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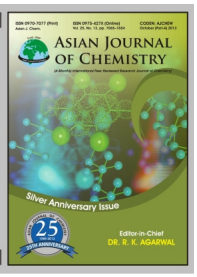

NOTE

Study on the Content of Beneficial Elements, Harmful Elements and Rare Earth Elements in the Wild Soybean (*Glycine soja*) by ICP-MS

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Wild soybean originated in China, but trace element nutrition in wild China Ixeris has not been reported. The results showed that wild soybean contained much macroelements Mg, P, K, Ca and Mn, but the concentrations Mg, P, K and Ca are much lower than those in cultured soybean, while the concentrations of Mn and Fe have no significant difference. Beneficial trace elements Se, Co and Mo in wild soybean are significantly higher than that in cultured soybean. The wild soybean contained much Al, Cu and Ni, but all heavy metals did not exceed the national standards. Rare earth elements in wild soybean were at a very low level, most of rare earth elements were below 1 ng/g and six kind of rare earth elements are not detected (Tb, Dy, Er, Tm, Yb and Lu).

Key Words: Wild soybean (*Glycine soja*), Trace elements, Heavy metals, ICP-MS.

Wild soybean (*Glycine soja*) belongs to Leguminosae, Papilionoideae, Glycine, Soja. The soybean (Glyci ne max) originated in China and annual wild soybean (Glyci ne soja), which has many excellent characteristics of high protein, strong resistance and high breeding coefficient, is wild relatives of cultivated soybean. Wild soybean is the important sources of genes to improve cultivated soybean varieties and is also valuable resource for research of soybean origin, evolution, classification. Distribution region of wild soybean is very narrow in the world, only distributed in non-arid temperate regions in East Asia, including China, the Korean Peninsula, Japan, the Russian Far East, Sakhalin, the Kuril, *etc*.[1].

China has the most wild soybean resources in the world, now national Gene Bank collected and preserved more than 6500 copies of wild soybean resources, which accounts for 90 % of the world-wild soybean resources. Wild soybean was included in the national key protected wild plants as the second class state protection object in 1999[2].

Many researches have studied the organic composition in wild soybean, such as isoflavones,protein and lipoid content[3] and crude fiber, total sugar, calcium, magnesium, total falconoid, total free amino acids, Zn and Cu[4].

Trace element nutrition in wild soybean from Beijing has been less reported, especially heavy metals, trace elements and rare earth elements. This work is to study the nutritional and safety characteristics of total elements to provide basis of food development and application of wild soybean.

Wild soybean (*Glycine soja*) was collected from Shangzhuang experimental station of China Agricultural University, Haidian district of Beijing city, China. The samples were washed with deionized water, dried and grinded, digested concentrated nitric acid and 30 % H_2O_2 solution, finally determined by ICP-MS, the ICP-MS instrument is Thermo-X7 produced by Thermo Electron Corporation of USA.

Macroelements in *Glycine soja*: The results show that wild soybean contain much macroelements Mg, P, K, Ca and Mn (Table-1), but the concentrations Mg, P, K and Ca are much lower than those in cultured soybean in northeast of China, the concentrations of Mn and Fe have no any significant difference[5].

Beneficial trace elements in *Glycine soja*: Beneficial trace elements Se, Co and Mo in wild soybean are significantly higher than that in cultured soybean, so wild soybean can supplement Se, Co and Mo for human health. The contents of Li and Zn in wild soybean were similar to cultured soybean[5]. The descending order of beneficial trace elements in wild soybean from Beijing is Zn > Mo > Se > I > Co > Li.

Harmful trace elements in *Glycine soja*: This research proved that wild soybean contained much Al, Cu and Ni, but all heavy metals did not exceed the national standards[6].

TABLE-1
CONCENTRATIONS OF MACROELEMENTS
IN *Glycine soja* (ng/g)

Elements	Concentration	Elements	Concentration
Mg	884784.63	Ca	1395794.52
P	4440612.63	Mn	22151.83
K	4843361.11	Fe	69936.07

TABLE-2
CONCENTRATIONS OF BENEFICIAL
TRACE ELEMENTS IN *Glycine soja* (ng/g)

Elements	Concentration	Elements	Concentration
Li	7.23	Zn	19312.40
I	470.70	Se	796.04
Co	167.81	Mo	2045.66

TABLE-3
CONCENTRATIONS OF HARMFUL
TRACE ELEMENTS IN *Glycine soja* (ng/g)

Elements	Concentration	Elements	Concentration
Al	2954.72	Tl	0.38
Cr	56.70	Pb	28.92
Ni	1029.68	Cd	36.91
Cu	8850.46	Sn	0.00
As	0.76	Sb	0.00
Hg	0.00	–	–

Rare earth elements in *Glycine soja*: This study proved rare earth elements in wild soybean were at a very low level, most of rare earth elements were below 1.00 ng/g and six kind of rare earth elements are not detected (Tb, Dy, Er, Tm, Yb and Lu) (Table-4).

TABLE-4
CONCENTRATIONS OF RARE EARTH
ELEMENTS IN *Glycine soja* (ng/g)

Elements	Concentration	Elements	Concentration
La	3.42	Dy	0.00
Ce	10.65	Ho	0.38
Pr	1.90	Er	0.00
Nd	5.33	Tm	0.00
Sm	0.38	Yb	0.00
Eu	1.14	Lu	0.00
Gd	0.76	Sc	64.69
Tb	0.00	Y	3.42

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