the nature network®

PhytoLab

Reference Substances for Herbal Products

Ginseng (*Panax sp.*)

As one of the leading manufacturers internationally, PhytoLab offers over 1,100 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.

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. Red ginseng is obtained by steam-treating the roots of *P. ginseng* prior to drying, while white ginseng is obtained by drying without the heating step. *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. 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. 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, or of various ethanolic or methanolic liquid, soft or dry extracts thereof, for the purpose of treating symptoms of asthenia such as fatigue and weakness. Especially in 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 #	Reference Substance	Product #
Ginsenosides (derived from protopanaxadiol)		**Ginsenosides (derived from protopanaxatriol)**	
Ginsenoside Rb_1	89208	Ginsenoside Re	89212
Ginsenoside Rb_2	89209	Ginsenoside Rf	89213
Ginsenoside Rc	89210	Ginsenoside Rg_1	89214
Ginsenoside Rd	89211	Ginsenoside Rg_2	89680
TLC markers		Notoginsenoside R_1	89743
Escin	89871		
Arbutin	89510		

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Proof of Quality for Markers

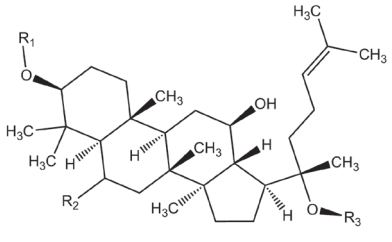
Ginseng contains typical tetracyclic terpenes known as ginsenosides. According to the nature of the underlying aglycone the ginsenosides can be further classified into compounds with protopanaxadiol or protopanaxatriol skeleton. Besides these dammarane-type saponins also pentycyclic oleanane-type ginsenosides 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 Rb_1. The dominant ginsenoside in *P. notoginseng* is Rg_1, while ginsenoside Ro is completely absent.

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 Rb_1 and Rg_1, or expressed as Rb_1 considering ginsenosides Rb_1, Rb_2, Rc, Rd, Re, Rf, Rg_1 and Rg_2. 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.

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. Rb_1, Rg_1 or notoginsenoside R_1, or as the sum of several compounds including e.g. Rb_1, Rb_2, Rc, Rd, Re and Rg_1, or Rb_1, Rd, Re and Rg_1 as well as notoginsenoside R_1. Peak area ratios, e.g. between Rb_2 and Rb_1, or between Rg_1 and Rb_1, descriptions of signal intensities, or absence of certain components are used for species authentication purposes.

For a reliable analysis and quality control of ginseng products well characterized reference substances are essential. PhytoLab offers all reference substances described in EP and USP. 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. For a full listing and up-to-date information on prices and specifications please contact us or visit our webshop at **http://phyproof.phytolab.de**.

Structure of ginsenosides



Ginsenoside	R_1	R_2	R_2
Rb_1	β-D-Glc-β-D-Glc	H	β-D-Glc-β-D-Glc
Rb_2	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-β-D-Glc	OH
Rg_1	OH	CH_2-O-β-D-Glc	β-D-Glc
Rg_2	OH	CH_2-O-β-D-Glc-α-L-Rha	OH
Notog. R_1	OH	O-β-D-Glc-β-D-Xyl	β-D-Glc

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