

Review

# Ancient Chinese orchid cultivation A fresh look at an age-old practice

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**Abstract**

The ancient practices of ‘Lan’ (orchids) cultivation in China are reviewed, particularly those cultural methods widely practised during the Song (960–1279 AD) and Ming (1368–1644 AD) dynasties. These practices are examined in the light of our recent understanding of the physiology and horticultural practices of orchids. © 2001 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

In China, orchids are commonly known as ‘lan’. The word ‘lan’ was used in several Chinese classics such as ‘Shih Ching’ (The Book of Songs, published at about 1000–600 BC, or 2500–3000 years ago) and ‘Li Chi’ (The Book of Rites, published during the Western Han Dynasty, 202 BC–9 AD). Orchids are also termed ‘ni’ and ‘chien’ in these classics (Chen and Tang, 1982), where ‘ni’ refers to ribbon grass (*Spiranthes sinensis* Pers. Orchidaceae). It is still uncertain whether chien and lan are true orchids. In many ancient writings, lan is used as a loose reference to fragrant plants rather than an exclusive reference to orchids (Chen and Tang, 1982). This has resulted in much confusion regarding the exact dates for orchid cultivation in China. Confucius (551–479 BC), for example, once said, “The lan that grows in deep forests never withholds its fragrance even when it is not being appreciated” and that “lan is the king of fragrant plants” (Chen

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and Tang, 1982). Some writers have contended that ‘chi lan’, mentioned by Confucius, is a true orchid, or *Cymbidium*. This is because the habitat of chi lan as described by Confucius is similar to that of wild cymbidiums (Chen and Tang, 1982; Arditti, 1992; Fig. 1). This view is not shared by most Chinese orchidologists (Wu, 1981; Chen and Tang, 1982; Deng, 1990). Wu (1981), for



Fig. 1. Painting of Chinese orchids growing in the wild. This was done by Zheng Ban Qiao, (Ching Dynasty) the most renowned Chinese artist who specializes in orchid painting.

example, expressed serious doubt that ‘lan hui’ as used in modern day China harbors the same meaning as the words ‘lan hui’ during Confucius’ era. Wu (1981) was of the opinion that the term ‘lan cao’, as used in ancient China referred to ‘tse lan’ (*Eupatorium japonicum* Thumb), while the term tse lan was used to describe ‘wah tse lan’ (*E. chinense* L). Hui was used to describe *Anaphalis hancockii* Maxim. Plants of both genera are fragrant and they belong to the family Compositae, not the Orchidaceae (Wu, 1981).

The lan of today is commonly known as ‘sun lan’ (mountain orchid) or you lan (Wu, 1981). Lan now commonly refers to *cymbidium* which bears a single flower and hui are *cymbidium* orchids which carry inflorescences with multiple flowers and are less fragrant (Deng, 1990).

The earliest record of Chinese orchids is in the ‘Shen Nung Pen Tsao Ching’ (Divine Husbandman’s Classic of Materia Medica), published during the Han Dynasty (202 BC–220 AD). Several orchids are mentioned, namely ‘shih hu’ (*Dendrobium* spp.), ‘chih chien’ (*Gastrodia elata*) and ‘pai chi’ (*Bletilla* spp.) (Chen and Tang, 1982; Hew et al., 1997). These three orchids mentioned in Shen Nung Pen Tsao Ching are also listed in Pen Tsao Kang Mu (Materia Medica Text and Commentary), the most celebrated herbal text in China, written by Li Shi Zhen (1518–1593) (Hew et al., 1997).

## 2. Brief history of orchid cultivation in China

It is believed that in ancient China, cultivation of orchids collected from the wild started in the private palace gardens of nobles (Deng, 1990) during the Wei (220–265 AD) and Chin dynasties (265–317 AD). It was during the Tang dynasty (618–906 AD) that orchid cultivation became popular among the common folks. The famous Tang poet, Wang Wei, was reported to use small stones to grow lan (Deng, 1990). Orchid cultivation became very widespread during the Sung dynasty (960–1126 AD) and records of the descriptive characteristics, ecology and distribution of orchids became fairly abundant (Table 1).

The earliest paper giving details of orchid cultivation in China is Jin Zhang Lan Pu (Treatise of Orchids of Jin Zhang) which appeared during the Southern Sung dynasty (960–1124 AD) (Wu, 1981). This was written by Zhang Shi Geng and published in 1233. It consists of five sections covering orchid quality, types, love, care and watering. Lan was divided into two groups — the ‘zhi lan’ (violet lan; 16 species) and ‘bai lan’ (white lan; 19 species). The zhi lan includes *Cymbidium sinense* and the bai lan includes *C. ensifolium* var. *Susin* Yen of today (Wu, 1981). About 10 years later, another paper was published on the cultivation of Chinese orchids, ‘Wang Shi Lan Pu’ (Wang’s Treatise on Orchids), which was written by Wang Kuei Hsueh in 1247. It was an improved version of the earlier paper, Jin Zhang Lan Pu, and it described the types and ranking of lan, the technique of

Table 1  
Some early literature on Chinese orchids and orchid cultivation<sup>a</sup>

Period	Title	Author	Year of publication
Song dynasty	金章兰谱 Jing zhang lan pu	赵时庚 Zhao Shi Geng	1233
	王氏兰谱 Wang shi lan pu	王贵学 Wnag Gui Xue	1247
	兰谱奥法 Lan pu ao fa	赵时庚/ 王贵学 Zhao Shi Geng/Wang Gui Xue	
	兰易 Lan yi	鹿亨翁 Lu Ting Weng	1250
	兰史 Lan shi	鹿亨翁 Lu Ting Weng	1368
Ming dynasty	本草纲目 Ben cao gang mu	李时珍 Li Shi Zhen	1578
	兰谱 Lan pu	高濂 Gao Lian	1591
	罗钟斋兰谱 Luo zhong zhai lan pu	张德文 Zhang De Wen	1598
	群芳谱 Qun fang pu	王象晋 Wang Xiang Jin	1621
Ching dynasty	第一香笔记 Di yi xiang bi ji	朱克柔 Zhu Ke Rou	1796
	兰蕙镜 Lan hui jing	屠用宁 Tu Yong Ning	1811
	兴兰谱略 Xing lan pu lue	张光照 Zhang Guang Zhao	1816
	兰言述略 Lan yan shu lue	袁世俊 Yuan Shi Jun	1876

<sup>a</sup> Sources: Wu, 1981, Chen and Tang, 1982, Deng, 1990.

watering and division, and the use of soil or soil mixtures as potting media. There was a third record of orchid cultivation in the Sung Dynasty, entitled 'Lan Pu Ao Fa' (Treatise on the Technique of Orchid Culture). The authorship of this paper remains unclear, although Chinese orchidologists like to believe that it was written by Zhang Shi Geng or Wang Kuei Hsueh. This paper described in greater detail the methods of propagation by division, irrigation, fertilization, and pest control.

Although orchid cultivation was common during the Sung dynasty, it became very popular during the Ming (1368–1644 AD) and Ching (1644–1911 AD)

dynasties and many papers on orchid cultivation appeared (Table 1). Worthy of mention are two articles — Lan I (I of lan or changes of lan, Part I and II) and ‘Lan Shi’ (History of Orchids), each with several versions (including authorship). The search of the literature showed that Lan I and Lan Shi were both written by Lu Ting Weng but there were two editions, one was edited by Dian His Tze (Sung Dynasty) and the other by Feng Jing Di (Late Ming Dynasty). Chen and Tang (1982) are of the opinion that Lan I was written by Lu Ting Weng and Lan Shi by Tan Hsi Tzu (Dian Xi Zi). However, Wu (1981) cited Lan I as written either by Lu Ting Weng or Dian His Tzi and Lan Shi by Dian His Tze. He believed that both Lan I and Lan Shi were the work of Feng Jing Di.

I in Taoism means ‘change’ as in ‘I Ching’ (The Book of Change). In the paper Lan I, we see the influence of the Tao philosophy on orchid cultivation. The cultural practices of orchids were divided into 12 months and the cultural practice of each month was based on the ‘Qua’ (trigram and hexagram of Taoist practices) for each individual month (Lan I, Part I). The trigram and hexagram of the I Ching consist of line drawings: the unbroken lines stand for Yang and the broken ones for Yin. There are eight trigrams and 64 hexagrams and they link all the changes in the cosmos to Tao (Liu, 1981). In Part II of Lan I, the author discussed the 12 ‘rules’ of growing orchids under 12 ‘chapters’ or ‘sections’ (Shi Er Yi). In my opinion, this is by far the most comprehensive treatise on orchid cultivation in ancient China.

The earlier papers on orchids and their cultivation are relatively short. For example, both Jin Zhang Lan Pu and Wang’s Lan Pu are only 4–5 pages long. Lan Shi is 4–12 pages long and Lan I is 6–12 pages long, depending on the edition and publisher. However, these early papers provided detailed information on the classification, morphology, history and cultural practices of Chinese orchids.

The ancient practices of lan cultivation, particularly those methods widely practised during the Sung and Ming dynasties will be examined in the light of our recent understanding of the physiology and horticultural practices of orchids (Arditti, 1992; Hew and Yong, 1997).

### **3. Ancient Chinese practices of orchid cultivation**

#### *3.1. Planting and repotting*

Orchids like to grow in ‘groups’ and are ‘afraid’ to be detached from mother plants and to stay single (extracted from Lan I, Part II). Division is necessary when the plant is too large and has overgrown the flower pot or when it is too ‘weak’. When overgrown, it becomes root bound. The root rots and disease sets in when it is ‘weak’. To repot, one may have to break the pot and carefully remove the damp soil and rotten roots. One can also place the pot in water, loosen the soil and get the plant out slowly. Trim the roots and or divide the plants before

repotting. After division, one can plant three to four shoots in one pot (Jin Zhang Lan Pu; Lan I, Part II; Wang's Lan Pu). Place the old shoot facing the middle and the new shoot facing the rim of the flower pot (Lan I, Part II; Wang's Lan Pu). The plant must initially be planted slightly deeper, pack in the soil, then raised slowly. This is to prevent the formation of air spaces among roots, resulting in water accumulation. Orchids do not like to be covered with thick soil. The bottom of pot should be filled with material that allows good drainage. Fill half of the pot with broken bricks and cover the top surface of the pot with finer sand. Apply rainwater or pond water to the newly potted orchids to 'fix' the root before placing the plant under shade. Refrain from watering and application of fertilizer for half-a-month (Lan I, Part II).

Division is best done in late autumn or early winter (Lan I, Part II). Cut away the first stalk of flower produced in the second year after repotting. This is good for subsequent flowering as the 'qi' has been conserved (Jin Zhang Lan Pu; Wang's Lan Pu). Make sure the leaves are growing well as this will guarantee good flowering (Jin Zhang Lan Pu).

For potting, burnt earth is the preferred potting medium. It can be mixed with dry animal manure; the best being that of goose and goat (Lan I, Part II; Wang's Lan Pu). Bone ash of pig and cow can also be used. The ratio of burnt earth to bone ash was 4:3 (Lan I, Part II). As mentioned earlier, water that had been used to wash fishes can also be used as fertilizer. So are raw beans and bean cake but they have to be soaked in boiling water prior to storage and usage. It is recommended that fertilizer be applied once or twice a month depending on the growth condition of the leaves and roots (Lan I, Part II). Also fertilizer needs to be applied when the newly emerging bud is 12–13 cm in length and right after flowering.

The ancient Chinese orchidologists recommended that the newly potted orchids after division must possess three to four shoots. In fact, the same practice is currently applied to the potting of other newly divided sympodial orchids such as *Dendrobium* and *Oncidium* (Hew, 1994). This is consistent with our recent findings that orchids have a highly integrated pattern of assimilate partitioning (Hew and Yong, 1997). All leaves supply photoassimilates to two major sinks — the inflorescence and apical meristem, with the former being a much stronger sink. It is not surprising that there was no mention of chemical fertilizer usage in these ancient Chinese articles. The recommendation that only dried goat and goose animal manure be used for orchid cultivation is worth noting. It implies that some experiments must have been conducted to evaluate the use of animal manure for orchid cultivation. Drying of animal manure before use is commonly practised to release ammonia which is toxic to plants (Sheehan, 1997). The ancient Chinese orchid growers also recommended to flush the pot with water after heavy fertilization. We have shown that the rate of uptake of minerals by orchids is slow (Hew et al., 1993) and excessive fertilization may lead to accumulation of salts in the potting medium. Pseudobulbs are also important

storage organs for minerals and carbohydrates. The mobilization of stored minerals and carbohydrates from older pseudobulbs for growth of developing pseudobulb has been observed in *Oncidium* (Hew and Ng, 1996). The importance of a minimum number of connected shoots in newly potted orchids cannot be overemphasized.

They also recommended that orchids should be divided and repotted in late autumn or early winter when growth is slow or the bud is dormant. This is sound horticultural practice. Cutting away the first flower produced after repotting is also practised in orchids grown for cut flower production (Hew, 1994). This is in agreement with the observation that the harvestable yield in orchids is generally source-limited (Hew and Yong, 1997). Selective removal of early unmarketable flower/inflorescence is one strategy to conserve the carbon and nutrients necessary for growth of subsequent inflorescence.

### 3.2. *Watering*

The amount of water used depends on soil type and season. For growing of orchids, the best water source is early morning mist. This is when the orchid is kept outside over night. Rainwater can also be used if mist is not available. This is followed by pond and river water. Well water is not recommended, particularly in early spring (Lan I, Part II). Watering should be stopped during the rainy season between April and May. In July, the amount of water used for irrigation depends on soil type. In early autumn, although the weather turns hot, the soil remains fairly moist. The orchids should be watered every 3 days only (Jin Zhang Lan Pu). In late September, care should be taken to avoid overnight freeze injury. At this time it is good to water the plant with water that has been used to clean fishes. This is to protect the plant from ice formation (Jin Zhang Lan Pu). Some orchids, for example, the zhi lan (violet orchids) are difficult to cultivate and it is better to use clean water to irrigate the plant. When the roots are young, refrain from heavy fertilization and watering. Watering frequency should be increased following heavy fertilizer application (Jin Zhang Lan Pu).

The watering regime recommended for orchid cultivation in ancient China was dependent on prevailing environmental conditions and the condition of the plant. The ancient writers were careful to stress, for example, while the weather is hot in early autumn, the potting medium is damp and watering should therefore be carefully controlled. *Cymbidium* spp. can withstand considerably low moisture stress because of the presence of pseudobulbs (Zheng et al., 1992). Often, it is over-watering, rather than drought, that kills orchids (Anonymous, 1993). The emphasis of ancient articles on Chinese orchid cultivation of having a good drainage in the potting medium is noteworthy. The attempt to protect overnight frost injury by increasing the solute content is interesting but of doubtful effectiveness. The quality of water has received

much emphasis in ancient Chinese orchid cultivation. The preference for rainwater in ancient literature on temperate orchid growing often stress the need for natural rain (Anonymous, 1993).

The ancient Chinese orchidologists were always quick to stress the need to treat each cultivar differently with regard to watering and fertilizer application. This sound horticultural practice has been adopted for cultivation of other tropical and temperate orchids (Northen, 1962; Anonymous, 1993).

### 3.3. Pest control

The major pests are ants, rats, earthworms, spiders, fleas and snails (Lan I, Part II). Rats love to eat orchid roots. Ants do not do great harm to orchid but ‘took away’ the ‘precious secretion’ (nectar) from the flowers. To control earthworms, the pot should be soaked in water. This would drown the worms (Lan I, Part II). Urine can also be used to ‘drive away’ the worms (Wang’s Lan Pu). Spiders form webs on leaf surfaces. Fleas are ‘minute’ insects that cannot be seen by the naked eye and they suck away the qi (energy) of the leaf, causing it to turn yellow and wilt. In February, the weather is unpredictable. Following rain, the plant should be covered when the sun is out. White spots will develop when the wet leaf is exposed to the sun. Poor ventilation breeds pests. To control pests, various concoctions have been suggested. These include the use of sesame oil, vegetable oil, garlic extract and cold tea. It is a common practice to mix the various ingredients with oils for application on the leaf surface. The use of Zao Jiao (*Gleditsia sinensis* Lam; Chen, 1992) and ashes from burnt charcoal to control pests has also been suggested. When a plant is badly infested, move the pot to an isolated spot (Lan I, Part II; Jin Zhang Lan Pu).

There was no mention of disease in these papers. Bacterial, fungal, and viral diseases were not recognized at that time. The proposed method for controlling minute ‘fleas’ by using oil and/or oil based mixture is interesting. It is likely that the minute ‘fleas’ mentioned in the paper could have included red spiders and other insects such as scale insects. Scale insects are also known as Lan Zao (orchid flea) (Deng, 1990). This is consistent with the ancient practice of scraping off the ‘fleas’ by means of thin bamboo pieces (Lan I, Part II; Jin Zhang Lan Pu). Oil controls insects and other minute pests mainly by suffocation. A good example is the present use of white summer oil to control scale insects. The utilization of plant extracts such as garlic extract and *G. sinensis* to control orchid pests is interesting. The use of garlic extract as an insect repellent is well documented. *G. sinensis* (Leguminosae) is an herb which has been in use for medical treatment in China for a very long time; it was listed in Pen Tsao Kang Mu, written by Li Shi Zhen (1518–1593). *G. sinensis* is slightly toxic and has been shown to inhibit gram negative bacteria in the colon (Chen, 1992). It has also been reported for use in control of maggots and flies, among other medicinal



uses (Chen, 1992). One sees the beginning of the use of natural pesticides and repellents in ancient Chinese horticultural practices.

#### 4. Conclusion

When reviewing the old literature on orchid cultivation in ancient China, one is struck by the sound knowledge the growers had of the growth and physiology of orchids. It is not surprising that many of the age-old practices are still in use today (Deng, 1990). In ancient China, orchids collected from the wild were propagated asexually by division. To date, there are no ancient records of growing or attempting to grow orchid from seed (Wu, 1981; Chen and Tang, 1982; Deng, 1990). This is rather surprising in view of the very long history of orchid cultivation in China (Joe Arditti, pers. commun.).

It is both interesting and refreshing to read the earlier articles on orchid cultivation in China. Not only do we get an insight into the orchid cultivation in ancient China, but we also see the passion the ancient Chinese orchidologists had for orchids, resulting in the development of appropriate cultural practices.

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