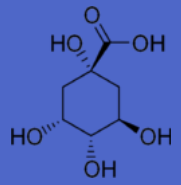
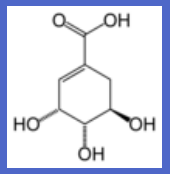
ORGANIC ACIDS AND MINERAL COMPOUNDS

Carboxylic acids are organic compounds characterized by the presence of a carboxyl group (-COOH).

TYPES OF ORGANIC ACIDS CLASSIFICATION

I. Depending on the nature of the carbohydrate radical	I. Depending on the number of carboxylic groups
1) Aliphatic - Saturated: lauric, myristic, palmitic etc. - Unsaturated: oleic, linoleic, linolenic, arachidonic etc.	1) Monocarboxylic: formic, acetic etc.
1) Alyciclic: quinic, shikimic etc.  	2) Dicarboxylic: oxalic, malonic etc.
1) Aromatic: benzoic, salicylic, gallic, phthalic etc.	3) Tricarboxylic: citric, isocitric etc.
	4) Polycarbonic

PLANT SOURCES OF ORGANIC ACIDS

Malic acid	Oxalic acid	Tartaric acid
-Rowan -Barberry -Apple	-Spinach -Garden sorrel	-Grapes -Tamarind
Citric acid	**Salicylic acid**	**Benzoic acid**
-Citrus fruits -Pomegranate -Hibiscus	-Raspberry -High bush cranberry	-Cranberry

MINERAL ELEMENTS

MACROELEMENTS

- calcium
- magnesium
- potassium
- sodium
- phosphorus
- sulfur
- chlorine
- nitrogen
- oxygen
- carbon

MICROELEMENTS

- Ferrum
- Copper
- Zinc
- Manganese
- Bromine
- Iodine
- Chrome
- F
- Cobalt
- Molybdene
- Arsenicum

PHARMACOLOGICAL EFFECTS OF SOME ORGANIC ACIDS AND ELEMENTS

Salicylic acid: anti-inflammatory, treatment of Seborrhoeic dermatitis, acne, psoriasis, calluses, corns, keratosis pilaris, and warts.

Benzoic acid: as food preservatives E210, E211, E212, and E213; as topical antiseptics

AHAs (glycolic, malic, lactic, citric pH adjusting agent in creams and gels of all kinds): in cosmetology as exfoliants to treat acne, wrinkles

Si: litholytic, strenghthens the lung tissue

Ca – Mg: take part in the work of muscles (contraction-relaxation)

Horsetail herb – *EQUISETI HERBA*

Common horsetail – *EQUISETUM ARVENSE*

Family – *EQUISETACEAE*

Description. Horsetail appears in two forms during the year. From March to April the red-brown to straw yellow simple stem develops with leaves arranged in a number of levels on the stem in whorls. The leaves are brown, fused to a sheath at the lower level with black-tipped, dry sporangia cones at the tip sprinkling greenish spore powder. In May and June there is a sterile summer form with 10 to 14 cm high stems and numerous branches that are arranged in whorls at the nodes. The stem and branches are deeply grooved, usually square and rough.

Constiuents. Silicic acid (a general name for a family of chemical compounds containing the element silicon attached to oxide and hydroxyl groups); flavonoids (equisetrin, luteolin); saponins; organic acids (aconitic, oxalic, malic, linolic)

Uses – diuretic, litholytic, anti-haemorrhagic, anti-inflammatory. It is used in the complex treatment of tuberculosis, as antidote at lead poisonings, as gargles in stomatitis

Knotgrass herb – *POLYGONI AVICULARIS HERBA*
Common knotgrass – *POLYGONUM AVICULARE*
Family – *POLYGONACEAE*

Description. Knotgrass is a highly polymorphous annual, widespread in fields, waste places, and along paths and roads, with prostrate, branched shoots and elliptic to narrow, ca. 3 cm long leaves with a transparent ochrea. Small, greenish to reddish, auxillary flowers appear in groups of 1 to 5.

Constiuents. Silicic acid (a general name for a family of chemical compounds containing the element silicon attached to oxide and hydroxyl groups); flavonoids (avicularin, quercetin, kaempferol, isorhamnetin); tannins; organic acids (aconitic, oxalic, malic, linolic); coumarins (scopoletin, umbelliferon)

Uses - anti-haemorrhagic, diuretic, litholytic, anti-inflammatory. It is used in the complex treatment of tuberculosis, urolithiasis.

Contraindication - pregnancy (uterotonic activity)

Garden sorrel leaf– *RUMICIS ACETOSAE FOLIA*

Garden sorrel – *RUMEX ACETOSA*

Family – *POLYGONACEAE*

Description. Sorrel is a slender plant about 60 cm high, with roots that run deep into the ground, as well as juicy stems and edible, oblong leaves. The lower leaves are 7 to 15 cm in length, slightly arrow-shaped at the base, with very long petioles. The upper ones are sessile, and frequently become crimson.

Constiuents. Organic acids (oxalic, malic); flavonoids (avicularin, quercetin, kaempferol, hyperoside, cathechins); tannins

Uses – diuretic, cholagogue, anti-inflammatory, capillary protective, antisclerotic. Externally – as anti-inflammatory.

Caution in patients with enterocolitis, gastritis, gastric ulcer.

Spinach leaf– *SPINACEAE OLERACEAE FOLIA*

Spinach – *SPINACEA OLERACEA*

Family – *AMARANTHACEAE*

Description. It is an annual plant (rarely biennial), which grows to a height of up to 30 cm. Spinach may survive over winter in temperate regions. The leaves are alternate, simple, ovate to triangular-based, very variable in size from about 2–30 cm long and 1–15 cm broad, with larger leaves at the base of the plant and small leaves higher on the flowering stem.

Constiuents. Organic acids (oxalic, citric); flavonoids (rutin, quercetin, kaempferol); vitamins (B1, B2, Bc, K, E, C); lipids; proteins; carbohydrates (fructose, glucose, saccharose); compounds of iodine, ferrum, phosphorus, calcium, magnesium

Uses – source of vitamins, anti-inflammatory, capillary protective, antisclerotic, mild laxative. Externally – as anti-inflammatory.

Contraindication – urolithiasis, nephritis, gout.

Blackcurrant fruit – *RIBIS NIGRI FRUCTUS*
Redcurrant fruit - *RIBIS RUBRI FRUCTUS*
Blackcurrant – *RIBES NIGRUM*
Redcurrant - *RIBES RUBRUM*
Family – *GROSSULARIACEAE*

Description. These are medium sized shrubs, growing to 1.5 x 1.5 metres. The leaves are alternate, simple, 3–5 cm long and broad, and palmate with five lobes, with a serrated margin. The flowers are 4–6 mm diameter, with five reddish-green to brownish petals; they are produced in racemes 5–10 cm long.

Constiuents. Organic acids (malic, tartaric, citric); flavonoids (rutin, quercetin, kaempferol, cyanidin); vitamins (K, P, C, carotenoids); carbohydrates (fructose, glucose, saccharose, pectins); compounds of iodine

Uses - source of vitamins, anti-inflammatory, capillary protective, mild laxative

Culinary uses – jams, fruit soups, filling for tarts

Cherry fruit – *CERASI VULGARIS FRUCTUS*
Sour cherry – *CERASUS VULGARIS (PRUNUS CERASUS)*
Family – *ROSACEAE*

Description. It is a tree 2,5 – 6 m high. Leaves are glabrous, shiny, without glands on stalks, elliptic or ovate, with serrate margin. Flowers are large, bisexual, actinomorphic, with 5 white petals. Fruits is a fleshy dark crimson-to-near black drupe. Flowers in April – May.

Constiuents. Organic acids (oxalic, citric); flavonoids (anthocyanidins); vitamins (B group, C, PP); lipids; carbohydrates (sugars, pectins); compounds of ferrum, magnesium, cuprum, potassium

Uses – expectorant, mild laxative, diuretic, antiseptic, improve appetite. The syrup is used to improve the taste of drugs

Schisandra fruit – *SCHIZANDRAE FRUCTUS*
Schisandra (Magnolia vine) – *SCHIZANDRA CHINENSIS*
Family – *SCHIZANDRACEAE*

Description. A deciduous woody climbing vine, up to 8 m long. Leaves are alternate, petiolate, ovate or oblong-obovoid, 5–11 cm long, 2–7 cm wide, the apex is acute or acuminate; the base is cuneate or broadly cuneate, membranous. Flowers are unisexual, dioecious, solitary or clustered axillary, yellowish-white to pinkish; the male flower is stalked, with five stamens, filaments united into a short column; the female flower has numerous carpels. Fruits, 5–8 mm in diameter, are arranged into a long spike with globular, deep-red berries. Seeds, one to two per berry, are reniform, shiny, smooth, yellowish brown, 4.5 mm long, 3.5 mm in diameter

Constiuents. Up to 20% organic acids (citric, malic, tartaric); flavonoids; vitamin C; lipids; sugars; lignans

Uses – CNS stimulant, hypoglycaemic, stimulates regeneration of tissues, uterotonic.

Contraindication – insomnia, hypertension