

46.1 Introduction

Dangshen, Radix *Codonopsis pilosulae*, is the dry root of *Codonopsis pilosula* (Franch.) Nannf. (Campanulaceae), which is collected in the fall. It is officially listed in the Chinese Pharmacopoeia and is used mainly as a tonic.

46.2 Chemical Constituents

The root of *C. pilosula* is one of the best-known traditional Chinese medicines and has sometimes been used as a substitute for ginseng in traditional Chinese medicine. Comparative thin-layer chromatographic studies on the butanol extracts of the roots of *C. pilosula* and their hydrolysates were carried out. The thin-layer chromatogram of the root extracts of *C. pilosula* from different areas were found to be similar to each other but quite different from those of the roots of *P. ginseng* and *P. pseudoginseng* [1].

The water-soluble components of the root of *C. pilosula* contain sugars, amino acids, and inorganic elements [2]. Essential mineral elements for humans detected in the root include K, Na, Ca, Mg, Fe, Cu, Co, Zn, Mn, Cr, and Mo [2, 3]. Inulin and fructose were the two major sugars. The monosaccharide content in the root was 4.3 g/10 g [4]. At least 17 amino acids were detected in the root [2] including threonine, aspartic acid, isoleucine, alanine, asparagine, glutamic acid, glycine, serine, valine, proline, and glutamine [5, 6].

The sterols and triterpenes in the root of *C. pilosula* include α -spinasterol [7] and its β -D-glucopyranoside, Δ^7 -stigmasterol and its β -D-glucopyranoside [8], $\Delta^{5,22}$ -stigmasterol [9], taraxerol, taraxeryl acetate [10], and friedelin [10].

The following substances were also isolated and identified: butyloxycarbonylurea [10], 5-(hydroxymethyl)-2-furaldehyde and 5-(methoxymethyl)-2-furaldehyde (46-1) [11], 2-furancarboxylic acid, atractylenolide II (27-2), atractylenolide III (27-3), syringin, 4-hydroxy-3,5-dimethoxybenzaldehyde [12], alkanol- or alkenolglycosides ethyl- α -D-fructofuranoside, *n*-hexyl- β -D-glucopyranoside [12], (Z)-3-hexenyl- β -D-glucopyranoside, and (E)-2-hexenyl- β -D-glucopyranoside [13]. The major components of the essential oil of *C. pilosula* were identified as methyl palmitate, octadecane, nonadecane, heptadecane, and long-chain carboxylic acid [14].

Antiulcerous polysaccharides named CP-1, CP-2, CP-3, and CP-4 were also isolated from the root of *C. pilosula*. They are primarily composed of glucose, fructose, galactose, arabinose, mannose, rhamnose, xylose, and ribose in different ratios [15, 16].