

AN ESTIMATION THE OF AUTHENTICITY OF A HERBAL EXTRACT AS A BAA RAW MATERIAL SCHISANDRA CHINENSIS

Komarova E.L., Doctor of pharmacological science (ZAO "Natural Ingredients", Moscow)

Eller K.I., Doctor of chemical science, (RAMS Nutrition Research Institute)
Vlasov A.M., (Sechenov MMA)

Schisandra (*Schisandra chinensis* (Turcz) Baill) is a woody liana with climbing branches (Shisandraceae family). The fruit are small red berries gathered into a bunch. All parts of the plant have a specific odour. When you rub the plant it produces a lemony smell which allows you to distinguish the plant from actinidia or bittersweet, which are very similar. Schisandra has a unique, spicy taste, simultaneously combining sour, sweet, salty, sharp and bitter properties. This unusual combination is reflected in the Chinese name for the plant "wu-wei-zi" meaning "five taste berry".

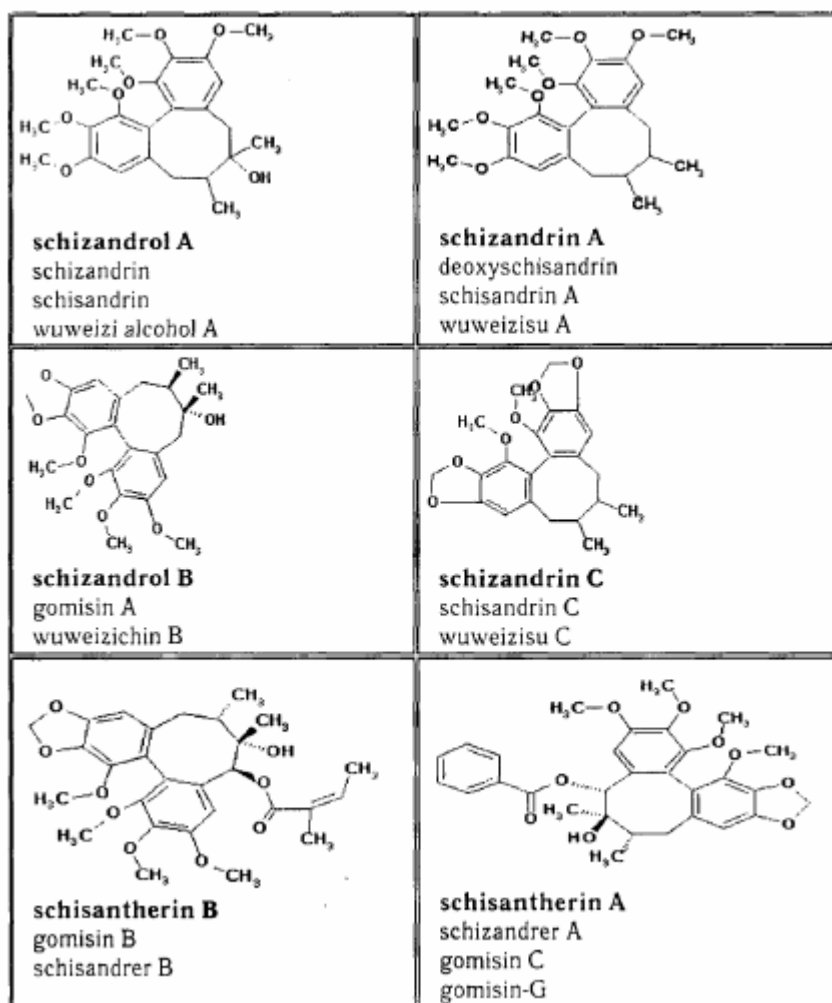
Schisandra can be found in the northern regions of China and Korea where it is also cultivated. In Russia Schisandra grows in Primorye, Sakhalin and the Kuril islands.

In the folk medicine of the Orient, Schisandra has been used as a phyto-genous remedy and it has been used as a health-improving and stimulating remedy in traditional medicine in the Far East.

A lot of scientific research into the chemical structure and pharmacological activity of Schisandra has been conducted in Russia. Special interest in this plant was aroused by its stimulating and anabolic action. In the 1960s-1980s medical products were developed which were prescribed for various disorders, from cold and flu prophylaxis (its adaptogenic properties) for both children and adults, to the treatment of the asthenic and depressive syndromes associated with psychiatric conditions, atherosclerosis and traumatic cerebraesthesia. It has been found that Schisandra has a positive effect on carbohydrate metabolism and arrests the development of stomach ulcers caused by the action of some chemical preparations. Also, preparations of Schisandra possess stimulating properties, enhance spinal reflexes and neuromuscular conduction, and improve visual acuity and night vision, reducing visual analyser fatigability.

New Chinese scientific research has been published recently confirming that Schisandra lignanes possess antihepatotoxic (hepatoprotective) properties, improve liver function and help prevent hepatitis.

In official medicine the whole dried fruit and seeds are used as they are the most effective. In folk medicine all parts of the plant are used including the cortex of the stems and roots.



Research of the chemical structure has shown that Chinese Schisandra is characterized by a high content of dibenzocyclooctane lignanes, such as schisandrin (up to 0,12% in the fruit), schisandrin A, schisandrin B, schisandrin C, γ -schisandrin (the racemate form of chisandrin B), gomisin A, gomisin N, etc.

Schisandra fruit contain large amounts of organic acids (ascorbic, citric, malic, dihydroxysuccinic), pectins, sugars, tannins, flavonoids, catechins,

anthocyanins. Organic acid content may be more than 10%. All parts of this plant contain essential oils, the seeds also contain up to 34% fatty oil. The fruit pulp contains pectins and sugars. Schisandra also contains anthocyanins, catechins, flavonoids, cyclic dipeptides, phytosterols (beta-sitosterol, stigmasterol), vitamins C and E, and microelements.

At various times there have been different names for Schisandra lignanes, which is why some lignanes have several synonyms (table 1):

Schisandrin = schizandrol A, wuweizi spirit A.

Schizandrin A = deoxyschisandrin, wuweizisu A.

Gomisin A = schizandrol B, wuweizichin B.

The characteristic taste of Schisandra chinensis is very important for the identification of the raw material. A more reliable method for determining the authenticity of the raw material is by using a thin-layer chromatogram to look at the layout of the characteristic spots on the leaf blade.

In some cases it is possible to substitute the raw material of Schisandra chinensis with a less valued species of Schisandra, for example S. Sphenanthera, the berries of which are different in size and taste. There have also been cases of substitution by other kinds of plant, such as Kadsura longipendunculata, K.japonica, Eunonymus spp. or Vitis spp.

Schisandra chinensis can easily be distinguished from S.Sphenanthera or other plants because of the two main lignanes, schizandrol A and schizandrol B, the high content of which is characteristic only for Schisandra chinensis.

The main biological activity of Schisandra is connected with its lignane content. At the present time about 30 compounds have been identified and a lot of scientific articles have been written on their pharmacological activity.

The standardization of Schisandra chinensis preparations and raw material is carried out according to the content of schisandrin (schizandrol A), as well as the mixture of schizandrin and gamma-schizandrin using the HPLC method (fig.1) [1, 3].

Among Schisandra lignanes, schizandrin prevails quantitatively (about 10% in the cortex of roots and stems and up to 5% in ripe pericarps and seeds). Schizandrin is also considered one of the main active components of the plant. According to their level of activity, schizandrin, schisandrins A, B, C, schisantherins A and B and gomisin A and N are also important.

The pharmacological studies of individual lignanes have shown that schizandrin C and its derivatives are effective in hepatitis treatment. Gomisin A and schizandrin B stimulate the regeneration of liver tissue. Schisandrins A, C and gomisin protect tissues from the influence of neurotoxic substances. Most Schisandra lignanes possess marked hepatoprotective, adaptogenic and antioxidant properties.

In connection with the marked biological activity of the whole complex of Schisandra chinensis active components, HPLC methods determining the total content of schisandrins are used for the standardization of the extract. The standardized total content of lignanes with different structures is used to carry out the analysis.

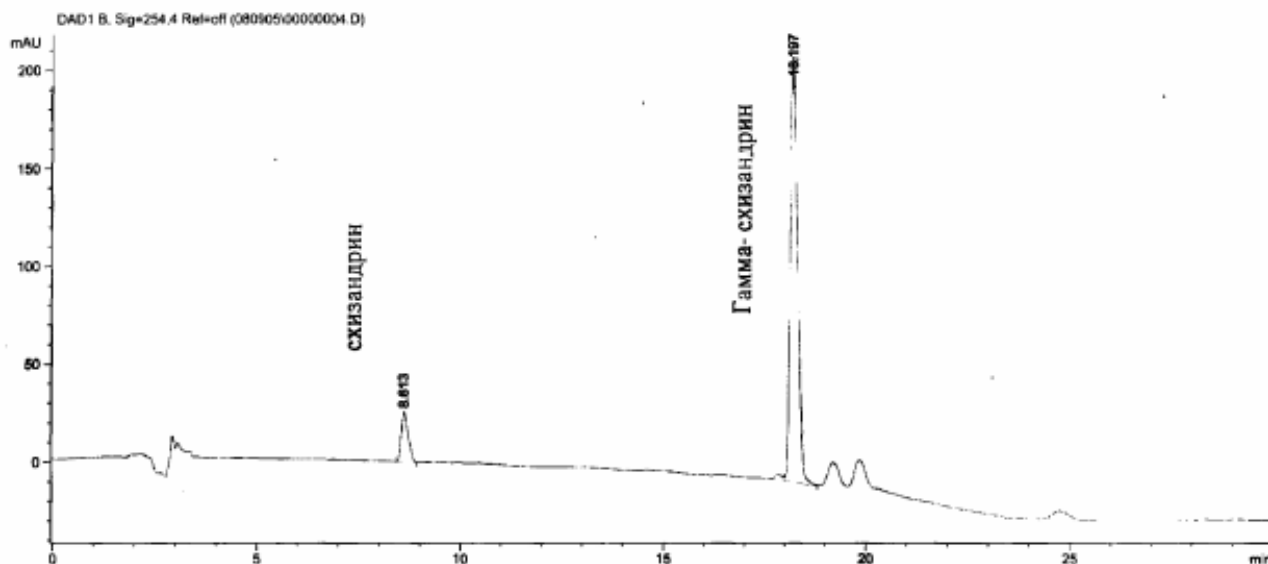


Fig.1. HPLC-chromatogram of a mixture of schizandrin and gamma-schizandrin (column Phenomenex LunaTM, 5 μ m, 4.6 x 250 mm; mobile phase, gradient: acetonitrile / trichloroacetic acid pH=2,5 (0 min. – 50% acetonitrile; 20 min. – 95% acetonitrile), 1ml/min., detection in UV at 254 nm).

Different kinds of products are derived from Schisandra fruit. The most popular in BAA production and pharmaceutical preparations are dry extracts from Schisandra chinensis fruit, and seed oil and liquid extract from the seeds of Schisandra chinensis.

In Russia the standardization of Schisandra chinensis pharmaceutical preparations and raw material is carried out according to schisandrin content which should be no less than 2%. Standardization of BAA products is also carried out according to schisandrin content the daily dosage of which (an adequate dose) should be no less than 500 mkg., and the maximum admissible dose is 1 mg [2].

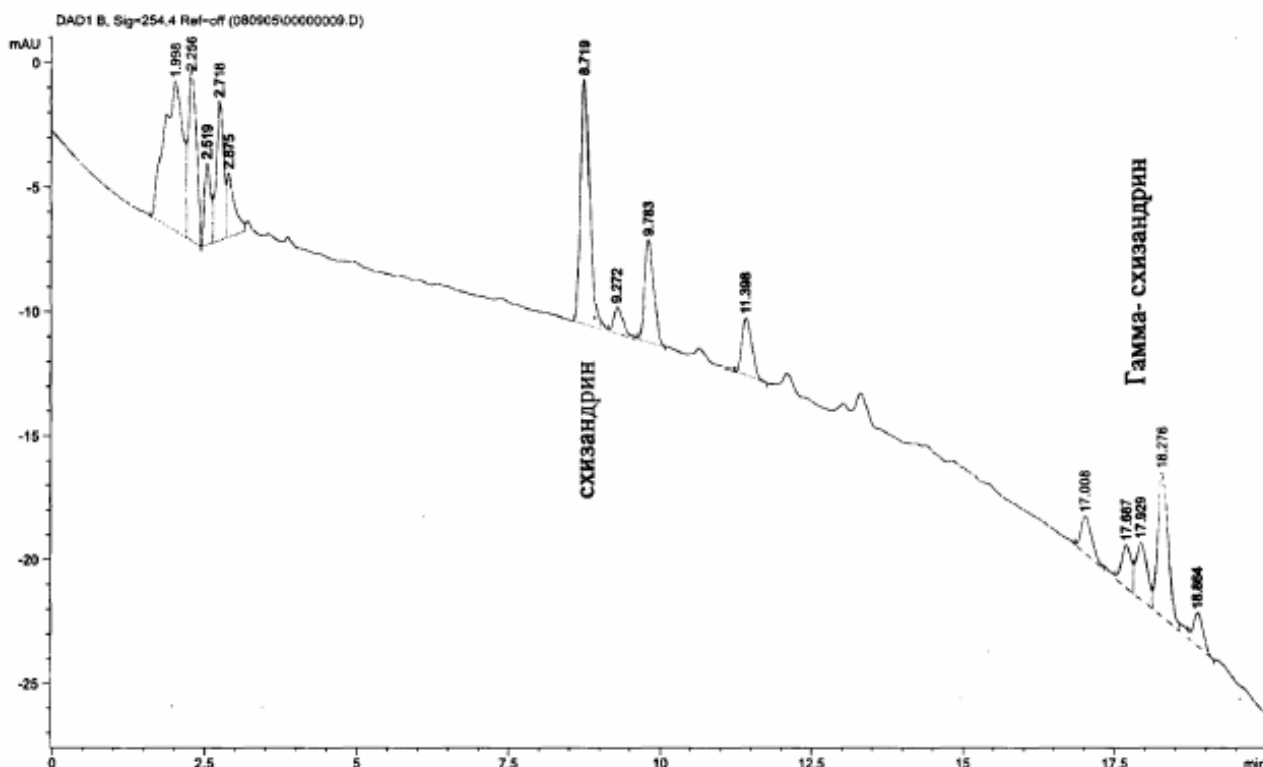


Fig.2. HPLC- chromatogram of total lignanes in Schisandra chinensis fruit.

Bibliography:

1. Guidelines for quality control and safety in biologically active food additives”, P4.1.1672-03, Ministry of Health, Russian Federation, 2004.
2. Method recommendations “Recommended levels of use for dietary and biologically active substances” MP 2.3.1. 19150-04, Ì., 2004.
3. B. Avula, Y-W. Choi P.V. Srinivas I.A. Khan. Quantitative Determination of Lignan Constituents from Schisandra chinensis by Liquid Chromatography Chromatographia 2005, 61, May (1 9/10).