

Ganoderma and its Secondary Metabolites

Kenza Cope*

Department of Pharmacy, Medical University, Bolivia, South America

PERSPECTIVE

Ganoderma is a genus of more than 300 wood-decaying fungi belonging to the Ganodermataceae family (order Polyporales). *Ganoderma* are shelf-like or knoblike fungi that feed as saprobes on dead wood or as parasites on living wood in hardwood trees, conifers, and palms. While some species are host-specific, the majority have a wide variety of hosts, and some are economically important plant diseases. Several species, notably the well-known reishi or lingzhi mushroom (*G. lucidum*), are frequently used in traditional Asian medicine and have piqued researchers' curiosity for their potential utility in cancer and other disorders.

Ganoderma fungus can be annuals or perennials, and can grow to be quite enormous, with a bracket-like pileus (cap) that can grow to be more than 60 cm (24 inches) in diameter. While many species have a rudimentary stipe (stalk) to hold the pileus, some species are sessile and have the pileus connected directly to the tree. Coloration patterns within species can vary based on age and environmental circumstances, but pileus can be white, yellow, brown, red, or deep purple, with a light-colored border. Some species have a polished, gleaming look.

Ganoderma fungus uses a variety of enzymes to break down lignin and cellulose in their hosts, causing the wood to break down and become bleached. While this breakdown process is beneficial to

the environment, *Ganoderma* infection in live plants can be fatal and has economic repercussions for a variety of agricultural and commercial plants. Some species, for example, produce serious infections in cocoa, rubber, tea, and coffee plants, while *G. zonatum* has resulted in significant crop losses in the Asian oil palm sector.

Secondary metabolites

The biological importance of secondary metabolites identified from *Ganoderma* is discussed in this article. Over the last 40 years, phytochemical research has resulted in the isolation of 431 secondary metabolites from diverse *Ganoderma* species. (a) C30 lanostanes (ganoderic acids); (b) C30 lanostanes (aldehydes, alcohols, esters, glycosides, lactones, ketones); (c) C27 lanostanes (lucidenic acids); (d) C27 lanostanes (alcohols, lactones, esters); (e) C24, C25 lanostanes; (f) C30 pentacyclic (n)

Ganoderma lucidum is the species that has had the most research done on it in terms of secondary metabolites and biological activity. *Ganoderma colossum*, *Ganoderma sinense*, *Ganoderma cochlear*, *Ganoderma tsugae*, *Ganoderma amboinense*, *Ganoderma orbiforme*, *Ganoderma resinaceum*, *Ganoderma hainanense*, *Ganoderma concinna*, *Ganoderma pfeifferi*, *Ganoderma neo-japonicum*, *Ganoderma tropicum*, *Ganoderma australe*, more phytochemical research on *Ganoderma* could lead to the discovery of hitherto unknown biologically active secondary metabolites.

Correspondence to: Kenza Cope, Department of Pharmacy, Medical University, Bolivia, South America, E-mail: copek@gmail.com

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