

An Underutilized Food "Miwu"

Subjects: **Others**

Contributor: Jinpeng Zou , Jiayi Wang , Kai Hou , Fang Wang , Shiwen Su , Wenjing Xue , Wei Wu , Ni Yang , Xuan Du

Miwu ("靡芜" in Chinese), the stems and leaves of *Ligusticum chuanxiong* Hort. has been used in China as a food for least 800 years. Modern research has shown that Miwu has a high dietary fibre content, is rich in iron and low in sodium, and has a similar aroma to celery but more than 4 times the dietary fibre content. At the same time, the wide cultivation of this herb, in combination with the use of the root as medicine, can better enhance the utilisation of this plant.

diet history

health function

industrial development

Miwu

Ligusticum chuanxiong Hort

1. Introduction

Ligusticum chuanxiong Hort. (CX), a medicine food homology plant of Umbelliferae, whose roots, *Chuanxiong Rhizoma* (CXR), is a traditional southeast Asian herb that is used clinically to treat chest pain, headache, irregular menstruation, etc. [1] [2]. *Chinese Pharmacopoeia* (Ch.P. 2020) published 1607 traditional Chinese medicine preparations, 246 of which contain CXR, accounting for 15.3% of the total and including Suxiao Jiuxin pills, Siwu mixture, etc. [3]. In 2002, CXR was approved to be a health food and could be used to produce health foods by the National Health Commission of the PRC (NHC). However, the stems and leaves of CX (Miwu, "靡芜" in Chinese), the non-medicinal part, has been ignored for a long time, causing Miwu to become an agricultural waste [2]. With the continuous increase in the planting scale of CX, governments and growers started to see its great potential as a food material [4]. In order to facilitate and standardize the international trade of CX, researchers' group considered not only the relevant indicators of CXR but also the indicators of Miwu when researchers drafted ISO/TC249 Traditional Chinese Medicine—*Ligusticum Chuanxiong* Rhizome (ISO/CD 8071) [5].

At present, Miwu has a huge amount of biological resources because it (the stems and leaves of CX) accounts for more than 75% of the fresh weight of CX, which could sprout tumble twice in the growth period. Meanwhile, according to a survey, the planting area of CX only in Chengdu, Sichuan reached 7000 ha, and the annual production of Miwu could reach more than 50 million tons [6]. However, the amount of Miwu decaying in the field may pose a threat to environment. Therefore, if Miwu can be effectively developed and utilized it will not only reduce the environmental pressure but also bring economic "spillover effect" to growers. In fact, Miwu has been an edible vegetable in *Daodi* areas (genuine producing area, the main CX optimal production areas) such as Chengdu, Meishan, and Deyang in Sichuan province for a long time [7][8]. In these places, Miwu have been gradually developed into different products, e.g., healthy tea, flavoring, craft, animal feed, and organic fertilizer [7][8] [9][10][11][12][13][14][15]. In the Chinese diet, Miwu is used for tea, salad, and soup or stir-fried, etc., and has been eaten for nearly a thousand years. Although the consumption of Miwu has been continuous in Chinese history, its consumption has gradually decreased in modern times. One important reason may be that it has gradually become a food in the *Daodi* area, although it is also changing with the climate [16].

2. Ethnobotany

CX's height is 40–60 cm and its stem is upright and cylindrical with longitudinal stripes and many branches on the upper part. The outline of the leaf is an oval triangle with a length of 12–15 cm and a width of 10–15 cm. It is pinnately divided into three to four times and three times. There are 4–5 pairs of pinnae, which are ovate-lanceolate with a length of 6–7 cm and a width of 5–6 cm. The last lobe is linear-lanceolate to oblong, with a length of 2–5 mm and a width of 1–2 mm and a small tip at the top and only sparse veins. The upper leaves of the stem are gradually simplified [17] (as shown in Figure 1).



Figure 1. Botanical appearance of Miwu.

3. The History of Using Miwu as Food in China and Other Countries

3.1. The History of Using Miwu as Food in China

It can be seen from the above that since the Han dynasty, Miwu uniformly referred to the tender stems and leaves of CX. Therefore, the literature on Miwu's consumption after the Han dynasty is of great value for researching the edible history of Miwu. "Yuefu poetry in Han Dynasty" recorded: "Picking wild Miwu on the hill when she goes up the mountain, meeting her husband when she goes down hill" [18]. The Tang dynasty has a verse: "She carries baskets of red leaves to pick Miwu for a whole day", which vividly depicts the scene of the ancient picking of Miwu that is used as accessories or ingredients [18]. Miwu is clearly recorded as a food material since the Song dynasty. "Illustration Classics for Materia Medica" in the Song dynasty recorded that "people in Jiangdong and Shuchuan picked Miwu to make tea which can make you refreshed". Han Qi, the prime minister during the Northern Song dynasty, wrote a poem to describe the refreshed feeling of after drinking the tea made of Miwu [19]. In addition, Miwu is not only used to make tea but also used for daily food therapy. "Lv Chan Yan Materia Medica" records that "Miwu tea tasted spicy, it is non-toxic and could treat headache". Ancient Wang Jie enjoyed chewing Miwu followed by drinking tar after every meal. In addition to records of the *materia medica*, there are also records of food history in lyrics and poems. Song Qi's "Brief Introduction of Featured products in Chengdu" published in the Song dynasty recorded the planting and eating history of Miwu in Chengdu: "People try to plant them in the garden, some people pick and muddled them and before mixed them in the soup". In other words, Miwu could not only be used to make tea but also be used in soup porridge. In the Song dynasty, Fan Chengda's book "Wu Chuan Lu" recorded that Taoists in Qingcheng Mountain planted CX on the mountain, indicating that artificial planting of CX was very common. It is recorded in the lines of the famous ancient poet Lu You; it was popular to drink Miwu tea in the spring after meals in his time. In the Southern Song dynasty, Zhang Zi' poem showed his preference for Miwu, "The taste of the soup with Miwu is even better than any other tea". The poem of Su Shi recorded the experience of picking and eating Miwu "Although I'm full, I'm still interested in finding Miwu in the grassland". From 1016 to 1848, there are many historical books to record the ways to have Miwu (as shown in **Table 1**). People did not stop eating Miwu because of the change of dynasties, and they cooked it in various ways. To sum up, Miwu have been used as a food material (tea, soup, etc.) since at least the Northern Song dynasty; therefore, it has been used as a food for more than 800 years.

Table 1. Traditional meal usage of Miwu.

Book Name	Publication Time	Edible Part	Diet Method
<i>Illustration of Materia Medica</i>	In 1016	Leaves	Tea

Book Name	Publication Time	Edible Part	Diet Method
<i>Lv Chan Yan Materia Medica</i>	In 1220	Leaves	Tea
<i>Materia Medica for Famine Relief</i>	In 1406	Tender leaves	Fry
<i>Compendium of Materia Medica</i>	In 1578	Leaves	Tea
<i>Collected Works of Materia Medica</i>	In 1619	Leaves	Tea
<i>Food materia medica</i>	Around 1650	Leaves, flower	Tea
<i>An Illustrated Book of Plants</i>	In 1848	Leaves	Decoction, Frying

According to the statistics of the China Poetry Website, the number of poems including the term "Miwu" gradually increased from 31 in the Tang dynasty to 457 in the Qing dynasty (shown in Figure 2) [20]. In other words, Miwu began to play a more and more important role in the catering of ancient people. Meanwhile, there were also various ways to cook Miwu. *Materia Medica for Famine Relief*, published in the Ming dynasty, is the earliest monograph on edible plants for famine relief in the world and still has practical value at the present time. It recorded that "Miwu could be fried for the food in the Great Famine". In addition to decoction, frying, and baking, many records reported that Miwu was an ancient raw material for making tea or soup. According to the field survey of researchers' team in Pengzhou City and Dujiangyan City in Sichuan Province, which have been *Daodi* areas for a long time, researchers find that the tender Miwu became a seasonal vegetable in the rural markets every spring. A cold mix of Miwu, Miwu salads, stir-fried Miwu, stewed chicken with Miwu, Miwu tea, and Miwu noodles have become the local specialty foods. With the booming development of rural tourism, they are a lot of people's preferences [21][22]. Although a larger market is waiting to be developed, the current market regulation could not provide this possibility.

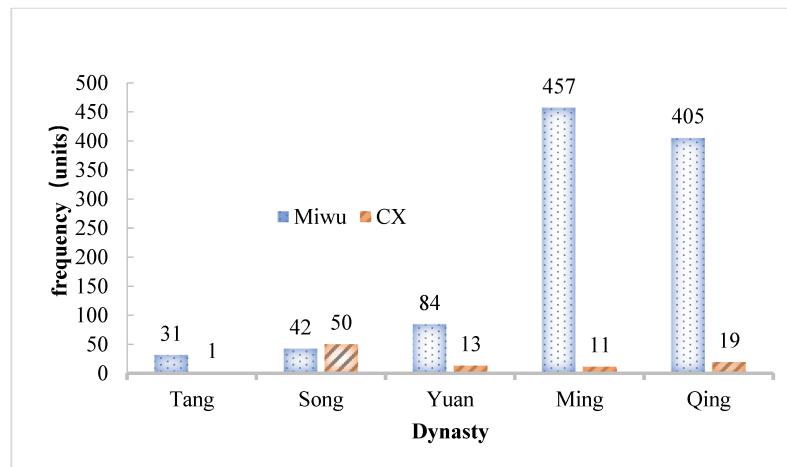


Figure 2. The frequency of Miwu and CX in ancient Chinese classical literature. Tang 618–907 AD, Song 960–1279 AD, Yuan 1271–1368 AD, Ming 1368–1683 AD, and Qing 1683–1840 AD.

3.2. The History of Using Miwu as Food in Other Countries

In Japan and South Korea, Miwu is considered a healthy vegetable or seasoning and is popularly used in salads and other meals; consumption of it is increasing [23][24]. In 2021, the first batches of fresh Miwu were exported from Chengdu to South Korea as vegetables [25]. In addition, CX was listed in the edible catalogue database of the British Future Plant Network (Plants For A Future: A Resource and Information Centre for Edible and other useful plants) [26]. This database suggests that the edible part of CX is its leaves and the tender stems.

References

1. Zhang, L. Practice and Thinking of Traditional Chinese Medicine Agriculture Helping Rural Revitalization. *Res. World Agric. Econ.* 2021, 2, 49–56.
2. Yan, H.; Zhou, Y.; Tang, F.; Wang, C.; Wu, J.; Hu, C.; Xie, X.; Peng, C.; Tan, Y. A comprehensive investigation on the chemical diversity and efficacy of different parts of *Ligusticum chuanxiong*. *Food Func.* 2022, 13, 1092–1107.

3. Chinese Pharmacopoeia Commission. Chinese Pharmacopoeia; China Medical Science Press: Beijing, China, 2020; ISBN 978-7-5214-1574-2.
4. Mengfei, M. Chuanxiong Leaves Are Put into a "Vegetable Basket" and cross the Ocean. Available online: <https://baijiahao.baidu.com/s?id=1700069277722067729&wfr=spider&for=pc&searchword=%E5%B7%9D%E8%8A%8E%20%E9%A6%96%E6%AC%A1%E5%87> (accessed on 18 May 2021).
5. ISO. ISO/CD 8071. Traditional Chinese Medicine—Ligusticum chuanxiong Rhizome. Available online: <https://www.iso.org/standard/82991.html> (accessed on 10 January 2022).
6. Wehrens, S.M.T. Effect of Sleep Deprivation and Shift Work on Metabolic and Cardiovascular Function; University of Surrey: Guildford, UK, 2010; ISBN 1392846935.
7. Chen, S. Quality Evaluation of Aerial Part of Ligusticum chuanxiong Hort. and study on Its Teabag Preparation. Master's Thesis, Chengdu University of Traditional Chinese Medicine, Chengdu, China, 2009.
8. Wang, W.; Fang, S.; Xiong, Z. Protective effect of polysaccharide from Ligusticum chuanxiong Hort against H₂O₂-induced toxicity in zebrafish embryo. *Carbohydr. Polym.* 2019, 221, 73–83.
9. Wen, Y.Q.; Chen, Y.; Li, G.; Luo, L.; Chen, P. Analysis of the current situation of Chuanxiong patent protection in China. *Pharm. Clin. Chin. Mater. Med.* 2019, 10, 1–4.
10. Deng, W. The Study of Chuanxiong gel formulation. Ph.D. Thesis, Southwest Jiaotong University, Chengdu, China, 2010.
11. Qiu, S.X.; Chen, Y.Y.; Li, J.; Wu, Y.; Lei, C.; Xu, Q.; Liu, H.; Zhu, J.; Xu, Z. Broiler feed containing stems and leaves of Ligusticum chuanxiong Hort extract and its preparation method. CN109730209A, 10 May 2019.
12. Wan, S. Manufacture method of Ligusticum chuanxiong Hort seasoning. CN103750247A, 30 April 2014.
13. Zhang, C.; Chen, Y.; Peng, F.; Tao, S.; Yuan, C.; Sha, X.; Wu, Y.; Shi, T.; Liao, X.; Liao, X.; et al. A Kind of Micronutrient Fertilizer and Its Application. CN111285708B, 4 January 2022.
14. Li, C.-M.; Guo, Y.-Q.; Dong, X.-L.; Li, H.; Wang, B.; Wu, J.-H.; Wong, M.-S.; Chan, S.-W. Ethanolic extract of rhizome of Ligusticum chuanxiong Hort.(chuanxiong) enhances endothelium-dependent vascular reactivity in ovariectomized rats fed with high-fat diet. *Food Func.* 2014, 5, 2475–2485.
15. Li, W.; Tang, Y.; Chen, Y.; Duan, J.-A. Advances in the chemical analysis and biological activities of chuanxiong. *Molecules* 2012, 17, 10614–10651.
16. He, P.; Li, Y.; Huo, T.; Meng, F.; Peng, C.; Bai, M. Priority planting area planning for cash crops under heavy metal pollution and climate change: A case study of Ligusticum chuanxiong Hort. *Front. Plant Sci.* 2023, 14, 1080881.
17. Plant Plus of China. Ligusticum Sinense 'Chuanxiong'. Available online: <http://www.iplant.cn/info/%E5%B7%9D%E8%8A%8E> (accessed on 1 January 2018).
18. He, D. Ligusticum chuanxiong rhizome is used as medicine, and the seedlings and leaves are edible. *TCM Healthy Life-Nurtur.* 2022, 8, 26–27.
19. Fang, R. A study of Chinese tenka tea culture during the Tang dynasty and Song dynasty. *Int. J. Hum. Cult. Stud.* 2019, 548–562.
20. Chinese Poetry Website Home Page. Available online: <https://www.zgshige.com/> (accessed on 2 June 2007).
21. Li, J.; Yu, J.; Ma, H.; Yang, N.; Li, L.; Zheng, D.-D.; Wu, M.-X.; Zhao, Z.-L.; Qi, H.-Y. Intranasal pretreatment with Z-Ligustilide, the main volatile component of Rhizoma Chuanxiong, confers prophylaxis against cerebral ischemia via Nrf2 and HSP70 signaling pathways. *J. Agric. Food Chem.* 2017, 65, 1533–1542.
22. Scholz, H. Plants for Human Consumption. An Annotated Checklist of the Edible Phanerogams and Ferns; JSTOR: New York, NY, USA, 1985; ISBN 3874292169 9783874292160.
23. Sim, Y.; Shin, S. Antibacterial activities of the essential oil from the leaves and rhizomes of *Cnidium officinale* Makino. *J. Essent. Oil Res.* 2014, 26, 452–457.
24. Chen, Z.; Zhang, C.; Gao, F.; Fu, Q.; Fu, C.; He, Y.; Zhang, J. A systematic review on the rhizome of Ligusticum chuanxiong Hort. (Chuanxiong). *Food Chem. Toxicol.* 2018, 119, 309–325.

25. The Stems and Leaves of *Ligusticum chuanxiong* Hort Are Sold to South Korea for the First Time. Available online: https://kscgc.sctv.com/sctv/redian/2021/05/18/1128295_shared.html (accessed on 18 May 2021).

26. Plants for a Future Home Page. Available online: <https://pfaf.org/user/AboutUs.aspx> (accessed on 27 July 2010).

Retrieved from <https://encyclopedia.pub/entry/history/show/120298>