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CHEMICAL COMPOSITION OF ALMONDS

BURXONOVA XILOLA

Academic Lyceum chemistry teacher at Kokan SPI

Annotation

This article presents the possibility of obtaining biologically active additives based on the biological description, chemical composition and components contained in almonds.

Key words: almond, essential fatty acid, vitamins, minerals.

Almond (Amygdalus L.) is a tree in the rhino family, common in Asia, North America, Central Asia. About forty species are known in the world. In Uzbekistan, there are 5 species. One of them-sweet magned almonds are planted, the rest are found wild. It is grown in the Fergana Valley, Surkhandarya, Samarkand, Tashkent regions of Uzbekistan. While in the Republic of 2020, an average of 9.7 tons of products were obtained per hectare of land planted with 8.8 thousand hectares of almonds, in 2021 this figure almost doubled to 9.8 tons per hectare with a yield of 15.7 thousand hectares. In 2022, measures were taken to establish an additional 2,700 hectares of almonds in Jizzakh, Kashkadarya, Samarkand, Surkhandarya and Tashkent regions.

Currently, high-quality varieties of almonds are also being planted in our country, such as "porridge", late-flowering "Nikitin", "Ugom", "thin pod", "Yalta", "Malika", "Zarina", "Sabernuskha", "Uzbek wheat". The almond is a deciduous tree growing to 4–12.2 metres (13–40 feet) in height, with a trunk of

up to 30 centimetres (12 inches) in diameter. The young twigs are green at first, becoming purplish where exposed to sunlight, then gray in their second year. The leaves are 8–13 cm (3–5 in) long, with a serrated margin and a 2.5 cm (1 in) petiole.

The flowers are white to pale pink, 3–5 cm diameter with five petals, produced singly or in pairs and appearing before the leaves in early spring. Almond grows best in Mediterranean climates with warm, dry summers and mild, wet winters. The optimal temperature for their growth is between 15 and 30 °C and the tree buds have a chilling requirement of 200 to 700 hours below 7.2 °C (45.0 °F) to break dormancy.

Almonds begin bearing an economic crop in the third year after planting. Trees reach full bearing five to six years after planting. The fruit matures in the autumn, 7–8 months after flowering.

The almond fruit is 3.5–6 cm long. It is not a nut but a drupe. The outer covering, consisting of an outer exocarp, or skin, and mesocarp, or flesh, fleshy in other members of Prunus such as the plum and cherry, is instead a thick, leathery, gray-green coat (with a downy exterior), called the hull. Inside the hull is a woody endocarp which forms a reticulated, hard shell (like the outside of a peach pit) called the pyrena. Inside the shell is the edible seed, commonly called a nut. Generally, one seed is present, but occasionally two occur. After the fruit matures, the hull splits and separates from the shell, and an abscission layer forms between the stem and the fruit so that the fruit can fall from the tree.

Bitter almonds contain 42 times higher amounts of cyanide than the trace levels found in sweet almonds. Extract of bitter almond was once used medicinally but even in small doses, effects are severe or lethal, especially in children; the cyanide

must be removed before consumption. The acute oral lethal dose of cyanide for adult humans is reported to be 0.5–3.5 mg/kg (0.2–1.6 mg/lb) of body weight (approximately 50 bitter almonds), so that for children consuming 5–10 bitter almonds may be fatal. Symptoms of eating such almonds include vertigo and other typical cyanide poisoning effects.

Almonds may cause allergy or intolerance. Cross-reactivity is common with peach allergens (lipid transfer proteins) and tree nut allergens. Symptoms range from local signs and symptoms (e.g., oral allergy syndrome, contact urticaria) to systemic signs and symptoms including anaphylaxis. Almonds are susceptible to aflatoxin-producing molds. Aflatoxins are potent carcinogenic chemicals produced by molds such as Aspergillus flavus and Aspergillus parasiticus. The mold contamination may occur from soil, previously infested almonds, and almond pests such as navel-orange worm. High levels of mold growth typically appear as gray to black filament-like growth. It is unsafe to eat mold-infected tree nuts.

Some countries have strict limits on allowable levels of aflatoxin contamination of almonds and require adequate testing before the nuts can be marketed to their citizens. The European Union, for example, introduced a requirement since 2007 that all almond shipments to the EU be tested for aflatoxin. If aflatoxin does not meet the strict safety regulations, the entire consignment may be reprocessed to eliminate the aflatoxin or it must be destroyed.

Breeding programs have found the high shell-seal trait. High shell-seal provides resistance against these Aspergillus species and so against the development of their toxins.

Almonds are 4% water, 22% carbohydrates, 21% protein, and 50% fat. In a 100-gram reference amount, almonds supply 2,420 kilojoules (579 kilocalories) of food energy. The almond is a nutritionally dense food, providing a rich source of the B vitamins riboflavin and niacin, vitamin E, and the essential minerals calcium, copper, iron, magnesium, manganese, phosphorus and zinc. Almonds are a moderate source (10–19% DV) of the B vitamins thiamine, vitamin B_6, and folate, choline, and the essential mineral potassium. They also contain substantial dietary fiber, the monounsaturated fat, oleic acid, and the polyunsaturated fat, linoleic acid. Typical of nuts and seeds, almonds are a source of phytosterols such as beta sitosterol, stigmasterol, campesterol, sitostanol, and campestanol.

Almonds are a rich source of oil, with 50% of kernel dry mass as fat. In relation to total dry mass of the kernel, almond oil contains 32% monounsaturated oleic acid (an omega-9 fatty acid), 13% linoleic acid (a polyunsaturated omega-6 essential fatty acid), and 10% saturated fatty acid (mainly as palmitic acid). Linolenic acid, a polyunsaturated omega-3 fat, is not present. Almond oil is a rich source of vitamin E, providing 261% of the Daily Value per 100 millilitres.

When almond oil is analyzed separately and expressed per 100 grams as a reference mass, the oil provides 3,700 kJ (884 kcal) of food energy, 8 grams of saturated fat (81% of which is palmitic acid), 70 grams of oleic acid, and 17 grams of linoleic acid.

Oleum amygdalae, the fixed oil, is prepared from either sweet or bitter almonds, and is a glyceryl oleate with a slight odour and a nutty taste. It is almost insoluble in alcohol but readily soluble in chloroform or ether. Almond oil is obtained from

the dried kernel of almonds.[81] Sweet almond oil is used as a carrier oil in aromatherapy and cosmetics while bitter almond oil, containing benzaldehyde, is used as a food flavouring and in perfume.

In conclusion, the rich content of almonds in vitamins and minerals makes it possible to apply it in folk medicine. Also, the development of biologically active additives from it leads to the development of pharmaceuticals based on local raw materials.

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