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ALKALOIDS OF *Capsicum annuum*

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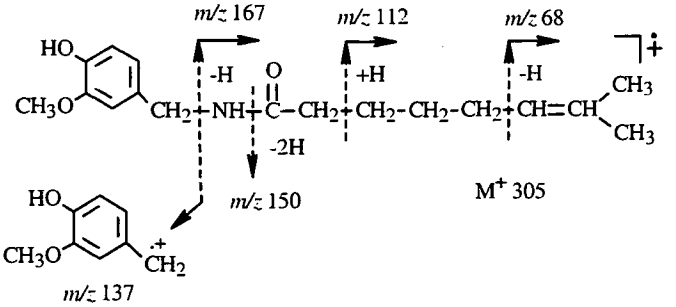
Capsicum annuum L. is an annual pepper of the nightshade (Solanaceae) family that is widely cultivated. About 90 cultivated varieties are known [1].

The chemical composition of pepper has been rather well studied. Its olefactory properties, hot and spicy, are due to the presence of capsanoid alkaloids, the content of which ranges from 0.02 to 0.2%. The pericarp of the fruit also contains an alkaloid similar to coniine, solanine, small quantities of acids (citric and palmitic), fatty and essential oils, and salts of P, K, Ca. The seeds have a large percent of fatty oil. The fruits typically are rich in vitamins A and C (vitamin C up to 380 mg%; vitamin A, 9-12 mg%).

Hot pepper is cultivated everywhere in Uzbekistan. The hot variety Margelanskii 330 has been adapted to the region. It chemical composition has not been studied.

We studied the alkaloid content of this pepper species. The alcohol extract, which contains capsanoids, was chromatographed on a silica-gel column. A substance with mp 62-63°C was isolated from the benzene eluate. Its IR spectrum contains absorption bands of active H (3316 cm^{-1}, NH, OH), amide carbonyl (1652 cm^{-1}), an aromatic ring (1601-1558 cm^{-1}), and an isolated double bond (973 cm^{-1}). The PMR spectrum ($CDCl_3$) exhibits a doublet at 0.84 ppm (6H), probably from a gem-dimethyl group. Protons of an aromatic methoxyl appear at 3.78 ppm (3H). A sharp two-proton doublet is observed near 4.24 ppm, apparently due to a methylene bound to the aromatic ring and the NH of an amide. Olefinic protons appear as a triplet at 5.18-5.32 ppm (2H). Protons of the aromatic ring (3H) are found in the range 6.60-6.84 ppm as a multiplet. Four groups of multiplets at 1.00-2.24 ppm that partially overlap are assigned by us to four methylenes bound at one terminus, probably with a carbonyl (quartet, 2H, 1.78-2.00 ppm), and at the other, with a C of a double bond (triplet, 2H, 2.00-2.24 ppm). Two two-proton quartets that partially overlap each other (1.10-1.74 ppm) ($-CH_2-CH_2-$ group) are located further out. Two one-proton signals are seen at 5.55-5.85 ppm (OH, NH).

The molecular mass of the alkaloid was found using mass spectra, where a peak for the molecular ion with *m/z* 305 (8.3%) was noted. The mass spectrum also contains a peak for a fragment with *m/z* 167 (21%), which corresponds to cleavage of a C–N bond and loss from M^+ of a fragment with *m/z* 137 accompanied by proton migration. The base peak occurs at *m/z* 68, which arises from cleavage of the C–C bond of the side chain and migration of a proton. Rather strong peaks with *m/z* 150 (58%), 137 (94%), and 112 (48%) are observed. These are logically formed based on the alkaloid structure. This is clearly illustrated in the mass-spectral fragmentation pattern of capsaicin shown in the scheme below:



Scheme 1

The spectral properties, melting point, R_f values of the alkaloid, and it solubility in organic solvents indicate that it is

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capsaicin, which was isolated previously from pepper growing in other countries and consists of vanillylamine acylated by decylenic acid [5].

We isolated capsaicin for the first time from *Capsicum annuum* L. cultivated in Uzbekistan.

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