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AN ANALYSIS OF BOTANY AND EVOLUTION OF PLANT ANATOMY

[1] Prof Hanamant Siddappa Koulagi,

[1] Department of Botany,

KLE's J.T College Gadag, Dist: Gadag State: Karnataka

Abstract: Botany is the scientific study of plants, including how they operate, how they look, how they are connected to one another, where they grow, how people utilise plants, and how plants developed. Botany, often known as plant science, plant biology, or phytology, is a discipline of biology that studies plants. A botanist, plant scientist, or phytologist is a specialist in this subject of science. Botany is derived from the Ancient Greek word botan, which means "pasture," "herbs," "grass," or "fodder"; it is derived from boskein, which means "to feed" or "to graze." Mycologists and phycologists, respectively, have traditionally studied fungi and algae as part of botany, with the study of these three types of organisms continuing within the scope of the International Botanical Congress. Botanists are now studying roughly 410,000 species of land plants, of which 391,000 are vascular plants and 20,000 are bryophytes.

Index Terms - **Botany, Scope, Scope, Evaluation**

1.1 Introduction:

Botany is the scientific study of plants, including how they operate, how they look, how they are connected to one another, where they grow, how people utilise plants, and how plants developed. Botany, often known as plant science, plant biology, or phytology, is a discipline of biology that studies plants. A botanist, plant scientist, or phytologist is a specialist in this subject of science. Botany is derived from the Ancient Greek word botan, which means "pasture," "herbs," "grass," or "fodder"; it is derived from boskein, which means "to feed" or "to graze." Mycologists and phycologists, respectively, have traditionally studied fungi and algae as part of botany, with the study of these three types of organisms continuing within the scope of the

International Botanical Congress. Botanists are now studying roughly 410,000 species of land plants, of which 391,000 are vascular plants and 20,000 are bryophytes.

Botany is one of the oldest branches of science, having begun as herbalism with early humans' efforts to discover and then produce edible, medicinal, and toxic plants. Plants of medical relevance were typically found in mediaeval physic gardens, which were often associated to monasteries. From the 1540s forward, they were forerunners of the first botanical gardens affiliated to universities. The Padua botanical garden was one of the first. The scholarly study of plants was made easier thanks to these gardens. Plant taxonomy began with efforts to categorise and describe their collections, which resulted to Carl Linnaeus' binomial system of nomenclature in 1753, which is still used to name all biological species today.

New tools for studying plants were created in the 19th and 20th centuries, including optical microscopy and live cell imaging, electron microscopy, chromosome number analysis, plant chemistry, and the structure and function of enzymes and other proteins. Botanists used molecular genetic research tools such as genomics, proteomics, and DNA sequences to more correctly identify plants in the last two decades of the twentieth century.

1.2 Scope of Botany:

Botany is a vast, multidisciplinary discipline that draws on contributions and insights from a wide range of scientific and technological fields. Plant structure, growth and differentiation, reproduction, biochemistry and primary metabolism, chemical products, development, illnesses, evolutionary links, systematics, and taxonomy are some of the research themes. Molecular genetics and epigenetics, which examine the mechanisms and control of gene expression throughout plant cell and tissue differentiation, are dominant subjects in 21st-century plant research. Botanical research has a wide range of applications in modern gardening, agriculture, and forestry, plant propagation, breeding, and genetic modification, chemical and raw material synthesis for building and energy production, environmental management, and biodiversity preservation.

Plant research is important because they support practically all animal life on Earth by producing a major amount of the oxygen and food that humans and other organisms require for aerobic respiration and chemical energy. Photosynthesis is a process that uses the energy of sunlight to convert water and carbon dioxide into sugars that can be used as a source of chemical energy as well as organic molecules that are used in the structural components of cells. Plants, algae, and cyanobacteria are the major groups of organisms that carry out photosynthesis. Plants emit oxygen into the atmosphere as a by-product of photosynthesis, a gas that practically all living creatures require for cellular respiration. Plant roots bind and stabilise soils, limiting soil erosion, and they have an impact on global carbon and water cycles. Plants are essential to human society's future since they supply food, oxygen, medicine, and products for people, as well as developing and sustaining soil.

The role of plants as primary producers in the global cycling of life's basic ingredients: energy, carbon, oxygen, nitrogen, and water, as well as ways that our plant stewardship can help address global environmental issues such as resource management, conservation, human food security, biologically invasive organisms, carbon sequestration, climate change, and sustainability, are among the most important botanical questions of the twenty-first century.

1.3 Evolution of Plant Anatomy:

1. **Arbuscular Mycorrhizal Symbiosis is a Symbiotic Relationship between Plants and their Mycorrhizal Fungi:** Although fossil evidence of rhizoids exists for certain species, such as Horneophyton, there is no evidence that early terrestrial plants of the Silurian and early Devonian developed roots. The earliest land plants also lacked vascular systems for water and nutrient transfer. The first land plant discovered to have had a symbiotic relationship with fungi was Aglaophyton, a rootless vascular plant known from Devonian fossils in the Rhynie chert. Fungi formed arbuscular mycorrhizas, literally "tree-like fungal roots," in a well-defined cylinder of cells in the cortex of its stems. The fungi ate the sugars from the plant in return for nutrients produced or removed from the soil, which the plant would not have received otherwise. Aglaophyton, like other rootless land plants from the Silurian and early Devonian periods, may have gotten water and nutrients from the soil through arbuscular mycorrhizal fungus.

2. **Intercellular Spaces, Stomata, and Cuticle:** Plants must absorb CO2 from the atmosphere in order to photosynthesise. However, allowing CO2 to enter the tissues causes water to evaporate, thus this comes at a cost. Plants need to refill water since it is lost considerably faster than CO2 is absorbed. Water was carried apoplastically, within the permeable walls of early terrestrial plants' cells. Later, they developed three anatomical features that allowed them to manage the water loss that came with CO2 uptake. The first step was the development of a waterproof outer coating, or cuticle, which minimised water loss. Second, changeable apertures, or stomata, which could open and close to control the quantity of water lost through evaporation during CO2 uptake, and third, intercellular space between photosynthetic parenchyma cells, which allowed for better internal CO2 distribution to the chloroplasts.

3. **Xylem:** Plants required a more effective water transport system to escape the constraints of limited size and continuous moisture imposed by the parenchymatic transport system. Specialized water transport vascular tissues arose as plants grew taller, first in the form of simple hydroids like those found in the setae of moss sporophytes. At maturity, these basic elongated cells were dead and water-filled, providing a water transport channel, but their thin, unreinforced walls would collapse under moderate water tension, limiting the plant's height. By the mid-Silurian, xylem tracheids, which are wider cells with lignin-reinforced cell walls that are more resistant to collapsing under the tension caused by water stress, are found in multiple plant groups and may have a single evolutionary origin, possibly within the hornworts, uniting all tracheophytes.
4. **Endodermis:** Although an endodermis may have originated in the earliest plant roots during the Devonian, the Carboniferous provides the first fossil evidence for the structure. The root endodermis protects the water transport tissue by regulating ion exchange between the groundwater and the tissues and preventing infections and other contaminants from entering the system. When transpiration isn't enough of a motor, the endodermis can exert upward pressure, forcing water out of the roots.

1.4 Conclusion:

Plant anatomy was polished into a contemporary discipline throughout the late 1600s. Marcello Malpighi, an Italian doctor and microscopist, was one of the two inventors of plant anatomy. His Anatomia Plantarum, published in 1671, was the first substantial development in plant physiogamy since Aristotle. The father of plant anatomy is Nehemiah grew. Roots, stems, leaves, flowers, fruits, and seeds are the basic elements of most terrestrial plants.

Most people think of plants as a broad category of living entities that includes anything from microbes to huge sequoia trees. Algae, fungi, lichens, mosses, ferns, conifers, and flowering plants are all considered plants under this definition. Medicinal plants are thought to be a rich source of components that can be utilised to make pharmacopoeial, non-pharmacopoeial, or synthetic medications. Apart from that, these plants have played an important role in the evolution of human cultures all across the world.

1.5 References:

1. Introduction And Importance Of Medicinal Plants And Herbs | National Health Portal Of India. (n.d.). Introduction and Importance of Medicinal Plants and Herbs | National Health Portal of India.
2. Botany - Wikipedia. (1995, January 1). Botany - Wikipedia.
3. *Hancock, James F. (2004). Plant Evolution and the Origin of Crop Species. Cambridge, MA: CABI Publishing. ISBN 978-0-85199-685-1.*
4. *Gray, Asa; Sargent, Charles (1889). Scientific Papers of Asa Gray: Selected by Charles Sprague Sargent. Boston, MA: Houghton Mifflin. Retrieved February 26, 2012.*
5. *Stover, R.H.; Simmonds, N.W. (1987). Bananas (3rd ed.). Harlow, England: Longman.*
6. *Hunter, Philip (May 2008). "What Genes Remember". Archived from the original on May 1, 2008. Retrieved August 24, 2013.*