.1 SCIENTIFIC NAME : *Triticum aestivum*

1.2 FAMILY : Wheat is an annual plant of Gramineae or Poaceae

1.3 ORIGIN :

The origin is south-west Asian countries from where it reached to European countries.

There are 18 species of wheat.

The important cultivated wheat species in India are

1.3.1 Hexaploid [AABBDD]

Triticum aestivum **Common bread wheat (n=21)**

1.3.2 Tetraploid [AABB]

Triticum durum **Macaroni wheat (n=14)**



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1.3.3 Diploid [AA]

Triticum monococcum **Emmer wheat (n=14)**

1.4 In India only three species of wheat namely

Triticum aestivum (common bread wheat)

Triticum durum (macaroni or durum wheat)

Triticum dicoccum (emmer wheat) are economically important.

1.5 Classification of Wheat

It belongs to genus Triticum. Although as many as 18 species of wheat have been describe and recognized by Percival (1921) only a few are of importance in agriculture. The following is the classification on the basis of chromosomal number:



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1.5.1 Einkorn series (diploid)

Chromosome No.

1. Triticum aegiloploids=7
2. Triticum monecocum=7

1.5.2 Einkorn Series (tetraploid)Triticum

dicoccoides=14

1. Triticum timopheevi=14
2. Triticum persicum=14
3. Triticum polonicum=14
4. Triticum turgidum=14
5. Triticum orientale=14
6. Triticum durum=14
7. Triticum dicocum=14



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1.5.3 Dinkale series (hexaploid)

1. Triticum spelts=21
2. Triticum macha=21
3. Triticum aestivum or vulgare=21

1.6 T. aestivum, the bread wheat is grown under 85 % of total area cultivated under wheat in India.

1.7 T. durum, the macaroni wheat, is the 2nd most important sps. of wheat occupying about 14% of wheat area in India. Its cultivation is confined to central and southern India only.

1.8 T. monococcum or emmer wheat is grown on a very restricted scale in Saurashtra region of Gujarat, southern Maharashtra, Karnataka, some parts of Andhra Pradesh and Tamil Nadu.



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1.9 Botanical Description of Wheat

Wheat plant can be divided in 2 distinct parts, viz., root system and shoot system.





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1.9.1 Root system

There are 2 sets of roots in wheat. The seminal or seedling roots belonging to embryo, and are produced by the germinating seedlings.

It arises at the depth where the seed is planted. As plant growth progresses, this primary root system usually dies, and is replaced by the more permanent secondary root system.

The second set of roots is called as 8-9 clonal roots, which arises from the basal nodes of the plants and form the compact vegetative mass known as 'crown'.

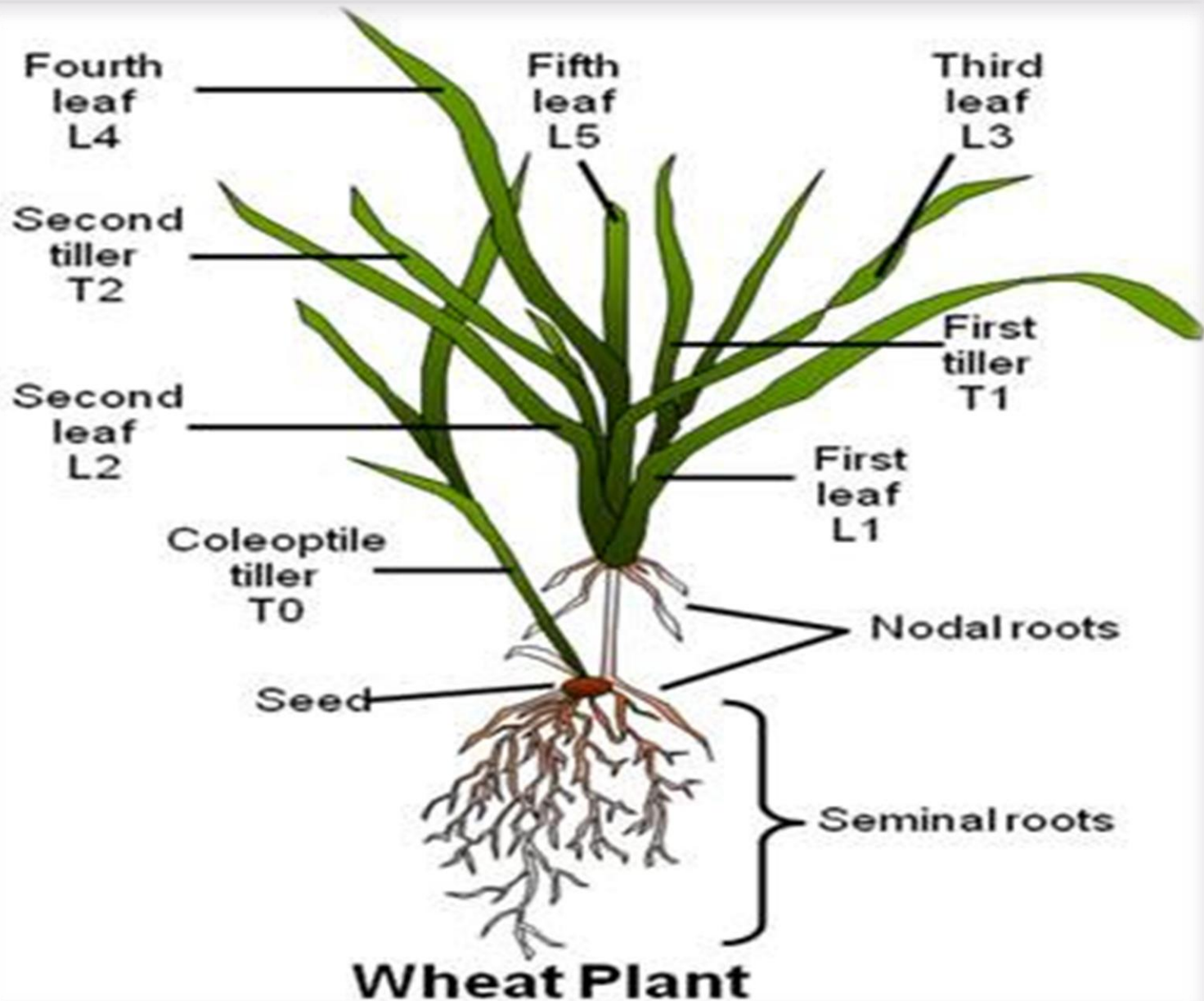
The entire roots are adventitious. The second set forms the permanent root system, while



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the seminal roots dry after about 30 days of the seedlings emergence.





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1.9.2 Shoot system

This system collectively applied to all the visible parts above the ground. It comprises of stems, leaves and inflorescence. A stem and inflorescence may be called a ‘culm’.

Stem: The stem of wheat plant is erect, cylindrical, jointed and smooth. In bread wheat, the stems are hollow, except at the nodes where they are solid, but in a few cultivars of Macaroni wheat, the internodes are completely filled with soft pith.

Leaves: The wheat leaves consists of the following 4 parts.



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Leaf sheath: The basal part of the leaf, which encircles the stem and the blade that bends away from the stem.

Leaf blade: the flattened, parallel veined portion of the leaf.

Ligule: the membranous outgrowth is called ligule.

Auricle: lobes of the leaf blade, which extend downward on each side at the junction of the blade and sheath. These are claw-like appendages projecting from the collar of the leaf.



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1.9.3 Inflorescence: The inflorescence is known as ‘ear’ or ‘head’, but its botanical name is spike. Spikelets are systematically arranged and are distributed along the central zig-zag axis ‘rachis’. The spikelets are borne on alternate sides of the rachis, which gives it a zig-zag appearance.

1.9.4 Spikelet: It is composed of flowers called florets. The number of florets in a spikelet may vary from 1 to 5. The florets in each spikelet are enclosed by 2 glumes.

1.9.5 Kernel: Wheat has a ‘caryopsis’ type of fruit. The typical wheat kernel is 3 to 10 mm in length and 3 to 5 mm in diameter.



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1.20 Growth Stages

Various Growth Stages of Wheat Plant Wheat plant passes through various stages of growth, as described below:

1.20.1 Pre-establishment stages

Pre-emergence: Germination of seeds, which produce seminal roots and coleoptiles.

Emergence: Germinating seeds produce coleoptiles above the soil surface.

1.20.2 Vegetative stages

Seedling: The young plants establish larger root systems in their seedling stage.

Crown root stage: This coincides with three or four leaf stage of plant.



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Tillering: Plant produces crown & branch out into tillers from their base at soil surface

Jointing: At this stage, the plant starts elongating when the nodes start developing above the crown node.

Booting: In this stage, the upper most leaf swells out into flag holding the spike into it.

Heading: In this stage, the spike starts emerging out from the leaf sheath.

Flowering: At this stage, anthesis of florets and fertilization of ovaries take place.

1.20.3 Post-anthesis stages

Filling: After fertilization, the ovaries start elongating in ovules or seed passing through milk, soft-dough and hard-dough stages.

Maturity: At this stage, the colour of glumes changes and kernels become fairly hard.



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1.21 IMPORTANT STAGES OF CROP GROWTH

1.21.1 CRI: In wheat, the first node of crown is formed near the soil surface irrespective of the depth of sowing. Crown roots start developing at this node. Depending upon temperature, CRI takes place 15-21 DAS. Plants at this stage are very sensitive to soil moisture stress. Hence, there is a need for adequate moisture at this stage.

1.21.2 TILLERING: The lateral buds at these nodes give rise to tillers. Tiller initiation takes place 4 weeks after sowing and tillers continue to emerge for another 2 or 3 weeks.

1.21.3 JOINTING STAGE: It represents the node production and active growth period. Up to this stage,



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the seedlings consists of a whorl of leaves. At this jointing stage, the stem becomes visible with distinct nodes.

1.21.4 HEADING: This is the stage where the internodes begin to elongate. Flag leaf and ear emerge towards the end of this stage. Adequate moisture should also be present in the soil at the heading stage.

1.21.5 GRAIN DEVELOPMENT: It is up to the end of soft dough stage of the grain. At this stage also, the plant requires adequate moisture at dough stage.