

## EXTRACTION OF SOBERAN FROM FIG LEAVES

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We have previously [1, 2] reported that soberan — a preparation with a photosensitizing action — has been isolated from the leaves of Central Asian varieties of the fig.

To develop a rational industrial technology for producing soberan, we have extracted furocoumarins by three methods: 1) with the preliminary elimination of the pigments and resinous substances; 2) with hot water; and 3) with organic and aqueous organic solvents.

For the preliminary elimination from fig leaves of ballast substances of resinous nature and pigments such as chlorophyll and carotenoids, 2 kg of comminuted raw material was extracted three times with gasoline and then with dichloroethane. The material was steeped in the solvent for 8 h each time. The dichloroethane extracts were concentrated to dryness in vacuum, and the yield of technical furocoumarins totalled 0.58%, while the yield of purified soberan was 0.24% on the weight of the raw material.

Comminuted fig leaves (2 kg) were extracted four times with boiling water (10 liters each time) in an apparatus fitted with a steam jacket. The time of each extraction was 1 h. The filtered extract was cooled, and the precipitate that deposited was separated by centrifuging and dried. The yield of technical furocoumarins totalled 0.3% on the weight of the raw material. We then studied the influence of the pressure in the extractor on the yield of soberan in extraction with boiling water.

At  $P_{\text{gauge}} = 1$  atm and a temperature of  $120^{\circ}\text{C}$ , the total yield of furocoumarins was 0.44%, and at  $P_{\text{gauge}} = 2$  atm and a temperature of  $135^{\circ}\text{C}$  0.55% of total coumarins on the weight of fig leaves was obtained. Consequently, the yield of total coumarins rises only slightly when the pressure in the apparatus and the temperature of the extractant are raised.

Comminuted fig leaves were extracted four times with ethanol, methanol, and acetone. The extracts were evaporated, dried, and purified [1].

On extraction of the raw material with alcohols, the yield of total coumarins was 0.15%, while with acetone it was 0.20%. The concentrated alcoholic extracts consisted of a very slowly drying viscous mass, the purification of which caused great difficulties.

The choice of binary mixtures as extractants was dictated by the fact that after the concentration of the extractant the hydrophilic sugary substances contained in the fig leaves in considerable amount and the other accompanying soluble substances remained in the dissolved form in the aqueous part of the extractant, thereby considerably facilitating the purification of the technical soberan.

The amount of the organic component in the binary mixture (water-acetone and water-ethanol) was varied from 40 to 80% (by volume). The comminuted fig leaves (2 kg) were extracted four times for 6 hours each time. The extract was concentrated under a reduced pressure of 400 mm Hg and the aqueous part was cooled. The precipitate of furocoumarins that deposited was separated off, dried, and purified. The best results were obtained by using 40% acetone [1] and 70% ethanol. The yield of technical soberan was 0.66% and of purified product 0.45% on the weight of the raw material.

### LITERATURE CITED

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