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## Almond : A health diamond

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### ABSTRACT

Today, Americans offer a bag of sweet almonds, to their special guests as a token of happiness, romance, good health and fortune. Almond is a dry fruit obtained from a tree native of Morocco. The fruit of the almond is not a true nut, but a drupe, which consists of an outer hull and a hard shell with the seed (nut) inside. Almonds are cultivated for the nuts, used in candies, baked products and confectioneries, and for the oils obtained from the kernels. Phytochemically, sweet almond contains carbohydrates, sterols, flavonoids, vitamins and phenolic compounds. Almond is a folk remedy for asthma, cough, dyspnea, skin eruptions, gingivitis, heartburn, prurigo, spasms, stomatitis, and ulcers. In Ayurveda, almond is prescribed as a brain tonic. It is said to promote intellectual caliber and neuronal longevity.

**Key words :** *Prunus dulcis*, Almond, Ayurveda

### INTRODUCTION

Almond is a native of Morocco. It has been cultivated from ancient times. The Romans called it as the 'Greek nut'. It was grown in Syria and Palestine during the days of the Bible. The almond has become a favorite ingredient of several recipes and finds application in several medicinal and healing procedures across the globe.

#### Biological source :

Almond is a fruit of *Prunus dulcis* (Mill.) D.A. Webb.

#### History :

Almonds enjoy a religious, ethnic and social significance. The Bible's "Book of Numbers" tells the story of Aaron's rod that blossomed and bore almonds, thereby making almond a symbol of divine approval. The Romans showered newly-weds with almonds as a fertility charm. Today, Americans offer a bag of sweet almonds, to their special guests as a token of happiness, romance, good health and fortune. In Sweden, cinnamon-flavored rice pudding with an almond hidden inside is a Christmas custom. It is believed that all those individuals, who are able to search this hidden fruit in given time, are blessed with good fortune for a year. Among the Hebrews, it is a symbol of watchfulness and promise due to its early flowering, while the Chinese consider it a symbol of enduring sadness and female beauty. Christians often

consider almond branches as symbolic of the virgin birth of Jesus. There are paintings, which depict almonds as a symbol of Mary encircling the baby Jesus. The ancient Romans used sweet almond oil extensively in skincare preparations. Almond oil was also embraced as a beautifier in Europe and the herbalist John Gerald sang its laurels as early as the 16th century.

#### Cultural aspects and folk medicine:

Almond is highly revered in traditional cultures of several countries. In Bible, the almond is mentioned ten times, beginning with Book of Genesis 43:11, where it is described as "among the best of fruits". The fruit of the almond supplied a model for certain kinds of ornamental carved work. The seed or its oil is used in folk remedies for cancer (esp. bladder, breast, mouth, spleen, and uterus), carcinomata, condylomata, corns, indurations and tumors. In traditional system of medicine, almond is recommended as an astringent, carminative, demulcent, diuretic, emollient, laxative, lithonryptic, nervine, sedative, stimulant and tonic. Almond is a folk remedy for asthma, cold, corns, cough, dyspnea, skin eruptions, gingivitis, heartburn, prurigo, sores, spasms, stomatitis, and ulcers. The kernels are added in diet, for preventing peptic ulcers. Oil is used as a flavoring agent in baked goods and perfumery. To this day, modern Jews carry branches of flowering almonds into the synagogue on spring festival days. Sweet almond oil is used for cosmetic creams and lotions. In crisis, almond

**Synonyms in Indian languages**

Assamese	Noosh, Nush
Bengali	Badam, Katbadam
Gujarati	Badam
Kannada	Badami, Badamu
Malayalam	Badam kayus
Marathi	Badam
Oriya	Badama
Punjabi	Badam
Sanskrit	Badama, Vatada,
Tamil	Paruppu, Vatumai, Padam
Telugu	Badamu, Badamup
Urdu	Badam

**Synonyms in International languages**

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<b>Domain</b>	→ Eukarya	<b>Order</b>	→ Rosales
<b>Kingdom</b>	→ Plantae	<b>Family</b>	→ Rosaceae
<b>Subkingdom</b>	→ Tracheobionta	<b>Subfamily</b>	→ Spiraeoideae
<b>Division</b>	→ Magnoliophyta	<b>Tribe</b>	→ Amgdaleae
<b>Class</b>	→ Magnoliopsida	<b>Genus</b>	→ <i>Prunus</i>
<b>Subclass</b>	→ Rosidae	<b>Botanical name</b>	→ <i>Prunus dulcis</i> (Mill.) D.A. Webb

**Toxonomy**

might conceivably be used as an energy source.

**Geographical distribution:**

The almond tree is a native of the warmer parts of western Asia and of North Africa, but it has been extensively distributed over the warm temperate region of the World, and is cultivated in all the countries bordering on the Mediterranean Sea including Spain, Italy, Portugal and Morocco, as well as in California. United States,

especially California, is the world's major producer of almonds. Its cultivation in India is mostly confined to Kashmir and some areas of Himachal Pradesh, which border Tibet. Almond production has continued to increase over time. Improvements in efficiency and technology have had a dramatic effect on increasing almonds yields. Overall yields of California orchards have increased. Advances in tree varieties, planting patterns, mechanization and orchard agronomy have been responsible for some of the increased yields per acre. Encased in a tough, leathery hull and an inner, protective hard shell, almonds are mechanically shaken from the tree during the fall harvest and sent to handlers for processing and marketing. The world's largest almond handler is the Blue Diamond Growers Cooperative, which is located in Sacramento, California.

**Top 10 countries (% of world production)**

1. USA (42 %)	6. Morocco (4%)
2. Spain (16%)	7. Greece (3%)
3. Syria (8%)	8. Turkey (3%)
4. Italy (6%)	9. Libya (2%)
5. Iran (5%)	10. Pakistan (1%)

**Cultivation and propagation:**

The almond is often cultivated in the temperate zone for its edible seeds. It prefers a Mediterranean climate with a clear distinction between winter and spring. There is also likely to be a shortage of pollinating insects around, when the tree is in flower, so hand pollination may improve the crop. Seed requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe. The seed may take around 18 months to germinate. The early, delicate flowers of the almond give it a unique position among ornamental trees. The almond flowers will flourish in any ordinary, well-drained soil, both in open and somewhat sheltered situations, and does well in town gardens.

**Description:**

Almond is a stone fruit, from the Rosaceae family, closest to the peach. It originates from the Middle East, where conditions are dry and hot. Almonds are spread throughout the entire Mediterranean Region, USA, Northern Africa, Turkey, Iran, Australia and South Africa. The almond is sensitive to wet conditions, and is therefore not grown in wet climates. The almond is popular in the market due to its dietary properties, such as low level of saturated fat, high Vitamin E level, as well as high level of unsaturated fat.

Cultivars of Almod	
Variety	Character
Aldrich	Plump nut of medium size and medium hard shell
Butte	Shell is hard, nut is small having wrinkled surface
Carmel	Shell is soft with medium and narrow shaped nut
Fritz	Small plumped shaped nut with light color soft shell
Largueta	Large, long, juicy, sweet kernel
Macrocarpa	Larger seeds than the type and easily cracked shells
Mission (Texas)	Round, hard-shelled nut with a slightly bitter flavor
Monterey	Hard shell having smooth surface, nut (large)
Ne Plus Ultra	Shell is softer than other, nut is long and flaky
Nonpareil	Medium-sized, smooth kernels with thin shell
Padre	Medium small kernel with hard shell
Peerless	Hard shell, smooth surface, medium wide shaped nut
Price Cluster	Paper shell, nut is small, short narrow shape
Ruby	Medium-small, plump kernels, well-sealed shells
Sonora	Large, elongated, light colored kernel, paper shell
Winter	Medium sized, elongated with soft and thin shell

### Leaves :

Almonds grow on small to medium sized trees with an open canopy, usually 10-15 feet in commercial orchards. Leaves are linear or slightly ovate, about 2 to 5 inches in length, with acute tips and finely serrate margins. Overall leaves are smaller and less folded along the midrib.

### Flowers :

Almond flowers are nearly identical to peach and other *Prunus* flowers in structure, but light pink or white in color, and fragrant. Flowers have 5 petals and sepals, and many elongated stamens, all of these appendages originate from hypanthium or floral cup that surrounds the ovary. The ovary is perigynous. Flowers are borne laterally on spurs or short lateral branches, or sometimes laterally on long shoots.

### Fruits :

Almond fruit is the nut. The entire fruit including the hull is a drupe; however, the hull dries and splits prior



Fig. 1 : Almond tree, fruits and nuts

to harvest, revealing what appears to be the pit of the fruit. Botanically, this pit with the kernel inside fits the definition of a nut (dry indehiscent fruit with a hard shell). Fruiting begins in 3-4 yr old trees, with maximal production in 6-10 years. Unlike its short-lived cousin the peach, almond trees can produce fruits for a period extending beyond 50 years.

### Pharmacological activities :

Anti-carcinogenic activity:

Almond consumption reduces colon cancer risk. (Davis and Iwahashi, 2001). Almonds inhibit cell growth and suppress tumour proliferation by virtue of terpenoids present in almond hull (Vincenzo *et al.*, 2006).

Chemical composition of Almond		
Chemical constituents	Plant part	Reference
Amygdalactones	Almond hull	Sang <i>et al.</i> , 2002
Anthocyanins (cyanidin and delphinidin)	Almond skin	Monagas <i>et al.</i> , 2007
Chlorogenic acid, Rypochlorogenic acid, Aneochlorogenic acid	Almond hull	Wijeratne <i>et al.</i> , 2006
Flavonols (kaempferol, isorhamnetin) and flavanones (naringenin)	Almond skin	Frison-Norrie <i>et al.</i> , 2002
Flavanones (persicogenin 3-O-glycoside)	Stem bark	Rawat <i>et al.</i> , 1995
Glycosides (amgdalosides, spingolipide)	Almond nut	Sang <i>et al.</i> , 2003
Magnesium, Phosphorus, Zinc, Calcium, Folic acid, Vitamin E	Almond nut	Amarowicz <i>et al.</i> , 2005
Palmitic, myristic, oleic and Linoleic acid	Oil	Chakre 1992
Phenolic acids (caffeic acid, ferulic acid, p-coumaric acid and vanillic acid)	Almond skin	Sang <i>et al.</i> , 2002
p-Hydroxy benzoic acid	Skin	Sang, chen <i>et al.</i> , 2002
Procyanidins (B2 and B3),	Skin	Monagas <i>et al.</i> , 2007
Proteins (Arginine, Lysine, Histidine, Leucine, Phenylalanine, Tryptophan, Valine, Methionine, Cysteine	Seeds	Suraj <i>et al.</i> , 2009
3-prenyl 4- $\beta$ -glucopyransyloxy-4hydroxylbenzoic acid, Protocatechuic acid, Catechin	Almond hull	Sang <i>et al.</i> , 2002
Stigmasterol, $\beta$ -sitosterol	Almond hull	Takeoka, 2002
Tocopherolss	Seeds	Suraj <i>et al.</i> , 2009
Triterpenoid acids (betulinic, oleanolic and ursolic)	Almond hull	Takeoka <i>et al.</i> , 2000
Quercetin, Quercitrin	Kernel	Wijeratne <i>et al.</i> , 2006
Vitamins (Thiamine, Riboflavin, Niacin, Ascorbic acid, Biotin, Folic acid)	Seeds	Suraj <i>et al.</i> , 2009

#### Anti-diabetic activity:

Raw almonds are a rich source of phytates and phenolic compounds, both of which show reduced amylyolytic digestion *in vitro* and reduced postprandial glycemia *in vivo*. Almond also lowers serum glucose levels. (Josse *et al.*, 2007).

#### Hair growth promoter:

Seeds of almond have been traditionally claimed to possess hair growth promoting activity. These seeds are excellent source of proteins, vitamins and tocopherol. Seed extract of *P.dulcis* exhibit a significant activity in promoting hair growth (Suraj *et al.*, 2009).

#### Hypo-lipidemic activity:

Almonds are rich in several beneficial compounds, such as  $\omega$ -9 fatty acids, which in the form of olive, canola, and other oils, have beneficial effects on blood cholesterol and lipoprotein profile. Thus, almonds are cardioprotective. (Spiller *et al.*, 1997).

#### Immuno-stimulatory activity:

Almond shell contains xylo-oligosaccharides, which shows immunostimulatory activity (Dourado *et al.*, 2004).

#### Anti-oxidant activity:

Almond skin contains polyphenols, flavonoids, vitamins C and E, which enhance the free radical scavenging activity (Oliver *et al.*, 2008).

#### Prebiotic activity:

Almonds alter the composition of gut bacteria by stimulating the growth of bifidobacteria and Eubacterium rectale. Thus almond increases prebiotic index.

#### Commercial uses :

The almond, known as the king of nuts among dry fruits, is a highly nutritious food. It is rich in almost all the elements needed by the body. Almond seed, raw, cooked or dried and ground into a powder is used in confections etc. The whole seed can also be roasted, sprouted or used in cakes, confectionery and pastry. The sweet-flavored forms have a delicious flavor. The seed is somewhat difficult to digest and so needs to be thoroughly masticated. It can be blended with water to make almond milk. An edible oil is obtained from the seed. It is used mainly as food flavor and in cooking. Almond paste is sold premade at most stores, for decorating desserts and in making some baked goods.

#### Miscellaneous uses :

Almond is used in various cooking and cosmetics products. The burnt ashes of the skins of almond used as a tooth powder strengthen the teeth and gums. Almond oil is used to apply on lips for making them pink, soft and supple. A patient suffering from tuberculosis derives immense benefits, if he takes almond and has his body massaged by almond oil. The almond is highly beneficial in preserving the vitality of the brain, in strengthening the

muscles and in prolonging life. It forms a vital part of all tonic preparations in Ayurveda and Unani medicines. Paste of almonds (with milk cream and fresh rose bud) applied daily over the face is a very effective beauty aid. It softens and bleaches the skin and nourishes it with the choicest skin-food. Its regular application prevents early appearance of wrinkles, black heads, dryness of the skin, pimples and keeps the face fresh. Almond oil mixed with a teaspoonful of amla juice, massaged over scalp, is a valuable remedy for falling hair, thinness of hair, dandruff and premature graying of hair. Almond kernels are highly beneficial in the treatment of chronic constipation. It is an excellent laxative. Almonds are also beneficial in the treatment of pimples. In case of skin inflammation, the external application of almond oil will reduce the pain and cool the heat. An emulsion of almonds is useful in bronchial diseases, hoarseness and tickling cough.

#### Marketed preparations containing almond:

- Britannia Milk Bikis
- Almond Cookies
- Almond Joy
- Badam Rogan
- Almond nut butter
- Badam milk powder
- Badam Feast Drink
- Bajaj Almond hair oil
- Maranatha Almond butter
- Queen Badam Herbal Ubtan
- Lavera Almond Milk Shampoo
- Amul Kool Milk Shake – Badam
- Divine fruit and nuts dark chocolate
- Mishrambu kesharia badam thandai
- Cherry Almond Gourmet sauce
- Ice creams containing (Almond)

#### Concluding remarks :

- Almonds enjoy a religious, ethnic and social significance
  - Almond is an effective health-building food, both for the body and mind.
  - Almond is a folk remedy for asthma, cough, dyspnea, skin eruptions, gingivitis, heartburn, prurigo, stomatitis, and ulcers.
  - A patient suffering from tuberculosis derives immense benefits, if he takes almond and has his body massaged by almond oil.
  - Almond is highly revered in traditional cultures of many countries.
  - Almond is highly beneficial in preserving the vitality of the brain, strengthening the muscles and in

prolonging life-span.

- Almond oil with amla juice is a valuable remedy for falling hair, dandruff and premature graying of hairs.
- If forms a vital part of all tonic preparations of Ayurveda and Unani medicines.

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