URSOLIC ACID FROM Agrimonia asiatica

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Ursolic acid is found widely among representatives of the family Rosaceae [1-4]. We have studied the plant Agrimonia asiatica Juz., which belongs to this family. In a qualitative investigation for the presence of ursolic acid we used D. Bocharova's method [2]. Ursolic acid was found to be present in all organs. For its quantitative determination we took raw material which had previously been dried for 2 h and exhaustively extracted with petroleum ether to remove ballast substances and then with diethyl ether. The ethereal extract was concentrated to half volume and treated with 30 ml of a 15% solution of caustic potash (three times).

The combined alkaline fractions were acidified with 50% sulfuric acid and shaken with 50 ml of ether three times. After elimination of the extractant, a white microcrystalline substance was obtained which gave positive Liebermann–Burchard and Sal'kovskii reactions, and this was recrystallized from ethanol and weighed [5, 6].

The dynamics of the accumulation of ursolic acid in the individual organs of Agrimonia asiatica can be judged from the figures in the table (% on the absolutely dry weight).

Then the substance isolated was investigated chromatographically. On paper chromatography (using German medium paper, FN-3) the R_f values of the substance were 0.36 [benzene–toluene (1:4) system], 0.90 [butan-1-ol–acetic acid–water (4:1:2.2) system], and 0.96 [petroleum ether–chloroform–acetic acid (100:40:4) system] [7]. We also used thin-layer chromatography on plates. The substance was chromatographed in a fixed layer of alumina (5% of gypsum), in the 1% of acetic acid in benzene system (R_f 0.33), and in the methanol–acetone–carbon tetrachloride (20:20:75) system, R_f 0.43.

For further confirmation of the nature of the substance obtained, its melting point was determined (282-284°C, from ethanol), and a mixed melting point with an authentic sample was recorded, which showed its identity as ursolic acid.

TABLE 1

Part of the plant	Phase of development			
	before flowering	flowering	milky ripeness of fruit	full ripeness of the fruit
Roots	0,21	0,34	0,46	0,17
Rhizomes	0,61	0,82	1,18	0,34
Stems	0,42	0,61	0,58	0,38
Leaves	0,17	0,19	0,15	0,13
Fruit	—	—	0,07	0,02

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