# THE INFLUENCE OF TRACE ELEMENTS ON THE ACCUMULATION OF POLYSACCHARIDES IN THE FRUIT OF *Aronia melanocarpa*

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The fruit of *Aronia melanocarpa* Elliot (black chokeberry) is used in medical practice [1]. It has been established that its active principles are vitamins, catechins, flavonoids, and anthocyans, which posses vitamin P activity [2].

The aim of the present work was to study the accumulation of water-soluble polysaccharides in the ripe fruit of the black chokeberry under the influence of trace elements and to investigate their monosaccharide composition.

Extraradical feeding was carried out with 0.03% solutions of $H_3BO_3$; $ZnSO_4 \cdot 7H_2O$; $CoSO_4 \cdot 7H_2O$; $CuSO_4 \cdot 5H_2O$; $(NH_4)_2MoO_4$; $FeSO_4 \cdot 7H_2O$; and $MnSO_4 \cdot nH_2O$ by the method described earlier [3] in the "Kiritsy" sovkho, Spasskii region, Ryazan' oblast, and in the municipal young naturalists' station.

The polysaccharides were extracted from the air-dry raw material (moisture content 11.0-12.0%) of the 1975-1976 harvest with hot water at 90-95°C (1:20) for 1.5 h. The extract was evaporated and was precipitated with 96% ethanol. The precipitate was separated off, washed with ethanol and acetone, and dried in vacuum for 12 h.

The ash content was determined by igniting samples of the polysaccharides in a muffle furnace at 600°C. The amount of uronic anhydride in the analytical samples of the polysaccharides investigated was determined by complexonometric titration [4].

The polysaccharides were hydrolyzed with 1 N $H_2SO_4$ for 9 h [5]. The hydrolysis products were investigated by descending paper chromatography in the butan-1-ol—pyridine—water (6:4:3) system. In all variants of the experiments galactose, glucose, arabinose, xylose, rhamnose, and two spots of the level of methyl ethers of monosaccharides were detected.

From preliminary results, the polysaccharides of chokeberry fruit have been assigned to the class of peptic substances.

Below we give the results of a study of the accumulation of water-soluble polysaccharides in the fruit of the black chokeberry under the influence of trace elements:

| Variant of the experiment | Yield, % | Amount of uronic anhydride, % | Ash content, % |
|---|---|---|---|
| Control | 2,37 | 85,5 | 6,86 |
| Cobalt | 1,94 | 84,9 | 6,02 |
| Molybdenum | 3,58 | 84,6 | 9,92 |
| Iron | 3,00 | 84,9 | 7,93 |
| Manganese | 4,38 | 84,8 | 8,55 |
| Boron | 4,58 | 87,3 | 10,75 |
| Copper | 4,60 | 85,3 | 8,76 |
| Boron + Zinc | 4,94 | 88,1 | 10,45 |
| Zinc | 5,30 | 89,2 | 10,14 |

This shows that under the influence of trace elements the amount of water-soluble polysaccharides may increase by a factor of 1.5-2.2.

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# A STUDY OF GOSSYPOLONE AND SOME OF ITS DERIVATIVES

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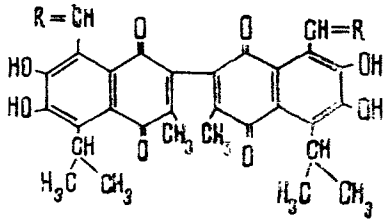
In connection with the recently established high phytotoxicity of phytoalexins with a quinoid structure in relation to *Verticillium dahliae* Kleb. [1], we have tested the toxicity of gossypolone [2] — gossypol p-quinone (formula below) — and some derivatives of it that we have synthesized for the first time in relation to the fungus — the causative agent of wilt — all the more since it is known that a number of gossypol-like substances are included among the phytoalexins [1].



I. R=O
II. R=NCH$_2$CH$_2$SO$_3$Na
III. R=OC–NH, =C(S)C=S
IV. R=C(CO–NH)(CO–NH)CO
V. R=N–C(=S)–NH–NH$_2$

The properties of gossypolone and its derivatives are as follows [system A: benzene—methanol (9.5:0.5); B: ethanol—acetic acid (9:1); C: chloroform—methanol (2:0.5); D: benzene—acetic acid—ethanol (3:2 drops:1)]:

| Compound No. | mp, °C | $R_f$ (*Silufol*) | Color | $\frac{\lambda_{max}(nm)}{\lg\varepsilon}$ | *LD*, μg/ml |
|---|---|---|---|---|---|
| I | 235 | 0,93, A | Dark orange | $\frac{215}{4,51}$; $\frac{268}{4,43}$; $\frac{310}{4,19}$; $\frac{400}{3,59}$ (in ethanol) | 6 |
| II | >350 | 0,89, B | Dark brown | $\frac{255}{4,17}$; $\frac{288}{4,01}$; $\frac{328}{3,85}$ (in water) | <250 |
| III | >350 | 0,61, C | Dark violet | $\frac{330}{4,01}$ $\frac{550}{4,20}$ (in acetone) | > 50 |
| IV | >350 | 0,92, B | Bright red | $\frac{268}{3,76}$; $\frac{330}{3,55}$; $\frac{430}{3,66}$ (in ethanol) | 4 |
| V | >350 | 0,52, D | Orange-brown | $\frac{285}{4,62}$; $\frac{410}{3,96}$ (in ethanol) | — |

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