Ginseng (*Panax sp.*)

PhytoLab

REFERENCE SUBSTANCES FOR HERBAL PRODUCTS

As one of the leading manufacturers internationally, PhytoLab offers over 1,500 extensively documented herbal reference substances of all classes of natural compounds. Our portfolio includes various reference substances applied in the analysis and quality control of ginseng, derived extracts and finished products thereof.

Genus Panax

The genus Panax (family: *Araliaceae*) comprises of several species, predominantly three of them being used in phytotherapy: ***Panax ginseng* C. A. Meyer**, known as Asian, Korean or Chinese ginseng, occurs mainly in Korea, northeastern China and Siberia, but is also cultivated in Europe, Australia and the Caucasus. ***Panax quinquefolius* L.**, known as American ginseng, occurs in North America and is also being cultivated in China. ***Panax notoginseng* (Burkill) F. H. Chen ex C. Y. Wu & K. M. Feng** (synonym: *Panax pseudoginseng* Wall. var. *notoginseng* (Burk.) Hoo et Tseng), known as notoginseng or Tienchi (from the Chinese name tiánqī) ginseng grows naturally in China and Japan. The botanical name Panax means all-heal in Greek. The word ginseng derives from the Chinese term rénshēn, rén meaning “person” and shēn meaning “root”. Thus, ginseng describes the man-like appearance of the ginseng root.

Medicinal use

Ginseng root has been used for more than two thousand years in traditional Chinese and Korean medicine and became popular in Europe in the 17th century. *P. ginseng* and *P. quinquefolius* are known as **adaptogenic herbs**, while *P. notoginseng* has been used extensively in the **treatment of blood disorders**.
Depending on the processing method – which strongly influences the phytochemical composition and, thus, also pharmacological activities – two types of ginseng roots are commonly applied: **red ginseng**, prepared by steam treating the roots of *P. ginseng* C. A. Meyer prior to drying, and **white ginseng**, obtained by dehydration without the heating step. **The European Union herbal monograph** on *Panax ginseng* C. A. Meyer radix describes the traditional use of the comminuted or powdered root of white and red ginseng, besides various ethanolic or methanolic liquid, soft or dry extracts thereof, for the purpose of **treating symptoms of asthenia such as fatigue and weakness**. Korea ginseng is also widely **consumed as a food product**, e.g. in form of soups or beverages, liqueurs, cookies or candies, or as an ingredient of ginseng coffee.

phyproof® reference substances for the analysis and quality control of *Panax sp.*

Reference Substance	Product #
Ginsenosides (derived from protopanaxadiol)	
Ginsenoside Rb1	89208
Ginsenoside Rb2	89209
Ginsenoside Rc	89210
Ginsenoside Rd	89211
TLC markers	
Escin	89871
Arbutin	89510
Ginsenosides (derived from protopanaxatriol)	
Ginsenoside Re	89212
Ginsenoside Rf	89213
Ginsenoside Rg1	89214
Ginsenoside Rg2	89680
Notoginsenoside R1	89743

phyproof® Reference Substances
PhytoLab GmbH & Co. KG / Dutendorfer Str. 5–7 / 91487 Vestenbergsgreuth / GERMANY
Phone: +49 9163 88-395 / Fax: +49 9163 88-456
ref-substances@phytolab.de / phyproof.phytolab.com

phyproof®
Proof of Quality for Markers

Ginseng (*Panax sp.*)

PhytoLab

United States Pharmacopoeia has monographs on **Asian**, **American** and **Tienchi ginseng**, describing the dried roots as well as powders and extracts prepared thereof. These monographs specify contents of ginsenosides, either individually for e.g. Rb1, Rg1 or notoginsenoside R1, or as the sum of several compounds including e.g. Rb1, Rb2, Rc, Rd, Re and Rg1, or Rb1, Rd, Re and Rg1 as well as notoginsenoside R1.
Peak area ratios, e.g. between Rb2 and Rb1, or between Rg1 and Rb1, descriptions of signal intensities, or absence of certain components are used for species authentication purposes.

Chemical composition

Ginseng contains typical tetracyclic terpenes known as **ginsenosides**. According to the nature of the underlying aglycone the ginsenosides can be further classified into compounds with **protopanaxadiol or protopanaxatriol skeleton**. Besides these dammarane-type saponins also pentacyclic oleanane-type ginsenosides occur, e.g. Ginsenoside Ro. Ginsenosides usually bear up to four glycosidic moieties in one or more side chains attached to various positions of the aglycone. The content of ginsenosides depends on the origin, the age and the root parts analyzed. All other parts of the plant also contain ginsenosides but in different ratios. The ginsenoside pattern also allows **differentiation between white and red ginseng, and the various Panax species**. Ginsenoside Rf, for example, is present in *P. ginseng*, but absent in *P. quinquefolius*. Roots of *P. notoginseng* and *P. quinquefolius* have a high content of ginsenoside Rb1. The dominant ginsenoside in *P. notoginseng* is Rg1, while ginsenoside Ro is completely absent.

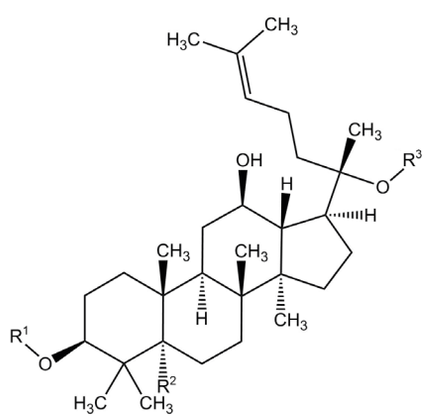
Pharmacopoeias

In **European Pharmacopoeia**, the monographs on **ginseng root** (*P. ginseng*, white or red), **ginseng dry extract** and **notoginseng root** specify contents of ginsenosides calculated either as the sum of Rb1 considering ginsenosides Rb1, Rb2, Rc, Rd, Re, Rf, Rg1, Rg2. **Arbutin and escin** are used as analytical markers in the TLC identification tests. Zones and peaks due to the various ginsenosides are described in TLC as well as HPLC chromatograms.

Reference Substances

For a reliable quantitative analysis and quality control of ginseng products well characterized reference substances are essential. **PhytoLab offers all reference substances described in EP and USP ginseng monographs. All of them are characterized as primary reference substances and supplied together with a comprehensive certificate of analysis**. Many other natural products that have been described to occur in ginseng are available as well (e.g. Panaxadiol, Panaxatriol, Pseudoginsenosides and many more). For a full listing and up-to-date information on prices and specifications please contact us or visit our webshop at **phyproof.phytolab.com**.

Structures of selected ginsenosides



Ginsenoside	R^1	R^2	R^3
Rb1	β-D-Glc-β-D-Glc	H	β-D-Glc-β-D-Glc
Rb2	β-D-Glc-β-D-Glc	H	β-D-Glc-α-L-Ara
Rc	β-D-Glc-β-D-Glc	H	β-D-Glc-α-L-Araf
Rd	β-D-Glc-β-D-Glc	H	β-D-Glc
Re	OH	CH_2-O-β-D-Glc-α-L-Rha	β-D-Glc
Rf	OH	CH_2-O-β-D-Glc-α-D-Glc	OH
Rg1	OH	CH_2-O-β-D-Glc	β-D-Glc
Rg2	OH	CH_2-O-β-D-Glc-α-L-Rha	OH
Notog. R1	OH	O-β-D-Glc-β-D-Xyl	β-D-Glc

phyproof® Reference Substances
PhytoLab GmbH & Co. KG / Dutendorfer Str. 5–7 / 91487 Vestenbergsgreuth / GERMANY
Phone: +49 9163 88-395 / Fax: +49 9163 88-456
ref-substances@phytolab.de / phyproof.phytolab.com

phyproof® Proof of Quality for Markers