MAJOR CHEMICAL CONSTITUENTS OF *STROBILUS LUPULI*

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Abstract: Strobilus Lupuli consists of the dried strobiles or inflorescences of the female plants of Humulus lupulus L (Cannabaceae). We want to learn Major chemical constituents of Strobilus Lupuli and uses in traditional medicine.

Key word: Strobilus Lupuli, Humulus lupulus L, Cannabaceae.

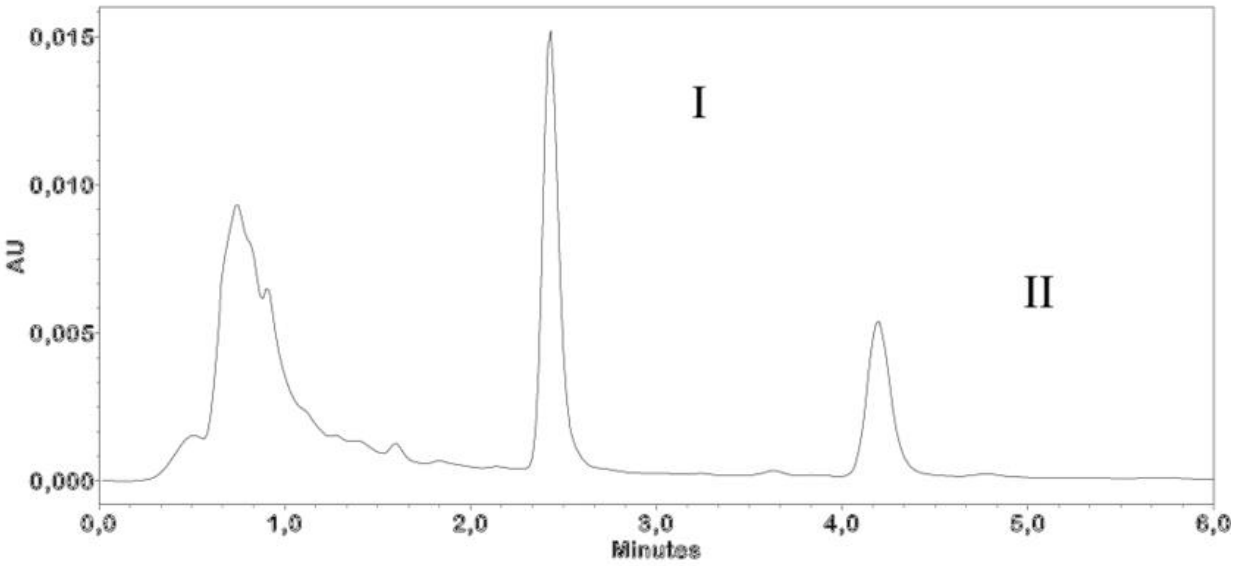
Description. A perennial, dioecious, twining herb, up to 6 m high. Aerial parts consist of several long, angular, rough-hairy, entwining stems bearing cordate, palmate, three-lobed, occasionally five- to seven-lobed, scabrous, dark green, stipulate leaves. Staminate flowers, with five bracts and five stamens, borne in axillary panicles. Pistillate flowers pale green, each consisting of an entire cup-like perianth and a unilocular ovary with a single ovule, and two long stigmas, borne on a leafy conical catkin. Fruits are ovate to ovate-cylindrical strobiles consisting of a flexuous rachis bearing yellowish-green to pale brown, ovate, membranous, scaly bracts, each enclosing a brown glandular achene.

Plant material of interest: dried strobiles. General appearance

Strobiles ovoid-cylindrical or cone-like, leafy, 3–4 cm long and up to 3 cm wide, consisting of a narrow, hairy, flexuous rachis and numerous imbricated, yellowish-green to dusky yellow, obliquely ovate, membranous bracts, the base of each with numerous orange to yellowish-orange, glandular trichomes, and frequently infolded on one side, enclosing a light brown subglobular glandular achene.

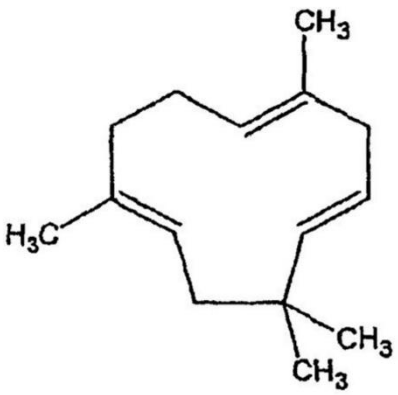
Chemical assays

High-performance liquid chromatography for bitter substances and Xanthohumol.

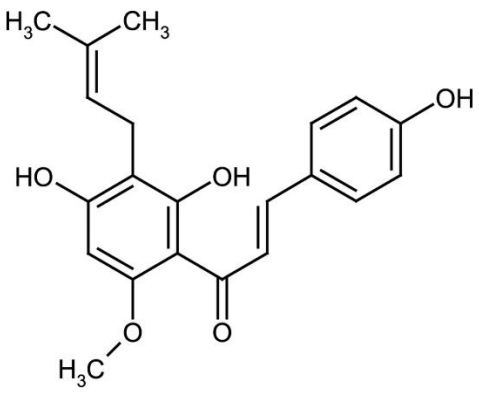


Representative HPLC chromatogram of a real extract sample: Humulus lupulus. Denotation of peaks: I-quercetin, II-kaempferol, isorhamnetin-detected only in traces. Column XBridge, mobile phase 0.1 % formic acid in water/methanol (14:11)

Major chemical constituents The major constituents are bitter substances (15–25%) in the resins. The resins are differentiated into hard (petroleum-ether insoluble) and soft resins. The lipophilic soft resins contain mainly α-acids (e.g. α-humulene (2,6,9-humulatriene) and related humulones) and β-acids (lupulones). The major chemical constituents of the soft resins are humulone and lupulone and their related derivatives, 2–10% and 2–6%, respectively. The hard resin contains a hydrophilic fraction, δ-resin, and a lipophilic fraction, γ-resin. The essential oil (0.3–1.0%) contains mainly monoterpenes and sesquiterpenes such as β-caryophyllene, farnesene, humulene and β- myrcene. The essential oil also contains traces of 2- methylbut-3-ene-2-ol, which increases in amount to a maximum of 0.15% after storage of the strobiles for 2 years, owing to degradation of the humulones and lupulones. Other constituents include the chalcone xanthohumol, prenylflavonoids and other flavonoids (e.g. kaempferol, rutin) and tannins. Representative structures are presented below.



α-humulene



xanthohumol

Uses described in pharmacopoeias and well established documents As a sedative for the treatment of nervous tension and insomnia. Treatment of dyspepsia and lack of appetite.

Uses described in traditional medicine Treatment of abdominal cramps, anaemia, bacterial infections, dermatitis, diarrhoea, dysmenorrhoea, leukorrhoea, migraine and oedema. As an analgesic, anthelminthic, antipyretic, carminative, depurative, digestant, diuretic, diaphoretic and tonic.

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