

Ministry of Higher Education
Salahaddin University-Erbil
Field Crops and Medicinal Plants Department



PLANT NATURAL PRODUCTS

Third Grade

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Instructor: Assist Prof. Dr. Saber Wasman Hamad

email: saber.hamad@su.edu.krd

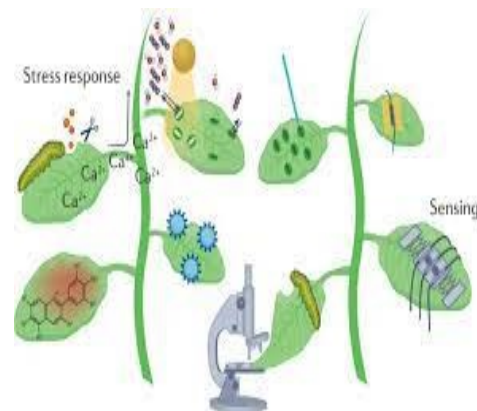
Lecture 3



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What is **Plant** Natural Product?

Plant natural products are organic compounds produced by plants through their metabolic processes.



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Plant natural compounds are not directly involved in the primary functions of plant growth, development, and reproduction, but they serve various secondary roles, including

defense against other plants, herbivores and pathogens,

attraction of pollinators, adaptation to environmental stressors,

and interactions with the surrounding ecosystem.

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General characteristics of plant natural products

- Plant natural products, also known as phytochemicals, exhibit several general characteristics that distinguish them from other chemical compounds.
- These characteristics are a result of their biosynthesis in plants and play important roles in the adaptation and survival of plants in their environments.
- Here are some general characteristics of plant natural products:

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General characteristics of plant natural products

1. Secondary Metabolites:

Plant natural products are often classified as secondary metabolites because they are not directly involved in the primary metabolic processes of plant growth, development, or reproduction. Instead, they serve secondary roles in the plant's interactions with the environment.



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General characteristics of plant natural products

2. Chemical Diversity:

Plant natural products encompass a wide range of chemical structures, including alkaloids, terpenes, phenolic compounds, polyketides, and more. This diversity allows plants to produce compounds tailored to their specific ecological niches.

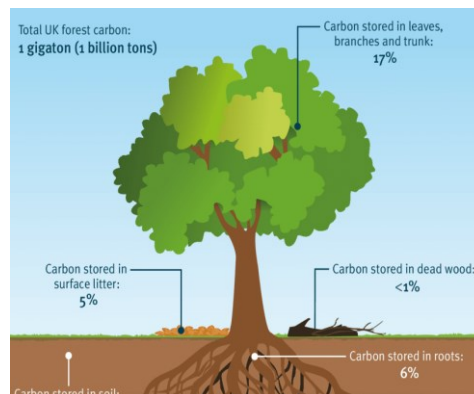


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General characteristics of plant natural products

3. Ecological Functions:

These compounds play various ecological roles, including defense against herbivores and pathogens, attraction of pollinators, allelopathy (inhibition of nearby competing plants), and adaptation to environmental stressors.



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General characteristics of plant natural products

4. Chemical Defense:

Many plant natural products serve as chemical defenses against herbivores and pathogens. They can be toxic, unpalatable, or inhibit the growth of herbivores and pathogens, reducing damage to the plant.



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General characteristics of plant natural products

5. Chemical Signaling:

Plants use natural products for chemical signaling. They release volatile organic compounds (VOCs) to communicate with neighboring plants, herbivores, and beneficial insects. These VOCs can signal stress, herbivore attacks, or attract predators of herbivores.



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General characteristics of plant natural products

6. Antioxidant Properties:

Several plant natural products, particularly polyphenols like flavonoids and phenolic acids, possess antioxidant properties.

They help protect plant tissues from oxidative damage caused by reactive oxygen species (ROS).



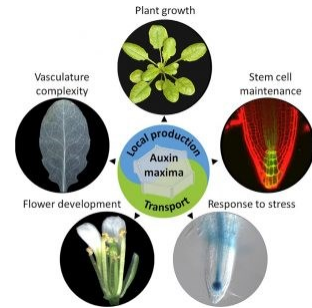
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General characteristics of plant natural products

7. Biosynthesis:

Plant natural products are synthesized through specific biosynthetic pathways within plant cells.

These pathways involve enzymes that catalyze chemical reactions leading to the formation of the final product.



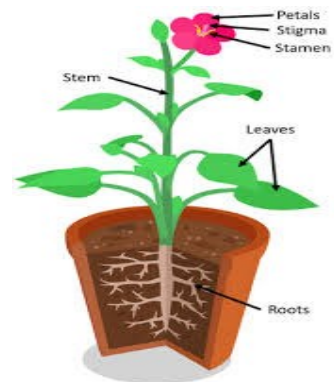
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General characteristics of plant natural products

8. Distribution Across Plant Organs:

Natural products are found in various plant organs, including leaves, stems, roots, fruits, and flowers.

Different parts of the plant may contain distinct natural products with specific functions.



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General characteristics of plant natural products

9. Structural Variation:

Plant natural products can exhibit remarkable structural diversity within and across plant species.

This diversity is a result of the modification of common precursor molecules during biosynthesis.



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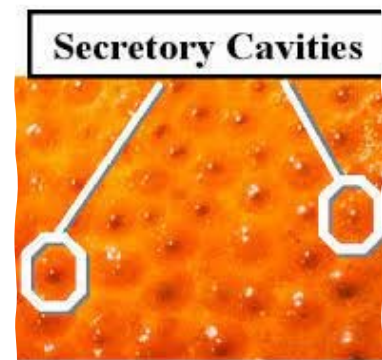
General characteristics of plant natural products

10. Storage and Secretion:

Some plants store natural products in specialized structures, such as glandular trichomes, resin ducts, or secretory cavities. These structures help protect the plant and facilitate the release of defensive compounds when needed.



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Storage and Secretion

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General characteristics of plant natural products

11. Medicinal and Nutritional Value:

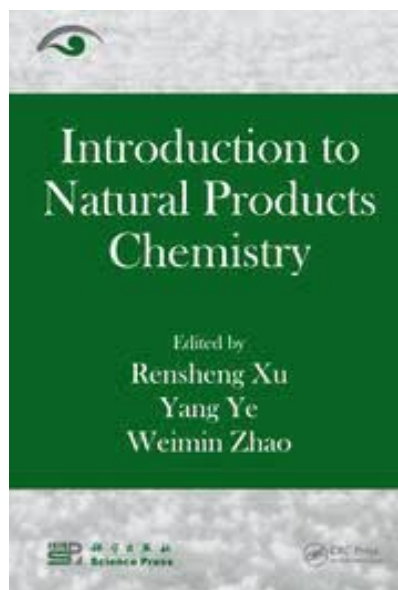
Many plant natural products have medicinal properties and are used in traditional herbal medicine.

They can also provide nutritional benefits when consumed as part of a balanced diet.



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Reference



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