

ALKALOIDS OF *Arundo donax*

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Arundo donax (Gramineae) is a perennial giant grass with a height of up to 6 m and enormous elongated leaves reaching a length of 1 m [1, 2] that is a rich source of valuable components: cellulose (about 65%), proteins, fats, lignin [3], and alkaloids. Of the 25 species of *Arundo* that have been described, 4 grow in Uzbekistan: *A. epigeois*, *A. phragmites*, *A. pseudophragmites*, and *A. donax*. In folk medicine a tincture of the leaves of *A. donax* is used as a uterine stimulant and a sudorific and diuretic agent [4, 5].

Thanks to its valuable biological properties, *A. donax* has long attracted the attention of chemists of various countries. A study of the alkaloids of *A. donax* growing in Central Asia was begun by A. P. Orekhov et al. [6] and continued by S. Yu. Yunusov et al. [7]. We have previously made a detailed investigation of the alkaloids of *A. donax* cultivated in the Tashkent Botanical Garden of the Academy of Sciences of the Republic of Uzbekistan. We studied the dynamics of the accumulation of alkaloids in four vegetation periods, isolated nine alkaloids, and showed the structures of three of them [8-11].

Continuing this work, we have studied the alkaloid composition of the epigeal part of the introduced species, *A. donax*, gathered in the Samarkand Botanical Garden of the Academy of Sciences of the Republic of Uzbekistan in the period of full development of the plant. The total alkaloids in this period (height of the plant 0.5-1 m) amounted to 0.25%. The main alkaloid in the mixture was donaxine, making up 0.05% of the weight of the dry plant. By chromatography of the total alkaloids obtained on a column of alumina we isolated nine alkaloids (Table 1).

An expedition of the Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, found large thickets of *A. donax* in the Chirakchinskii region of Kashkadar'ya. In the period of vigorous growth the epigeal part of *A. donax* from this site contained 0.3% of alkaloids, from which 10 individual bases were isolated. The results of investigations of the alkaloids of *A. donax* from three growth sites are given in Table 1.

The results of our study of the dependence of the alkaloid composition of *A. donax* on its growth site permit the following conclusions to be drawn; the total alkaloids of the cambium from different growth sites differ both in their quantitative ratios and in the compositions of the individual components, particularly in the case of wild-growing and cultivated types.

TABLE 1

Growth site	Date of collection and plant organ	Vegetation period	Total alkaloids, %	Donaxine content, %	Alkaloids isolated
Tashkent Botanical Garden	08.1993, epigeal part	Vigorous growth	0.36	0.05	1-9*
Samarkand Botanical Garden	05.1993, epigeal part		0.25	0.05	1-9
Chirakchinskii region of Kashkadar'-inskaya oblast	06.1994, epigeal part		0.3	0.14	1-9 Arundinine [12]

*1) Donaxine; 2) N-phenyl- β -naphthylamine; 3) deoxyvasicinone; 4) arundine; 5) aridine; 6) donaxarine; 7) donaxanine; 8) donaxaridine; 9) donine.

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The main alkaloid in the *A. donax* from the Samarkand Botanical Garden and from the Chirakchinskii region of Kashkadar'ya was donaxine. The qualitative compositions of the total bases of *A. donax* cultivated in the Tashkent and Samarkand Botanical Gardens were the same and the amounts of the individual bases were of the same order. Thus, arundine and donaxanine were isolated in minor amounts from both these sets of bases, while arundinine was completely absent.

A wild-growing *A. donax* plant from Kashkadar'ya was richer in alkaloids in the qualitative respect, and its content of the main alkaloid, donaxine, was greater than that of the introduced species and may be considered as a source for its isolation. The donaxine amounted to 0.14% of the weight of the air-dry plant.

The plant *A. donax* growing in a difficultly accessible region of Tadzhikistan has been proposed previously for obtaining donaxine hydrochloride. Now a new source of raw material for its isolation has been found in Uzbekistan.

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