

## REVIEW OF *OSMANTHUS FRAGRANS* PLANTING AND UTILIZATION IN CHINA

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### ABSTRACT

*Osmanthus fragrans*, an horticulture plant, is one of the National plants in China. As China's native plants, they were usually utilized in seasoning, health protection, perfuming and dressing. Based on analyzing China history literature, this paper highlights native varieties of *Osmanthus fragrans* as well as their planting technologies. Finally the methods of utilization of *Osmanthus fragrans* are discussed in ancient China, and its impact on the traditional living in China.

**Key words:** Ancient China, *Osmanthus fragrans*; health protection; perfuming

### INTRODUCTION

*Osmanthus fragrans*, blooming in August of China's lunar calendar, has been cultivated widely for more than 2500 years in China. Originally people favour their sweet-scenting flowers, then people made cake using fragrant flower, produce beverage made of osmanthus flower, and even manufacture wine fermented with fragrant flower. Because osmanthus fragrans is a symbol of rich and luck, the ancients often planted it in courtyards. There are a large volume of literature about *Osmanthus fragrans* in China's historical documents. These documents mainly focus on classifying *Osmanthus fragrans* varieties, discussing its planting technologies, reviewing manufacture process, and recording its application. This paper discusses the planting technologies and utilization methods of *Osmanthus fragrans* in ancient China, and discovered that the China's ancients used the snow and silkworm excrement to fertilize the osmanthus fragrans, used the graft means to breed the red osmanthus, and put the pounded flowers into a new jar which was laid in cold well water to preserve the fragrant flower.

Originally growing in China, *Osmanthus fragrans*, a kind of aroma flower in subtropical zone, is planted outdoors in the south of Yangtse river, and planted indoors in the north of China. Although it is difficult to discern the exact distribution area, it is certain that *Osmanthus fragrans* is an indigenous plant in south of China. This can be verified from China's historical literature. The *Songs of Chu*, the literature about convention in south of China in the Warring States Period (about BC 770-BC 256), recorded the fact about how to plant and use the fragrant flower (Li, 2006). The similar record could be found in *Shi jing* (the first collection of China's ancient poem about during BC 11 to BC 7 Century). It should be noted here that all above documents are approved before or during the Warring States Period China had no diplomacy with any foreign state, and the later historian could not find any records about foreign affairs of this period in China's literature until Han dynasty (about BC 206). Therefore, we can confirm that the *osmanthus fragrans* is not the foreign plant.

Even now there are still some surviving wild *Osmanthus fragrans* communities, which could be found in the south of China, such as Fujian, Hunan, Zhejiang and other south provinces, mainly found in calcareous mountain. After an investigation of forest and verification from China ancient books, we recognize that in ancient China, *Osmanthus fragrans* was only widespread in the south of Yangtze River before the Ming dynasty. Along with the progress of planting technologies, *Osmanthus fragrans* now could be found in anywhere of China. Currently, Xindu, Guilin, Xianning, and Shanghai are famous centers of producing *Osmanthus fragrans* in China.

According to China's historical literature, there are over four kinds of *Osmanthus fragrans*. Wang Shimao, an agriculturist in Ming dynasty, said there were 3 cultivars of

*Osmanthus fragrans*, which were “Zaohuang” (early yellow), “Qiuzi” (global flower) and “Sijigui” (four seasonal flowering) in *Xuepu Zashu* (“*Horticulture Miscellanies*”). These varieties are currently still cultivated in south of Qinling Mountains and Huaihe River in China. The *zhong shu shu*, *Qun fang pu*, *Bencao Gangmu* and other history literature had all recorded that there exists four kinds of *Osmanthus fragrans* in ancient China, separately called silver *Osmanthus* which has white flowers and strong scent, orange *Osmanthus* which has yellow flowers and produces more flowers than other varieties, red *Osmanthus* which has red flowers and can fruit, and semper flower *Osmanthus* which blooms over three times in one year and is planted mostly in Fujian. It showed that the China’s ancients had great knowledges of *Osmanthus fragrans*.

### ***Osmanthus fragrans* planting history and planting technology in ancient China**

The *Xijing Zaji* (“*Miscellanies about West Capital*” of Han dynasty), it was had recorded that the *Osmanthus fragrans* grown in Hanwu Emperor’s Shanglin Gardens (about BC 140-BC 88) (Han and Luo, 2003). This was the earliest recordation about the planting of *Osmanthus fragrans*. Similar records also can be found in other China ancient books in the same period, such as the *Shanglin Fu*. According to the historical records, *Osmanthus fragrans* experienced a long process in changing from a wild plant to domestic plant for about over one thousand years. It had no fixed official names until Ming and Qing dynasty.

Like pine, cypress, willow, and camphor tree, *Osmanthus fragrans* also was used as the road trees in ancient China. The *Kezuo Zawen*, a *Miscellanies* literature in Ming dynasty, had recorded that there were seventeen thousand *Osmanthus fragrans* trees planted on both sides of the road in Hengshen temple which is in Fujian. This indicates that the *Osmanthus fragrans* were used as the road trees in China in 13 century. Currently, the *Osmanthus fragrans* is still the essential virescence trees in China’s south cities, such as Hangzhou, Wuhan, Changsha, Chengdu, Nanjing, Guilin and so on. This should be attributed to China’s advanced planting technologies. The planting technologies of *Osmanthus fragrans* in ancient China mainly included choosing soil, reproducing, fertilizing, and administration of living through the winter. When choosing soil for planting *Osmanthus fragrans*, the ancients should pay attention to choose the acidic sandiness soil which contains rich humus, and the place should be in avoid of wind with sunny exposure. To be propitious to growing root, the soil should be ploughed up smash ahead. To reproduce *Osmanthus fragrans*, the ancient agricultural scientists have to use the methods of seminating, inoculating, and pressing twig. Semination need the seeds which were planted in April of China’s lunar calendar. But *Osmanthus fragrans* have no fruit except the the semper flower *Osmanthus* and red *Osmanthus* can fruit occasionally, thus the seeds germination rate is very low.

Graft could satisfy the need of largely reproducing the fine and decorative breeds. Guo tuotuo, the author of the *Zhong shu shu* (a history literature about how to plant trees in Tang dynasty), an China ancient agriculture administrator, said that *Osmanthus fragrans* were grafted the megranate, then the flower would be red (Zhou, 1985). The red *Osmanthus* was a rare and precious breed in ancient China, mainly depended on graft, otherwise it would be difficult to survive.

The pressing twig method is to embed the shaved twig in the soil in early April, and the root would grow after five months. The embedded twig could be removed from the maternal plant, and then transplanted to another place to grow in the next year. The survival rate would be high in the way of pressing twig. It was not strange that China’s ancient agriculture scientists advocated the method of pressing twig to reproduce. Through long-term cultivation practice, people compared some planting *Osmanthus* methods, and then chose the reasonable methods of seminating and pressing twig in the process of planting *Osmanthus fragrans*. Fertilization is key in the planting *Osmanthus fragrans* process. The China’s

ancients fertilization method was great, and the ancient fertilization technology is being used today. Guo tuotuo and other ancient agriculturalists advocated that the planter should use swine excrement but not human excrement to fertilize the *Osmanthus fragrans*. Wang Xiangjin, the author of *Qun fang pu* (a special literature recorded the aromatic plant), an agriculturist of Ming dynasty, put forward a proposal to heap snow and silkworm excrement around the *Osmanthus fragrans* roots, then the tree would flower more exuberantly in the next year (Wang and Gao 2006).

*Osmanthus fragrans*, growing in the tropics or subtropics, only can be planted in pot indoors in the cold north areas. In *Qun fang pu*, Wang Xiangjin said that people could use straw mat covered around the trees, then coated mud over the straw mat about one meter height around the trees else, and kept a little gap which was filled with hay when the weather was cold, or exposed it to the sun when it was warm in winter. Today, the horticulture workers still use the ancient methods to protect the *Osmanthus fragrans* through the winter in the cold north areas.

### **The technology of picking and preserving *Osmanthus fragrans* flowers**

The *Osmanthus* flowers must be collected in September when they are blooming and aromatic, otherwise it would perish and lose its aroma exposed in the air too long. After the long-term practice, the ancients found some collecting and preserving methods which is interesting. Compared with other history documents, the *Xiang Sheng*, the special literature recording spice history of Ming dynasty, had recorded the methods of collecting and preserving *Osmanthus* flowers completely and accurately (Chen, 2004). The book mentioned that the farmers could first put a clean cloth around the root, and then collect the half-blooming flowers in morning. Then the worker picked off the pedicel and gathered the flowers in a stone basin to pestle lightly. After above work, the pounded flowers were put into a new jar, and these flowers were covered by some dried lotus leaves, then the people used the batten or some pieces of dried bamboo (the flowers would be odorous if using the fresh bamboo) to press and fix them. Finally, the worker put the jar into the well water which should be substituted by the fresh one every five days in winter, three days in spring and autumn, and one day in summer. The temperature of well water is far low, and thus was used to preserve food in ancient China.

Through above preserving methods, the *Osmanthus* flowers will be fresh for about one year, and the colour remained intact. Such method also could be applied in picking and preserving other fresh flowers, such as the plum blossom, the jasmine, the rose, and the other aromatic herbs and flowers. In the period of having no preservative or antiseptic, the ancients used the nature methods to collect and preserve fresh flowers or foods with the advanced technologies. The ancient preservation methods of *Osmathus* flowers offer us an implication in preserving food.

### **Fragrant flower utilized in diet and seasoning**

China's culture of eating flowers is of long standing, and people have formed the habit of eating flower soup and flower meals for more than one thousand years. The ancients had many methods of using fragrant flower in diet and seasoning. For example, the fragrant flower were immersed in sugar or honey to make the fragrant flower sugar or fragrant flower honey; and the tea was fumigated with fragrant flower to make the fragrant flower tea. Fragrant flower chestnut soup, fragrant flower cake, fragrant flower wine, fragrant flower catsup, fragrant flower rice glue ball and other fragrant flower foods were all great creations of China ancients in fragrant flower diet. The *Shi Jing*, *Shanjia Qinggong*, *Zunsheng Bajian* and other historical documents had many records about fragrant flower which were used in diet and seasoning. In addition, in baking, braising, sauting, frying and other cooking process,

fragrant flower were the seasoning in foods for detoxifying, adding scent and increasing appetite.

The China ancients usually used the fragrant flower or other spice to make the aromatic wine. Especially in south of China, there is a tradition of making aromatic wine, and this tradition prevails for nearly two thousand years. The *Nanfang Caomu Zhuang*, a botanical literature about south of China, recorded that the people in the south of China were good at using herb or aromatic flower to make fragrant wine (Xiaoqing and Tao, 2006). *Osmanthus fragrans* was largely grown in the south of Yangtse River, then it was not strange that the fragrant flower wine was mostly appeared in this area. There were some introduction about making and using aromatic wine in the *wine books*, which had recorded that the fragrant flower and Chinese pepper were used in making aromatic wine. Fragrant flower wine is one of the most ancient aromatic wine besides the tulip wine and Chinese pepper wine. Before Ch'in dynasty (BC 221-BC 207), the ancients had been able to make fragrant flower wine. Fragrant flower are local products in south of China, then it was not strange that the fragrant flower wine was the vintage wine to serve guest for its aroma in south of China. The *Songs of Chu* had recorded the status of planting fragrant flower and the method of making fragrant flower wine. After Han dynasty, there were a large volume of literature recording about the fragrant flower wine, such as the *Han Shu*, *Tan Yuan Ji*, *Zhuyu Shanfang Zabü*, and other diet and wine books. (These books mainly contained China people's living trivialities or how to make wine).

The fragrant flower cake contained the special savour and was popular for the taste of the people. The method of making fragrant flower cake was mastered by the most of China's ancients. The ancients put some fragrant flower into the rice flour, laid the admixture in a mold, finally braised the admixture, and then the cake was made. Lin Hong, a gastrologer of Song dynasty, firstly mentioned the method of making fragrant flower cake in his *Shanjia Qinggong* (a literature which recorded about diet) (Huang, 2005). The method was that people sprinkled the liquorice succus over the *Osmanthus* flowers by which the pedicel were picked out, and braised fragrant flower with the rice flour. Then the fragrant flower cakes were made. People not only liked the delicious taste but also favored the beautiful pattern of the foods. The *Zunsheng Bajian*, the literature of recording living things of Ming dynasty, firstly noted that the fragrant flower cake was made by the red flowers which were collected from the red *Osmanthus*, and the cake was very beautiful for its fresh colour.

With the diversification of diet, the fragrant flower was more and more utilized in diet. Fragrant flower tea and fragrant flower soup were the direct utilization. *Bianmin Tuzuan*, the literature recorded the diet of Ming dynasty, noted that the fragrant flower and chrysanthemum could be mixed with tea to make the aromatic tea, and the fragrant flower and chrysanthemum could successively satisfy the people's demand all the year round (Jiang and Fang, 2001). Gu Zhong, the author of *Yang Xiao lu* (a literature about how to preserve one's health) in Qing dynasty, listed the name of aromatic flower and herb which could be made aromatic tea, and mentioned that people could use the distillation to distil the fragrant flower essence which could be put into the water, the soup, the wine, or the other foods to increase the flavour (Tan, 2004).

Because the soup is prepared from fragrant flower which were dehydrated, we first discuss the manufacturing process of dehydrating fragrant flower. There were mainly two methods mentioned in China's ancient literature—"Zunsheng Bajian" (Teng, 1997). The first method was that, after workers picked the blooming fragrant flower in the morning and pounded it, they put 100g liquorice and ten salted plums into 500g pounded *Osmanthus* flowers to manufacture the fragrant flower conglomeration, and finally located the fragrant conglomeration in a hermetic jar to keep the fragrant scent and make the fragrant flower conglomeration dry slowly. In the second method, the drying fragrant flower powder was

mixed with the ginger powder and liquorice powder, then ancient workers put the salt into the admixture to increase flavour, and finally the admixture was airproofed in a jar. When needed, by putting a bit of fragrant flower conglomeration or fragrant powder into the boiling water, people could make the aromatic soup.

The archaic methods of making aromatic fragrant flower foods have a profound effect on the modern foodstuff industry in China. The present China's people inherit the archaic habit of eating fragrant flower foods. Fragrant flower foods have become the dominating production in some foodstuff manufactories.

### **The *Osmanthus fragrans* applied in medicine and preserving health**

The medicine function of osmanthus fragrans was also recorded in a large volume of China ancient literature, especially in the medical literature. The "Shuo Wen", "Lutian Piya", "Guihai Yuhengzhi" and books all had mentioned that the osmanthus fragrans bark, flower, fruit and foliage could be used as medicine. In addition, the ancients proposed that osmanthus fragrans were the efficacious remedy for its favorable character. Li Shizhen, a China's ancient doctor, had said that the osmanthus flowers had no toxin, and it could secrete the saliva stimulatingly and cure the cough. Modern biochemical experiment indicated that fragrant flower contain some steady organic component having good effect on human body.

According to the literature statistic, there were more than 30 prescriptions of utilizing *Osmanthus fragrans* in China's ancient medical literature, such as the "Qian Jin Fang", "Zhou Hou Fang" and "Taiping Shenghui Fang" (these were medical literature of Song dynasty). These ancient prescriptions mainly contained the recordation of function and applying methods of flower, fruit, root, bark and foliage of *Osmanthus fragrans*. The applying methods of *Osmanthus fragrans* contained decocting, dipping in wine and dunking in boiled water. These ancient prescriptions mentioned that the decocted *Osmanthus fragrans* root could cure the rheumatism and lumbago, the *Osmanthus* flower or *Osmanthus* fruit tea could decrease the halitosis, the *Osmanthus fragrans* bark could alleviate the toothache, and the liquor of *Osmanthus fragrans* fruit dunk in the boiled water could warm the stomach and mitigate the stomachache. In addition, from the literature, if the purified medicine which was decocted from the *Osmanthus* foliage was poulticed on the pain part several times everyday, the bones and muscles ache would be relieved.

It is impressive that before thousands or hundreds of years, China's ancients can understand so many medical and chemical characteristic of natural plants. The ancients of China were very smart that they had been cognizant of the scent active function of *Osmanthus fragrans*. Once the distillation technology was appeared in Song dynasty, the fragrant flower were applied in the process of distilling essence, and its essence was applied in aromatic remedy to relieve the mentality pressure. The essence of fragrant flower has become prevailing and popular in China recently.

Some current academic research has verified the medical qualities of *Osmanthus fragrans* which had been applied for thousands of years in China. The modern medicine research indicates that the *Osmanthus* flowers, foliage and bark oil have the effect of relieving ache and exciting, so the *Osmanthus* flowers, foliage and bark oil were greatly applied in the clinic medicine now. The aromatic smell has the function of relaxing mentality tension and it could convey some information to nerve, brain and hormone system. The scent of fragrant flower act on the nerve edge system, according to its medical usage.

Now, the scent of aromatic flowers were classified for some kind, for example, the scent of diverting, endearing, exciting. The certain scent could stimulate the psychological and physiological activity. For example, the scent of rosemary could accelerate the heartbeat, the scent of ageratum could calm and concentrate spirit, the jasmine oil could be used to cure hypochondria, and the *Osmanthus* flowers oil has the function of removing the fear. When

people stay in a certain aromatic environment, they would feel relaxed, pleasurable, exciting, or facetious. The aromatic remedy has appeared and it is greatly popular in recent years.

### **The fragrant flower utilized in perfuming and hairdressing**

Dressing, perfuming, deodorizing and hairdressing was the main intention of the ancients using fragrant flower or herb. Referring to the history literature, we find that the ancients usually used the sandalwood, agalloch, camphol, styrax, rosebush essence, benzoin, *Osmanthus fragrans* flowers and the other aromatic plant to perfume their living environment. In the above listed aromatic plants, only the *Osmanthus fragrans* natively grow in China, and the other aromatic plants mainly depended on import from other countries in ancient China. Then, we could be convinced that the foreign aromatic plant were very precious and valuable for ancient China. The common fragrant flower were utilized widely in perfuming and hairdressing by the China ancients.

*Dong Ming Ji*, the history literature of Han dynasty (about BC 206-AD 220), recorded that in the Hanwu emperor period (about BC 140-BC 88) the worker had used the wood of *Osmanthus fragrans* to construct the Lingbo Palace, and the aromatic scent of *Osmanthus fragrans* was emanated to the air with the wind. This was the earliest recordation that the China's ancients how to utilize the scent of *Osmanthus fragrans*. With the improvement of confecting spice technology, the mixed spice which were mixed with many kinds of spice appeared after Tang dynasty. The ancients usually used the fragrant flower to confect the spice. The methods of confecting spice could be investigated and verified in some volumes of special literature, such as the *Xiang Pu* (appeared in Song dynasty) and the *Xiang Sheng*. (These were literature of introducing spice.) *Xiang Sheng*, a special historic book in Ming dynasty mainly containing the introduction of varieties, confection and utilization of spice, recorded that the dried fragrant flower could be mixed with the muskiness, agalloch, camphol, sandalwood, styrax oil or other precious spice to confect the mixed spice. There were approximately ten methods of confecting mixed spice containing fragrant flower in *Xiang Sheng*, and these methods should be the most original mode of producing mixed spice. For avoiding the odour, scenting the living environment, and incensing the body, the ancients put the confected fragrant flower into sachet to scent clothes and closets, burned the dried and confected fragrant flower to cense their room, or put these fragrant flower into the tub when people need to bath. The similar recordation could be found in historic literature of essay, novel and miscellanea. Comparing with the modern advanced essence distillation technology, there were a lot of trouble in the process of confecting spice in China ancients, but the ancient technics should be reserved as a civilization and art.

According to the recordation of historic literature, the China ancients had already utilized the distillation technic to get the essence in Song dynasty. Wang Xiangjin, the author of *Qun Fang Pu*, mentioned that fragrant flower not only it could be used as seasoning but also it could be made as aromatic face cream and hair oil. Li Shizhen, a doctor of Ming dynasty, had said that the fragrant flower were braised with the gingeli oil, the fragrant flower were saturated with gingeli oil, and then the aromatic face cream or fragrant hair oil was made. (we called these aromatic liquid balsam.)

From the method of making fragrant flower balsam, we could know the ancient technology of making balsam. The worker picked the half-blooming fragrant flower before the sun rise, put suitable amount of gingeli oil in the flower which were picked off the pedicle, located these in a round jar which was hermetic with thick oilpaper, cooked the jar which was placed in a kettle for about two hours, finally laid the jar in a untouched and dried place for ten days, then people could use the balsam which was as the face cream or hair oil. Foremost, the jar's opening should be airtight for a long time, and the balsam scent would be strong.

The gingeli oil shares the common character with the other organism, and it has the function of accelerating the hair growing. Therefore the ancients utilized the gingeli oil as the medium to make balsam. The aromatic face cream and hair oil was used widely by the ancients, and the aromatic substance brought many pleasure to the ancients. The ancient technologies were the primitive mode which could be used in modern perfume industry, and it greatly promoted the development of modern perfume industry.

## **CONCLUSION**

As a native plant, *Osmanthus fragrans* has been cultivated for more than 2500 years in China. A large volume of China's ancient literature mentioned *Osmanthus fragrans*, and in fact *Osmanthus fragrans* had become a part of China's culture. Based on China's ancient literature, the paper highlighted the varieties, planting, manufacturing and utilization of *Osmanthus fragrans* from historical perspectives, especially presented the utilization of *Osmanthus fragrans* in diet, medicine, and perfuming, and provided some information which has not been mentioned in former research. Although *Osmanthus fragrans* are still utilized presently, there are some planting, manufacturing and utilizing technologies which only could be found in China's historical literature. This paper discovered at the first time that the China's ancients used the snow and silkworm excrement to fertilize the *Osmanthus fragrans*, used the graft means to breed the red *Osmanthus*, and put the pounded flowers into a new jar which was laid in cold well water to preserve the fragrant flower. This paper proposed that *Osmanthus fragrans* is not only a nature product but also a part of China's historical culture, and the culture come down to us and our offspring.

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