J. Jpn. Bot. **95**(4): 220–234 (2020)

Pharmacognostical Studies of Salviarum Radicies. Morphological and Anatomical Characteristics on the Underground Part of Seven *Salvia* Species (*Lamiaceae*)

Seiichi YAMAJI[a,*], Toshie SATO[b], Shao-Qing CAI[c] and Katsuko KOMATSU[b]

[a]Division of Kampo Pharmaceutical Sciences, Nihon Pharmaceutical University,
10281 Komuro, Ina, Saitama 362-0806, JAPAN;
[b]Institute of Natural Medicine, University of Toyama,
2630 Sugitani, Toyama 930-0194, JAPAN;
[c]School of Pharmaceutical Sciences, Peking University,
38 Xueyuan Road, Haidian District, Beijing 100191, P.R. CHINA
*Corresponding author: seiichi@nichiyaku.ac.jp

(Accepted on March 3, 2020)

The crude drugs, Salviarum Radicies derived from the underground part of plants of *Salvia* L. (*Lamiaceae*), are widely used in the system of traditional Chinese medicine. Among them, Salviae Miltiorrhizae Radix (Danshen in Chinese and Tanjin in Japanese) was recently included in the Japanese Pharmacopoeia, and used for cardiovascular disorders and syndromes caused by blood stagnation. Through our field survey, the commercial crude drugs varied in color, texture and/or diameter. Accordingly, the crude drug, namely Salviae Miltiorrhizae Radix but of improper origin, is possibly used, which may impact safety and efficacy. Therefore, we carried out morphological and anatomical studies on the underground part of seven species of *Salvia* plants, i.e., *S. bowleyana* Dunn, *S. deserta* Schangin, *S. miltiorrhiza* Bunge, *S. paramiltiorrhiza* H. W. Li & X. L. Huang, *S. przewalskii* Maxim., *S. sinica* Migo, and *S. yunnanensis* C. H. Wright to find out the species-specific characteristics for identification of the crude drugs. The compared plant materials could be distinguished from each other by the external morphologies and the anatomical characteristics such as shape of the masses of the mechanical tissues in xylem (MTX), maximum diameter of vessels in secondary xylem in the roots, and so on.

Key words: Danshen, mechanical tissue, plant anatomy, *Salvia miltiorrhiza*, *Salvia przewalskii*, Salviae Miltiorrhizae Radix, standardization, Tanjin.

The crude drugs, Salviarum Radicies (SR) derived from the underground part of *Salvia* L. (*Lamiaceae* (*Labiatae*)) such as Danshen (丹参), Zi-danshen (紫丹参, Purple danshen), and Hongqinjiao (紅秦艽, Red qinjiao), are widely used in the system of traditional Chinese and Kampo medicines. Among them, Danshen (Tanjin in Japanese) is one of the most famous crude drugs and is described as high grade medicine (Tao and Mori, 6th century, 1973) used traditionally as a remedy for heart or abdominal diseases and removing pathogenic blood stagnation (Tang and Kimura, 1108, 1970). At present, one of well-known formulae prescribing Danshen, Guanxin 2 haofang (冠心２号方), which has been also sold in Japan, is used for

Materia Medica, Institute of Natural Medicine, University of Toyama, Japan [TMPW].

1. ***S. bowleyana*** Dunn: **CHINA**. Fanquan Vil., Xiacheng, Gaoan, Jiangxi Prov.: G.-C.Zhou & al. 97-5, 97-8, 97-21 (Aug. 1997); Yangshuo County, Guanxi Prov., K.Komatsu & Y.D.Zhu 86043 (Jun. 1986).

2. ***S. deserta*** Schangin (= *S. sylvestris* L.): **CHINA** (Xinjiang). Lake Sairam, Xinjiang Uighur Autonomous Region: T.Namba & al. CX-169 (Jul. 1995).

3. ***Salvia miltiorrhiza*** Bunge: **CHINA**. Zhongjiang County, Dezu, Sichuan Prov., alt. 600 m: G.-C.Zhou 96001-1, 2, **cultivated** (Aug. 1996).

4. ***S. paramiltiorrhiza*** H. W. Li & X. L. Huang: **CHINA**. Jiuya Vil., Xitangchi, Shucheng County, Anhui Prov.: G.-C.Zhou & al. 97-24, 97-25, 97-27 (Aug. 1997); Bohua shan, Jurong County, Jiansu Prov., K.Komatsu 86115 (Apr. 1986); Jiuya timberyard, Xitangchi, Shucheng County, Anhui Prov.: G.-C.Zhou & al. 97-33, 97-34, **cultivated** (Aug. 1997). The specimens cited are identified as *S. paramiltiorrhiza* f. *purpureo-rubra* H. W. Li in detail.

5. ***S. przewalskii*** Maxim. **CHINA**. Wolong, Wenchuan, Sichuan Prov.: G.-C.Zhou 96005-1 (Nov. 1996), Between Yaan and Kangding, Gantze, Sichuan Prov.: T.Namba & al. CZ036, 045, 046 (Jul. 1996), **CHINA** (Tibet). Between Gongpo Gyamda to Bayi (Nyntris), alt. 2900–3000 m: T.Namba & al. 631 (Aug. 1995).

6. ***S. sinica*** Migo: **CHINA**. Mt. Maan shan, Wumei, Yangtian, Qingyang County, Anhui Prov., G.-C.Zhou & al. 97-39, 97-41 (Aug. 1997); Wumei, Yangtian, Qingyang County, Anhui Prov. G.-C.Zhou & al. 97-42, 97-43, **cultivated** (Aug. 1997); **CHINA**. Mt. Maan shan, Wumei, Yangtian, Qingyang County, Anhui Prov.: G.-C.Zhou & al. 97-44 (Aug. 1997); Wumei, Yangtian, Qingyang County, Anhui Prov.: G.-C.Zhou & al. 97-45, 97-46, **cultivated** (Aug. 1997).

7. ***S. yunnanensis*** C. H. Wright: **CHINA**. Yunnan Prov., No.: G.-J.Xu 12313 (*sine datum* 1991).

山路誠一[a]，佐藤利江[b]，蔡 少青[c]，小松かつ子[b]：**丹参類生薬の生薬学的研究．シソ科アキギリ属７種の組織形態学的特徴について**

丹参類生薬はシソ科アキギリ属植物の地下部に由来する，漢方や中医学の汎用生薬である．もっとも有名な丹参は第十七改正日本薬局方に収載され，日本でも循環器障害や瘀血証等の治療に用いられる．われわれは丹参に加え，紫丹参や紅秦艽など，中国や日本の市場で様々な丹参類生薬を入手してきたが，これらは色，質感，径が変化に富むため，基原植物の誤用を招き，有効性や安全性を損ねる可能性がある．そこで丹参類生薬の種特異的な性状を見出す目的で，文献上丹参類生薬の基原植物とされる *Salvia bowleyana* Dunn，*S. deserta* Schangin，*S. miltiorrhiza* Bunge，*S. paramiltiorrhiza* H. W. Li & X. L. Huang，*S. przewalskii* Maxim.，*S. sinica* Migo，*S. yunnanensis* C. H. Wright の地下部を対象として，組織学的に種間差を比較した．その結果，根における木部の機械組織群 (MTX) の形状，二次木部中の最大道管径などにより，各種は区別可能であった．

（[a]日本薬科大学漢方薬学分野，
[b]富山大学和漢医薬学総合研究所，
[c]中国・北京大学医学部薬学系）