

Plant secondary metabolites: A review

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Abstract

Plant are important sources of drug additives, flavors and others. The importance of these secondary metabolites has resulted in the production of these products and their potential in recent years. Plants cell culture technologies have been introduced during the 1960's as a possible tool for both studying and producing plant secondary metabolites. The focus of the present is the application of tissue culture technology for the production of other important plant secondary metabolites. The present antimicrobial properties and importance of plant secondary metabolites.

Keywords: plant secondary metabolites, recent improvements, antimicrobial properties, tissue culture

Introduction

Metabolites are the intermediates and products of metabolism. The metabolites are usually restricted to small molecules. Metabolites have different functions, including fuel, structure, signaling, stimulatory and inhibitory effects on enzymes, catalytic activity of their own (usually as a cofactor to an enzyme), defense, and interactions with other organisms. These substances, which are traditionally referred to as secondary metabolites, are often distributed in the taxonomic groups. The evolving commercial significance of secondary metabolites has been successful in the possibility of altering the production of bioactive plant metabolites by means of tissue culture technology. Plant cell and tissue culture technologies can be used routinely used under sterile conditions from explants, such as leaves, stems, roots, and meristems for both ways of multiplication and extraction of secondary metabolites. In-vitro production of secondary metabolite in plant cell suspension.

Classification

Compounds containing solubility in various solvents, composition (containing nitrogen or not), or the pathway by which they are synthesized (Eg, phenylpropanoid, which produces tannins). And usually classified according to their biosynthetic pathway. Phenolic, Terpene and Steroid, and alkaloid, flavanoid.

Alkaloids

Alkaloids are originally defined as pharmacologically active, nitrogen-containing basic compounds of plant origin and they can block ion channels, inhibit enzymes or mess about with neurotransmission, producing hallucination, loss of coordination, convulsions, vomiting, and death.

Phenolic

Phenolic interfere with digestion, slow growth, block enzyme activity and cell division.

Terpenes

Terpenes are among the most widespread chemically groups of natural products. Terpenes are classified by the number of 5-carbon units. The function of terpenes in plants is

considered to be ecological and physiological, allelopathy, insecticidal, insect pollinators, plant hormones.

Flavonoids

Flavonoids with more than 4500 different parts, the flavonoids constitute an enormous class of phenolic natural products. Present in most plant tissues, often in vacuoles, flavonoids can occur as monomers, dimers and high oligomers. Flavonoids include different sets of compounds and perform a wide range of functions. Specific flavonoids can there for be used to protect plants against UV-B irradiation. Tea Flavones, aurones, flavanones, isoflavonoids, flavones, flavonols, leucoanthocyanidins, catechins, and anthocyanins.

Production of secondary metabolites and recent improvements of production process

Plant secondary metabolites are single resources for pharmaceuticals, food additive, and fine chemical. They also provide original materials in other areas. Other techniques for the production of such plants include: extraction of plant growth and chemical synthesis. But, in the process of production, the production of secondary metabolites by plant cell culture is still largely biotechnological. One of the major obstacles in the field of metabolites in plant cell cultures Insecticides, herbivores and pathogens, or to biotic and other biotic stresses, some Strategies for the production of metabolites based on metabolic and metabolic processes are described in the literature. Many such treatments really promote the wide range of secondary metabolites, both *in vivo* and *in vitro*. However, the productivity is still competitive for industrial applications.

A recent work for improving production of plant metabolites has been applied on the plant growth and the production of biocides. Their mechanisms for the transduction pathway include the use of biosynthetic mutations in the metabolic pathway of secondary metabolites and the regulation of secondary metabolites. Genes to metabolic intermediates and metabolic intermediates secondary metabolism in a whole sense.

Antimicrobial properties of plant secondary metabolites

Plants produce a huge variety of secondary compounds as a natural protection against microbial and insect attack. Some of these compounds are toxic to animals, but others may not be toxic. Indeed, the potential benefits of plant compounds are believed to be beneficial in the production of plant compounds.

Essential oil and its effects

Essential Oils are steam-volatile and organic-solvent extracts traditionally used for many years for the pleasant odor of the essence, its flavor and its antiseptic and / or preservative properties. Recently, for example, the effects of essential oils have been taken against pathogenic bacteria. Oils from *Cinnamomum osmophloeum* have been shown to possess uncontaminated activity against *E. coli*, *Enterococcus faecalis*, and *Staphylococcus aureus* (including the clinically problematic methicillin resistant *S. aureus*), *Salmonella* sp. and *Vibrio parahemolyticus*; Cinnamaldehyde is the main antibacterial component of the mixture. *E. coli* O157: H7 is inhibited by oregano oil, peppermint oil and essential oils from other herbs. *Helicobacter pylori* are highly sensitive to spearmint oil. These compounds are widely used in antiseptic mouthwashes. With this range of antimicrobial activity, it is essential to evaluate essential oils. Essential oils have been studied many years ago their contribution to palatability in some plant species. Oh *et al.* (1967) has shown that individual oils have different effects on mixed ruminal bacteria. Monoterpene hydrocarbons are less toxic and sometimes stimulatory to the microbial activity compared with the corresponding oxygenated compounds, the monoterpene alcohols and aldehydes. R.J. Wallace (2004), said that they are not toxic to ruminal bacteria, and their effects may be expected to persist.

Saponins and effects of saponins in ruminants

Saponins, like essential oils, are covered by a wide variety of chemical compounds, and are similar to essential oils. The word 'saponin' is derived from the Latin word *sapo* (soap) and has traditionally been used in saponin-containing plants. Cemicly, sponing are high molecular weight glycosides in which sugars are related to a triterpene or steroidal aglycone moiety. Van Nevel & Demeyer (1990) found no sign of any toxic effects of sarsaponin on microbial growth or protein breakdown. *In vitro* In contrast, Lu *et al.* (1987) has reported that Lucerne (*Medicago sativa*) saponins appear to suppress fermentation in a continuous culture. There are many consequences for fermentation and that for nutrition, which results from protozoa removal. A meta-analysis has recently revealed the benefits of defaunation outweigh any disadvantages. Antiprotozoal agents, such as surface-active agents, have been investigated in their clinical trials and have been suspected of having problems with other conditions. Lipids are toxic to protozoa and hence to fiber digestion. Thus, there is no reliable safe on-farm method for suppressing protozoa.

Importance and natural functions of secondary metabolites

Secondary metabolites, which are a characteristic feature of plants, are especially important and can protect plants against a wide variety of microorganisms (viruses, bacteria, fungi) and herbivores (arthropods, vertebrates). As is the

situation with all defense systems of plants and animals, a few specialized pathogens have evolved in plants and have overcome the chemical defense barrier.

Secondary metabolites, including antibiotics, are produced in nature and provide a survival function for the formation of secondary metabolites, because of the ability of the fungi, amoebae, plants, insects and large animals, as metal transport agents, as agents of symbiosis between microbes and plants, nematodes, insects, and higher animals, as sex hormones; Some antibiotics are not obligatory for the population, but some secondary metabolites (including antibiotics) stimulate the formation of secondary metabolites and spores. The secondary metabolite can slow down the germination of spores and reduce the competitive environment, and protect the dormant or induced spore from the consumption of amoeba, or cleanse the immediate environment of competing microorganisms during germination.

Conclusion

Secondary metabolites are the useful natural products that are synthesized by secondary metabolism in plants. The production of some secondary metabolites is related to the induction of morphological differentiation and to the fact that the cells undergo morphological differentiation and maturation during plant growth. It is seen that *in-vitro* production of secondary metabolites is much higher than different tissues when compared to non-differentiated or less-differentiated tissues. There are many advantages of these metabolites, and they are especially useful in the metabolites. Many other Examples of metabolic engineering metabolic engineering are probably a major step forward in the development of plant metabolites. And Advances in plant cell cultures could provide cost-effective, commercial production of rare or exotic plants, their cells, and the chemicals that they will produce.

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