

THE ACID COMPOSITION OF *Inula grandis*

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On studying *Inula grandis* Schrenk we directed our attention to the fact that it contains a considerable amount of organic acids. The concentration of ethanolic extracts from the leaves collected in the period of the development of the radical rosette gave about 0.2% (of the weight of the initial raw material) of colorless acicular crystals which sublimed at a temperature of about 200°C in an open capillary and at 287°C in a closed capillary. Their solution in water had a strongly acid reaction. In its R_f value, melting point, and IR spectra this acid differed from the monocarboxylic fatty acids. When it was heated in methanolic solution in the presence of sulfuric acid a dimethyl ester, $C_6H_8O_4$, with mp 102°C was obtained. The NMR spectrum of the ester showed, in addition to the signals of the methyl groups, a singlet at 6.79 ppm corresponding to olefinic protons. The physicochemical constants and IR spectra permitted the acid isolated to be identified as fumaric acid.

In order to identify the other acids, which were present in small amounts, we used thin-layer chromatography. The leaves, flowers, and roots were treated with hot water, and the extracts were acidified and extracted with ether. The residue after the evaporation of the ether was treated with ammonia solution until it was strongly alkaline to litmus, after which it was deposited on plates coated with the adsorbent. Chromatography was performed in a nonfixed layer of cellulose in the following systems: 1) tert-butanol-conc. ammonia-water (25:3:5), and 2) ethanol-conc. ammonia-water (20:3:2). The revealing agent was Bromophenol Blue [1]. In experiments in the presence of markers, the leaves were found to contain fumaric acid with R_f 0.40 (2) and traces of acetic acid with R_f 0.42 (2); the flowers contained fumaric acid and butyric acid with R_f 0.72 (1), and also traces of propionic acid with R_f 0.61 (1) and of acetic acid; and the roots contained traces of cinnamic acid with R_f 0.81 (2). The acid fraction isolated from a chloroform extract of the roots was shown by chromatography on paper impregnated with a 10% solution of paraffin oil in benzene [90% acetic acid-80% formic acid (3:1) system] to contain myristic and palmitic acids. The latter was revealed with a 1% solution of copper acetate and rubeanic acid in methanol. In addition, this fraction was shown to contain an unsaturated hydroxy acid which could not be identified.

LITERATURE CITED

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