Novel Plant Diterpene Synthase and Their Use for Production of Diterpene Products

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ABSTRACT

Researchers at the University of California, Davis have developed a diterpene synthase (diTPS) of plant origin that shows a novel enzyme function in forming the precursor to a chemotherapeutic lead compound, and methods for producing other natural and novel high-value natural products.

FULL DESCRIPTION

Manufacturing bioproducts by means of chemical synthesis or extraction from natural producers, is limited due to the compounds' chemical complexity and low abundance in nature. The use of plant-derived enzymes in microbial or plant-based combinatorial production systems can enable the scalable and versatile production of various bioproducts.

Researchers at the University of California, Davis have developed diterpene synthases (diTPS) of plant origin that show novel enzyme functions, and methods for producing natural and novel high-value diterpene natural products. A previously unidentified 5,7-fused bicyclic diterpene, termed pseudolaratriene, has expanded the known structural landscape of plant diterpenoids. There is evidence that pseudolaratriene serves as a key intermediate for pseudolaric acid B (PAB). PAB is a rare diterpenoid naturally occurring in the roots of the Chinese Medicinal plant golden larch and holds promise to yielding numerous therapeutic bioproducts with anti-cancer and anti-microbial efficacy. The broad spectrum of diterpenoid bioproducts accessible through combinatorial engineering of diTPS stretches from high-end perfume ingredients to potential pharmaceuticals for the treatment of cancer, diabetes and inflammation. Current therapeutics involving diterpenoids include the anti-cancer drug taxol and the weight-loss drug forskolin.

APPLICATIONS

- Cosmetics
- Anti-cancer drugs
- Anti-diabetic drugs
- Anti-inflammatory drugs

FEATURES/BENEFITS

- Improved production
- Wide range products
- Possible new uses

RELATED MATERIALS

- Zerbe P and Bohlmann J (2015) Plant diterpene synthases: exploring modularity and metabolic diversity for bioengineering. Trends in Biotechnology 3, 419-28. - 07/01/2015

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20190241912	08/08/2019	2015-775
Patent Cooperation Treaty	Published Application	2018/022654 A1	02/01/2018	2015-775

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OTHER INFORMATION

KEYWORDS

biosynthesis, bioproducts, diterpene, ambroxides, metabolic engineering, marrubiin, andrographolide, plant natural products, lead compounds, Pseudolarix amabilis, pseudolaric acid, chemotherapeutic drug

CATEGORIZED AS

- **Materials & Chemicals**
  - Biological
- **Medical**
  - Disease: Autoimmune and Inflammation
  - Disease: Cancer
  - Disease: Metabolic/Endocrinology

RELATED CASES

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