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人工栽培山莨菪和野生山莨菪中 4 种托烷类生物碱含量的比较研究*

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摘 要 :为了评估人工栽培山莨菪的药用价值, 采用高效液相色谱技术对人工栽培和野生山莨菪的地上部分和根中具有生物活性的 4 种托烷类生物碱: 樟柳碱、山莨菪碱、东莨菪碱和阿托品的含量进行了测定。结果表明无论是人工栽培还是野生植物, 地上部分中 4 种生物碱含量均远低于根, 这解释了人们为什么用山莨菪的根而不是整株入药。在栽培植物的根中, 一年生山莨菪中各生物碱含量均小于二年生山莨菪, 其根中 4 种生物碱总量与野生根相比差异不是很明显。二年生山莨菪根中, 4 种生物碱总量以及樟柳碱、东莨菪碱和阿托品含量均比野生的高。这说明人工栽培的山莨菪, 尤其是二年生山莨菪, 同野生山莨菪一样具有一定的药用价值。

关键词 :托烷类生物碱; 樟柳碱; 山莨菪碱; 东莨菪碱; 阿托品; 人工栽培; 山莨菪

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Comparative Study of Contents of Four Tropane Alkaloids in Cultural and Wild *Anisodus tanguticus*

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Abstract :To assess the medicinal value of cultural *Anisodus tanguticus*, the contents of four bioactive tropane alkaloids, anisodine, anisodamine, scopolamine and atropine, in cultural and wild materials were determined by the HPLC method. The results showed that content of each alkaloid in the aboveground parts of cultural and wild samples was lower than that in roots, and this explained why it was not the whole plant but the root that was used as medicinal materials. The content of each alkaloid in the roots of one-year cultural material was lower than that in the two-year plants. The discrepancy of the total of four alkaloids between one-year and wild plants is not significant. Moreover, the total of four alkaloids, and the contents of anisodine, scopolamine, and atropine in two-year plants were higher than those in wild plant. Thus there is medicinal value in the cultivated *A. tanguticus* as well as wild *A. tanguticus*, especially in the two-year cultural *A. tanguticus*.

Key words :tropane alkaloid; anisodine; anisodamine; scopolamine; atropine; cultivation; *Anisodus tanguticus*

Anisodus tanguticus (Maxim.) Pasher (Solanaceae), a traditional Chinese medicine, called Tang-chongnabao by Tibetan, mainly distributes in Qinghai, Tibet, Yunnan, Sichuan and Gansu Provinces.

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of China (altitude 2 200~ 4 200 m above sea level)^[1]. Its biologically active compounds are known to be tropane alkaloids. Thus, the content of tropane alkaloids is regarded as major indexes for quality control of *A. tanguticus*. In recent years, natural resources of *A. tanguticus* suffer from destruction to some extent. To evaluate the medicinal value of the cultural *A. tanguticus*, four tropane alkaloids, atropine, anisodamine, scopolamine and anisidine present in this plant, were determined by the HPLC. And the contents of those alkaloids were compared with those of wild *A. tanguticus*.

1 Materials and methods

1.1 Plant materials

Wild *A. tanguticus* was collected in Datong

County, Qinghai Province on October 16, 2003. Cultural *A. tanguticus* was collected in Ershilipu Planting Base on October 28, 2003.

1.2 Sample preparation and HPLC analysis

Sample preparation and the HPLC analysis were carried out as previously described^[2].

2 Results and discussion

It is reported that the roots of *A. tanguticus* in September or October have been used as medicinal materials. So October was chosen to be as the time of herbORIZATION^[1].

Table 1 Contents of four tropane alkaloids in cultivated and wild *A. tanguticus* (mg/g)

Samples		anisidine	anisodamine	scopolamine	atropine	Total
Wild <i>A. tanguticus</i>	Aerial part	0.0655	0.0231	0	0.0703	0.159
	Root	0.830	0.234	0.0399	0.506	1.61
One-year-perennial	Aerial part	0.0303	0.0101	0.0201	0.0613	
	Root	0.605	0.0638	0.214	0.559	1.44
Two-year-perennial	Aerial part	0.0427	0.0219	0.0130	0	0.0776
	Root	0.980	0.186	1.03	1.65	3.85

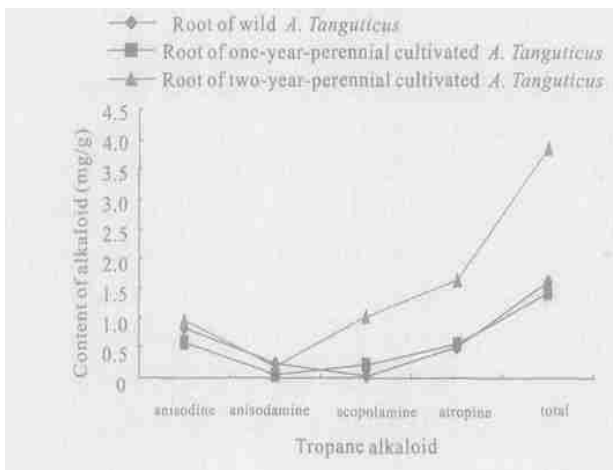


Fig 1 Contents of four alkaloids in the root of cultivated and wild *A. tanguticus*

The contents of anisidine, anisodamine, scopolamine and atropine in cultivated and wild *A. tanguticus* are presented in Table 1. In the above-ground parts, except for the alkaloid scopolamine, contents of the other three tropane alkaloids in one-year cultural materials as well as two-year cul-

tural materials are lower than those in wild plants. Scopolamine was not determined in the above-ground parts of wild sample. And the contents of the four alkaloids in the root of *A. tanguticus* are much higher than those in the corresponding above-ground parts, which is corresponded to the fact that people select not the whole plant but the root of *A. tanguticus* as medicinal materials. Figure 1 shows that the contents of four alkaloids in the root of one-year cultural materials are lower than those in two-year cultural materials. Compared with root of wild *A. tanguticus*, the content of anisodamine in cultural *A. tanguticus* is lower; the discrepancy between the two-year cultural and wild samples is not remarkable. Whereas the contents of scopolamine and atropine in the root of cultural *A. tanguticus* are higher, especially the content of scopolamine in the two-year cultural material,

which is almost twenty-five times as high as that in the wild material. As to the content of anisodine in the root of the three species of *A. tanguticus*, the one-year plant has the lowest content, and the two-year plant has the highest content. In addition, the difference among the total contents of the four alkaloids in the root of one-year cultural and wild sample is not noticeable. And the total of the four alkaloids in the root of two-year cultural sample is bigger than that in the wilding. Consequently, we can conclude that cultural *A. tanguticus* and wild

A. tanguticus, especially the two-year cultural *A. tanguticus* have medicinal potential.

It is reported that the content of scopolamine among alkaloids is the lowest in the root of wild *A. tanguticus*^[1]. In this paper, the content of scopolamine among the four alkaloids in the root of wild sample is exactly the lowest. However, it is of interest to note that the content of scopolamine is the highest in the root of two-year cultural sample, and is not low even in the root of one-year plant.

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