Determination the trace elements in *Aquilaria sinensis* leave By ICP-MS

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Abstract

There are a lot of active components (amino acids, polysaccharides, saponins, alkaloids, flavonoids, organic acids and essential oils) and many trace elements in the leaves of *A. sinensis*. It has been reported that *A. sinensis* leaves were used as functional health tea. But till now, there is no report about the determination of the trance elements in the leaves of *A. sinensis*, we tested the trace elements in the leaves of *A. sinensis* using ICP-MS, to provide the valuable scientific evidence for the development of drinks.

Aquilaria sinensis (Lour.) Gilg, a tropical and subtropical evergreen trees, belonging to the family Thymelaeaceae, is endemic and rare medicinal plants in China. *A. sinensis* can secrete a fragrant defensive black resin when suffering from an injury or infected by fungi. The black resin was named as Chinese eaglewood, which is specific medicine for stomach disease in clinic, and it possess a wide spectrum of biological activities, such as spasmolysis, antihypertensive, antibacterial, sadation, analgesia and so on [1]. The research of *A. sinensis* was mainly focused on the flowers. While the Chinese eaglewood is rare and precious because of its long period of formation. Therefore, injection fungi into the trunk has been carried out to promote the formation of the Chinese eaglewood. In order to comprehensively utilize this resource of *A. sinensis*, much attention has been focused on studying its leaves, especially the leaves after been injected fungi in the trunk of *A. sinensis*, and several healthy drinks have been developed: Wang Keyuan [2] mixed mature and tender leaves of *A. sinensis* with different ratios to prepare different teas for treatment of defecation, detoxification, sleep-promoting and reducing fat; Wang Keyuan [3] also prepared a kind of health product with mature and tender leaves of *A. sinensis*, *Morinda officinalis* How, *Cistanche deserticola* Ma and *Panax quinquefolium* in different forms (granule, capsule, tablet, etc.), which can be used for detoxification, nourishing the face, improving sleep, lowering blood sugar and lipid, tonifying kidney, enhancing immunity. Wang Jian et al. [4] prepared a kind of tea with *Clerodendranthus spicatus*, *Aquilaria sinensis* leaves and *Glycyrrhiza uralensis* Fisch, which possess the activities of heat-clearing, detoxicating, promoting liver, drenching, warming kidney. Based on the above results, in this work, we determined nineteen trance elements in three different leaves of *A. sinensis* (No.1 Natural growth leaves, No. 2 Leaves implanted with *fungi*, No 3. Non-implanted leaves, all leaves were collected from Taiwan, China) using ICP-MS, to provide scientific evidence for the development of drinks.

The experimental procedure listed below: the three kind different leaves were dried at 60°C and powdered respectively. Each sample was weighed the given weight and diluted in 50 mL volumetric flask using the deionized water after nitrolysis. The trace elements in three different leaves were detected using ICP-MS. The nitrolysis processes see to figure 1 and the results listed in table 1, which provide the evidence for development of drinks with the leaves of *Aquilaria sinensis*.

According to scientific research, up to now, there are 18 kinds of essential trace elements related to human health and life. Such as: Fe, Cu, Zn, Co, Mn, Cr, Se, I, Ni, F, Mo, V, Sn, Si, Sr, B, Rb, As. We can know from table 1 that there are 11 kinds of essential trace elements related to human health and life in he leaves of *A. sinensis*, such as; V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Sr. Especially the contents of Mn, Fe, Zn and Sr are rich in the leaves of *A. sinensis*, and V, Cr, Co, Ni, As, Se are also with higher contents in the leaves of *A. sinensis*. It means that the leaves of *A. sinensis* contains abundant essential trace elements related to human health and life, which can be developed the drinks and health products.

Acknowledgements

Elements	Standard curve	R^2	The content of the elements (ug/g)		
			No.1	No.2	No.3
Al	Y=0.0128X+0.2013	0.9989	1.8579×10^2	5.9205×10	1.3195×10^2
Ti	Y=0.0203X+0.0063	0.9992	6.3573	4.2760	6.3467
V	Y=1.0952X+0.0440	0.9992	0.4403	0.5847	0.8295
Cr	Y=1.4904X+0.7925	0.9992	2.5941	2.2039	2.1078
Mn	Y=0.4714X+0.2261	0.9994	1.0507×10^2	4.1486×10^3	6.1820×10^3
Fe	Y=1.0349X+4.6486×10	0.9988	2.0340×10^2	3.2262×10^2	2.9124×10^2
Co	Y=3.0012X+0.1006	0.9989	0.1013	0.4766	0.8735
Ni	Y=0.8618X+7.3903	0.9988	0.5887	0.4761	1.0901
Cu	Y=2.3178X+4.1572×10^2	0.9945	1.6511×10	<0.000	<0.000
Zn	Y=0.2807X+1.6809	0.9986	1.7542×10^2	1.8528×10^2	2.2940×10^2
Ga	Y=0.2420X+1.0000	0.9995	0.0639	0.1128	0.1598
As	Y=0.2098X+0.0329	0.9975	0.4159	1.1240	0.4066
Se	Y=0.0045X+0.0050	0.9927	0.0820	0.4115	0.4023
Sr	Y=0.0120X+0.0023	0.9959	4.5023×10^1	3.7764×10	4.6574×10
Cd	Y=0.0111X+1.3526×10^{-4}	0.9933	0.1952	1.5355	2.6309
Sb	Y=0.0854X+0.1005	0.9746	0.0433	0.0504	0.0137
Ba	Y=0.0250X+0.0264	0.9767	6.2973	2.1474×10	4.3463×10
Tl	Y=0.3310X+0.0025	0.9878	0.0060	0.01735	0.0143
Pb	Y=0.2715X+0.0721	0.9941	1.3505	1.2660	1.2630

Table 1. The content of the trace elements

No.1: Natural growth leaves, No. 2: Leaves implanted with fungi, No. 3: Non-implanted leaves
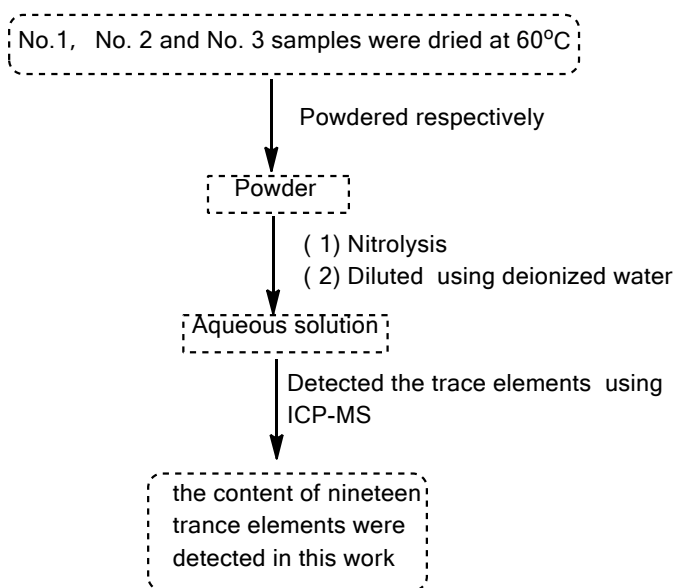

Figure 1. The processes of nitrolysis and detect the trace elements

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