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SECONDARY METABOLITES IN PLANTS

DR.S. SENTHILKUMAR

KARUR, TAMILNADU, INDIA.

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Terpenoids, Alkaloids,
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FOR CORRESPONDENCE:**DR.S.****SENTHILKUMAR *****ADDRESS:**

KARUR,
TAMILNADU, INDIA.

ABSTRACT

In natural habitats, plants are surrounded by an enormous number of potential enemies. Nearly all ecosystems contain a wide variety of bacteria, viruses, fungi, nematodes, mites, insects, mammals and other herbivorous animals. By their nature, plant cannot avoid these herbivores and pathogens simply by moving away, they must protect them selves in otherways. Their first line of defense involves the plant surface. The cuticle (a waxy outer cayer) and the periderm (secondary protective tisiue), besides retarding water loss, provide passive barriers to bacterial and fungal entry. A diverse group of plant compounds, commonly referred to as secondary metabolities, also defends plants against a variety of herhivores and pathogenic microbes. Some secondary metabolities serve other important function as well, such as providing stretural support, as in the case of lignin, or acting as pigments, as in the case of the anthocyanins.

INTRODUCTION:

Plants produce a large, diverse array of organic compounds that appear to have no direct function in their growth and development. These compounds are known as secondary metabolites, secondary products, or natural products. Secondary metabolites have no generally recognized direct roles in the processes of photosynthesis, respiration, solute transport, translocation, protein synthesis and nutrient assimilation.

Plants synthesize a huge variety of secondary metabolites, with complex chemical composition, which are produced in response to different forms of biotic stresses, as well as to fulfil important physiological tasks, like attracting pollinators, establishing symbiosis, providing structural components to lignified cell walls vascular tissues. Importantly, many of the secondary metabolites produced by a plants are used by pharmaceutical industries, in cosmetics, nutrition, for the manufacture of drugs, dyes, fragrances flavors, dietary supplements. Hence, both the scientific and industrial interest around plant secondary metabolites is enormous.

PHARMACOLOGICAL ACTIVITIES OF SECONDARY METABOLITES

Extensive biological investigations have been carried out with in the group of these studies have revealed a broad spectrum of pharmacological and physiological properties.

1. TERPENOIDS:

A number of terpenoids gaining medicinal applications. The recent findings demonstrate that certain nitrogenous terpene derivatives possess the potent anti-hypertensive activity and may indicate a new era in medicine through the synthetic terpenoids path. The antimicrobial and insecticidal properties of other terpenoids have led to their utilization as pesticides and fungicides in agriculture and horticulture.

2. ALKALOIDS:

Alkaloids used some important pharmacological and medicinal activities. Antifungal, anticancer, antibacterial, anti inflammatory, antimalarial, stimulant, insecticide, anti depressant activity etc.

3. PHENOLICS:

Phenolic compounds from plants are one of the largest group of secondary plant constituents synthesized by fruits, vegetables, teas, cocoa and other plants that process certain health benefits. They are characterized by the antioxidant, anti-inflammatory, anti-carcinogenic and other biological properties.

4. TANNINS:

The tannins also constitute the active principles of plant-based medicines. According to the literature the tannin-containing plants are used as astringents against diarrhea, diuretic against stomach and duodenal tumors and anti-inflammatory activity.

5. SAPONINS:

They are largely distributed in the plant kingdom which have many physicochemical and biological properties. Haemolytic, antimicrobial, antioxidant, molluscicide, insecticide and ichthyocide, exploited in many applications in food, cosmetics, pharmaceutical industries and soil bioremediation.

CONCLUSION:

Secondary metabolites, also known as phytochemicals, natural products or plant constituents are responsible for medicinal properties of plants to which they belong. Many scientific sources state that their role is not crucial for living cells in normal growth, development and reproduction, but they act in defense purposes to protect a plant from any possible harm in the ecological environment and other interspecies protection. Therefore, they are usually synthesized in plants for particular needs. While the primary metabolites have generally the shared biological purposes across all species, plants have been evolving to adapt to the environment with genetic encoding of useful and diverse syntheses for secondary metabolites. In human life, these compounds are used as medicines, flavorings, or relaxing drugs, especially essential oils.

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