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In a study of the flavonoids of the plant *Ammothamnus lehmannii* Bge., collected in the phase of flowering and end of vegetation in the Bukhara Province, we detected the presence of a series of phenolcarboxylic acids.

The organic acids were determined quantitatively by a known method [1]. Titration was performed on a 262 pH-meter. In the flowering phase, the roots contained 5.09%, the stems 4.79%, and leaves 6.47%, and in the period of the withering of the epigeal part the roots contained 4.70% and the stems 6.43% of organic acids.

To isolate the phenolic acids, concentrated ethanolic extracts of various organs were diluted with distilled water (1:1) and extracted exhaustively with ether. The ethereal extracts were washed with 5% sodium carbonate solution and then the aqueous solution was acidified with 5% sulfuric acid and re-extracted with ether. The combined phenolic acids so obtained were separated by column chromatography on silica gel and cellulose in a gradient hexane-acetone system. In this way, four substances of phenolic nature were obtained which gave positive reaction with a number of reagents for phenolcarboxylic acids [2]. These acids were identified on the basis of their UV and IR spectra, and also by direct comparison with authentic samples.

Substance (I) with mp 156-158°C,  $R_f$  0.73 [here and below, on Silufol in the chloroform-methanol (8:2) system] was identified as salicylic acid. Substance (II) with mp 209-211°C,  $R_f$  0.58, and substance (III) with mp 188-190°C,  $R_f$  0.68, were identified as p-hydroxybenzoic and protocatechuic acids, respectively. Substance (IV) with mp 165-167°C,  $R_f$  0.75 was identified as ferulic acid.

The presence of oxalic, tartaric, citric, malic, lactic, succinic, and malonic acids was detected by ascending paper chromatography [Filtrak No. 2, butan-1-ol-formic acid-water (18:2:9)] with markers. It was established by the pentabromoacetone method [1] that at the end of the vegetation phase the roots contained 2.6% and the leaves 2.2% of citric acid.

The amount of malic acid was determined by the photolorimetric method on an FÉK-M instrument [1]. At the end of the vegetation period, the amount of malic acids in the roots was 1.06% and in the stems 2.86%.

*Ammothamnus lehmannii* Bge. belongs to the typical alkaloid-bearing plants [4]. These acids are apparently present in it in the form of salts with alkaloids. This is the first time that the acids described have been isolated from the plant under investigation.

## LITERATURE CITED

1. A. I. Ermakov, V. V. Arasimovich, M. I. Smirnova-Ikonnikova, and I. K. Murri, Methods in the Biochemical Examination of Plants [in Russian], Moscow-Leningrad (1952).
2. G. N. Zemtsova, V. A. Bandyukova, and A. L. Shinkarenko, Izv. Ser.-Kauk. Nauchn. Tsentr. Vyssh. Shk. Estestv. Nauki, 3, 72 (1973).
3. R. Ya. Shkol'nik, Dokl. Akad. Nauk SSSR, 90, No. 5, 847 (1953).
4. S. Yu. Yunusov, Alkaloids [in Russian], Tashkent (1980), p. 202.

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