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Determination of Chemical Constituents of *Curcuma Aromatica* and *C. Longa* *

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Abstract: The chemical compositions of the volatile oils obtained from two traditional Chinese medicines, rhizomes of *Curcuma aromatica* and *C. longa* were analyzed by GC- MS- DS. The major constituents in the oil from *C. aromatica* are Germacrene D, Curdione and Germacrone, whereas those in the oil from *C. longa* are xanthorrhizol, Camphor, α- curcumene, Germacrone, 1- methyl- 2, 3- methlene- 4- isopropylcyclohexanol, and 1, 8- cineol.

Key words: *Curcuma aromatica*; *Curcuma longa*; rhizome; volatile oil; chemical composition
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Both *Curcuma aromatica* Salisb. and *C. longa* L. (Zingiberaceae) grow wild in Zhejiang and Sichuan, China respectively. Common names of these two plants are hei- yujin (wen- yujin) or dark yujin and huang- yujin or yellow yujin respectively in Chinese. The both rhizomes are used as the traditional Chinese medicines and recently as a part of the raw materials of antivirus oral drugs. The volatile oils of both *C. aromatica* and *C. longa* have been reported to have various activities. Several compounds have been identified from Indian and Japanese *C. aromatica*[1]. The major monoterpenes were camphor, 1, 8- cineole and camphene. Furthermore, the most abundant sesquiterpenes were β- curcumene, α- curcumene and xanthorrhizol.

As a part of a systematic research on the chromatographic fingerprints of the traditional Chinese medicine[2~6], we report in this study the chemical constituents of the volatile oils obtained from Chinese *C. aromatica* and *C. longa* rhizomes. The materials of rhizomes were submitted for 5 h to steam distillation. The obtained oils were dried over anhydrous sodium sulphate and stored at 4~ 6 ℃ until they were analyzed. Both of them were light yellow oils.

The volatiles were investigated by GC- MS- DS by using a HP 6890 (splitless injection, 230 ℃), carrier gas helium (1 mL/min), equipped with a DB1 column (30 m × 0. 25 mm × 0. 25 μm) with split ratio of 1∶ 20. The temperature programming was performed 5 min at 60 ℃, then rise to 240 ℃ at 2 ℃/min, 240~ 290 ℃, 23 ℃/min. The samples were dissolved in CH_2Cl_2 and each dissolved sample of 1 μL was injected. The GC was coupled with a Micromass PlatformII MS, ion source 180 ℃, ionization energy 70 eV, electron current 200 μA. Identification of compounds was carried out with the NIST Mass Data Base (1994) and by comparison of the retention times with those published data[1].

The main components (%) of the volatiles for both *C. aromatica* and *C. longa* as well as the composition based on the percent total peak area of each component peak, are showed as follows respectively: α- pinene 0 and 0. 37; cam-

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phene 0.97 and 2.19; β- pinene 0.57 and 0; myrcene 0 and 0.49; limonene 0 and 0.57; 1, 8- cineol 1.47 and 6.63; 1, 4- cineol 0 and 0.26; camphor 1.18 and 14.20; isoborneol 0 and 0.33; 1- methyl- 2, 3- methlene- 4- isopropyl- cyclohexanol 0.84 and 7.42; borneol 0 and 1.89; 4- terpineol 0 and 0.29; α- terpineol 0 and 0.99; β- curcumene 0.30 and 2.18; β- elemene 0 and 1.35; α- curcumene 4.25 and 9.34; isocaryophyllene 0 and 0.35; caryophyllene 0.44 and 0; 1, 2, 3A, 5, 6, 8A- hexahydro- 1, 2, 3A, 5, 6, 8A- naphthalene 0 and 0.75; 1, 2, 3, 4, 4A, 7, 8, 8A- octahydro- 1, 2, 3, 4, 4A, 7, 8, 8A- 1- naphthaleol 0.28 and 0.30; 1, 2, 3, 5, 6, 7, 8, 8A- octahydro- 1, 2, 3, 5, 6, 7, 8, 8A- naphthalene 0.31 and 2.25; β- cyperene 5.96 and 3.80; β- muurolene 0 and 0.21; germacrene B 0.50 and 0; caryophyllene oxide 0.39 and 0; aromadendrene 0.47 and 0.66; sinensal 0.40 and 0; germacrene D 24.68 and 3.47; humulene epoxide 0.33 and 0; decahydro- 1, 4A- dimethyl- 1- naphthalene 1.31 and 0.37; neocurdione 4.28 and 0.98; teridenone 0 and 0.83; β- eudesmol 0.84 and 0.55; dehydro- curdione 0.44 and 0; germacrone 14.42 and 7.55; curdione 23.79 and 0.24; xanthorrhizol 1.22 and 21.08; 4, 5- epoxide- germacrone 4.79 and 0.

Twenty five constituents were identified and quantified from the oil of *C. aromatica*. The major constituents were germacrene D, curdione and germacrone. Thirty constituents of the volatile oil of *C. longa* were identified and quantified. The major components were xanthorrhizol, camphor, α- curcumene, germacrone, 1- methyl- 2, 3- methlene- 4- isopropylcyclohexanol, and 1, 8- cineol. Based on the relative abundance of selected components of the votatile oils of *Curcuma* species, it might be possible to define chemotaxonomic markers for the identification of this species. It is noteworthy that the percentages of the selected components may vary in the studied species. When further chromatographic analysis on the oils *Curcuma* species become available, including relative abundance of the constituents, they should prove valuable in obtaining a chemotaxonomic classification of the genus.

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郁金和姜黄中挥发油的化学成分测定

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摘　要: 应用气相色谱- 质谱联用技术对姜黄属中草药郁金和姜黄中挥发油的化学成分进行了测定. 结果表明: 郁金挥发油的主要化学成分为大根香叶烯D、姜黄二酮和大根香叶酮; 姜黄挥发油的主要化学成分为黄根醇、樟脑、α- 姜黄烯、大根香叶酮、1- 甲基- 2, 3- 亚甲基- 4- 异丙基- 环己醇和桉叶油素.

关键词: 郁金; 姜黄; 块根; 挥发油; 化学成分

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