



PHYTOCHEMISTRY AND BIOLOGICAL APPLICATIONS OF *PRUNUS ARMENICA* L. FRUITS

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ABSTRACT

Prunus armenica L. (Apricot) is a fruit species has a high nutritional value with good source of fiber, minerals (potassium but also Ca, Fe, Zn, Mg, P & Se etc) and vitamins such as vitamin A, vitamin C, thiamine, riboflavin, niacin and pantothenic acid. Moreover, apricot contains a number of secondary metabolites such as polyphenols, carotenoids, fatty acids and polysaccharides whose biological activities are useful for exerting various desirable benefits for human health. Apricot is a rich source of strong antioxidant phytonutrients. Quercetin, a flavonoid occurring in apricot possesses anti-cancer property. Proanthocyanidins exhibits inflammatory property. Along with it protect from CVDs by vessel relaxation and LDL oxidation inhibition. Apricot contains catechins in low quantity compared to tea. Studies have shown that epicatechin plays protective role as insulin and significantly lowers diabetes type 2 and improve diabetes complication. It relaxes heart muscles for better heart health. Numerous studies support hydroxycinnamic benefits from diabetes, Alzheimer's disease, cardiovascular diseases and chronic lung disease. Gallic acid caffeic acid, coumaric acid, ferulic acid and β -cryptoxanthin are in apricot have multiple properties like anti-mutagenic, anti-angiogenic, anti-inflammatory and anti-carcinogenic. Apricot tends to be healthy fruit option due to its high nutrient content. The Fe content in apricots is helps preventing from developing anemia. It is often characterized by dizziness, weakness, fatigue, nausea and inability to carry out day to day activities due to persistent tiredness. It is also a good source of calorie required for proper nourishment. So it is highly beneficial for therapeutic uses and supplementary health.

KEYWORDS: *Prunus armenica* L., Secondary metabolites, Antioxidant phytonutrients, Anticancer property, Cardiovascular Disease (CVD).

INTRODUCTION

Apricot is botanically known as *Prunus armenica* L., also called Khubani belongs to family rosaceae, sub family – rosidae and order rosales.

Fruits of this plant are good source of nutrients. It is a medium sized tree with radish bar cultivated in Kashmir, Himachal Pradesh, Uttarakhand etc. (Varsha et al., 2012, Baytop, 1999, Chopra et al., 1956, Krishnamurthy, 1969, Dang et al., 1964, Gezer and Dikilitas, 2002, Shrivastav and Lata, 2019).

Apricots are small, golden orange fruits, with velvety skin and flesh, not too juicy their flavor is almost musky, with a faint tartness. Some people think of the flavour as being somewhere between a peach and a plum fruits to which they're closely related. Apricots are originated from China but arrived in Europe via Armenia that is why the scientific name is *Prunus armenica*. Apricots are enjoyed as a fresh fruit but also dried, cooked into pastry, and eaten as jam. The fruits are also distilled into brandy and Liqueur.

Essential oil from the pits is sold commercially as bitter almond oil. Turkey, Italy, Russia, Spain, Greece, US. and France are the leading producers of apricots. Although dried and canned apricots are available year-round, fresh apricots with a plentiful supply of vitamin C grown in season from May to August. Apricots are beautifully orange coloured fruits full of β -carotene and fiber that are one of the first signs of summer. Apricot (Fig. 1), when ripened naturally, are a rich source of antioxidants (Erdogan-Orhan and Kartal, 2011). Antioxidants are required for body's natural functioning. Higher the amount of antioxidants in the body, higher is the rate of elimination of toxins from it. Toxins are harmful substances that accumulate in the intestines and the digestive tract. Anti-oxidants also get rid of free radicals that are produced naturally in the body due to exposure of oxygen. It is also useful for the growth of cells in the body and helps in improving the immune system that leads to overall improvement in the health of the human body.



(A) Fresh



(B) Dried

Fig. 1: Apricot fruits (Fresh (A) and Dried (B)).

Nutritional Values

Apricot is rich in antioxidants and help in eliminating free radicals and toxins thereby strengthening the immune function. Apricots are rich in Ca & K content. The body requires calcium in bone formation and bone development. Lack of Ca leads to a disorder of the bones called Osteoporosis. The high calcium content is thus useful in the keeping of bone health and saves you from brittle bones. However, one essential mineral that regulates the absorption, distribution and excretion of calcium in our body is K. Apricots maintain strong and healthy bones owing to their Ca and K content. Without K, all Ca that you consume and Ca contained in the bones would be released in blood stream eventually getting evicted from the body. It will not only affect the bone health but will also choke the bladder that purifies the blood. Proper functioning of the cells requires a good balance of the electrolyte levels in the body. The electrolyte is required for transporting ions and neurotransmission from brain to rest of the body. It also maintains a stable fluid level that is necessary for proper expansion and contraction of the muscles. Apricots

contain a healthy level of potassium and a moderate quantity of sodium. These are essential minerals required by the body to optimize the electrolyte levels in the body. Electrolyte levels in the body are maintained by P and Na amongst other minerals and both of these are contained in apricots in ideal quantities (Leccese et. al., 2008, Table 1 and 2).

There are many nutritional benefits of eating apricots. This is a rich source of minerals that cures anaemia, asthma, tuberculosis and bronchitis. But, are you also aware of the health benefits of apricot seed and its oil. Apricot seeds (figure 2) can be consumed raw or ground into a powder for adding to soups, vegetables, curries, fruit juice or cereal. It can also be roasted in the oil that is used in salad dressings, cooking, fuel and facial lotions. Apricot juice is believed to cure fever. Its soothing and anti-inflammatory properties affect the body's overall temperature, curing fever. Prepare a concoction using apricot juice and water. Add 1 tablespoon of honey to this concoction. Drink this concoction twice a day to relieve cold, cough and fever.

Table 1: Apricot Nutritive Values.

Apricots (<i>Prunus armeniaca</i>), fresh, Nutritive Value per 100 g, Total-ORAC umol TE/100 g-1115.(Source: USDA National Nutrient data base)		
Principle	Nutrient Value	Percentage of RDA
Energy	50 Kcal	2.5%
Carbohydrates	11 g	8.5%
Protein	1.4 g	2.5%
Total Fat	0.4 g	1%
Cholesterol	0 mg	0%
Dietary Fiber	2 g	5%
Vitamins		
Folates	9 µg	2%
Niacin	0.600 mg	4%
Pantothenic acid	0.240 mg	5%
Pyridoxine	0.054 mg	5%
Riboflavin	0.040 mg	3%
Thiamin	0.030 mg	2.5%
Vitamin A	1926 IU	64%
Vitamin C	10 mg	16%
Vitamin E	0 mg	0%
Vitamin K	3.3 µg	3%
Electrolytes		
Sodium	1 mg	0%
Potassium	259 mg	5.5%

Minerals		
Calcium	13 mg	1.3%
Copper		
Iron	0.39 mg	5%
Magnesium	10 mg	2.5%
Manganese	0.077 mg	3%
Phosphorus	23 mg	3%
Zinc	0.2 mg	2%
Phyto-nutrients		
Carotene- α	19 μ g	—
Carotene- β	1094 μ g	—
Crypto-xanthin- β	104 μ g	—
Lutein-zeaxanthin	89 μ g	—

Table 2: Complete Nutritional Profile: Apricot Kernel Oil.

Nutrient	Value	Percentage
Energy (Calories)	884	44%
Carbohydrates	0	0
Proteins	0	0
Fats	100	100%
Dietary fiber	0	0
Cholesterol	0	0
Sugars	0	0
Vitamins	Value	Percentage
Vitamin A	0	0
Thiamine (B1)	0	0
Riboflavin (B2)	0	0
Niacin (B3)	0	0
Pantothenic Acid (B5)	0	0
Pyridoxine (B6)	0	0
Biotin (B7)	0	0
Folic Acid (B9)	0	0
Vitamin B12	0	0
Vitamin C	0	0
Vitamin D	0	0
Vitamin E	4 mg	20%
Vitamin K	0	0

Electrolytes	Value	Percentage
Potassium	0	0
Sodium	0	0
Minerals	Value	Percentage
Iron	0	0
Calcium	0	0
Magnesium	0	0
Phosphorus	0	0
Zinc	0	0
Manganese	0	0
Copper	0	0
Selenium	0	0

Micro-Nutrients	Value	Percentage
Phytosterols	266 mg	—
Caffeine	0	—
Theobromine	0	—

(Source: USDA)

Medicinal Applications

Apricot oil is great for heart health as it contains mostly unsaturated fats. If taken in small amounts, one can expect to have cardiovascular health benefits and it may also help in lowering blood cholesterol levels, like other oils that are rich in unsaturated fats. The seeds of the apricot fruit contain a substance called laetrile, which may help in the treatment and prevention of cancer. Laetrile is also known as Vitamin B17. There are four substances present in amygdalin – two types of glucose, benzaldehyde, and cyanide. Of course, it is known that benzaldehyde and cyanide are poisonous, but only if they are freed or released as pure molecules. Many foods that contain cyanide are safe to be consumed as this substance is locked as a component of another molecule.

An enzyme known as rhodanese is present in normal cells and can capture cyanide molecules that are free and make them harmless by binding them with sulphur. When the cyanide is bound to sulfur, it gets converted to a neutral substance known as cyanate. It will then be able to pass through the urine easily without causing any harm to the normal cells. This helps to maintain the immune system. This strengthens our body's ability to fight infections such as colds and flu. Apricot seed oil is used for cooking and flavouring of traditional Italian liquor. It can also be used as a salad oil that has many health benefits (Bartolini *et. al.*, 2014).

As free radicals eliminator

Apricots contain a number of potent antioxidants. We rank the apricot as a good source of both vitamin A (from beta-carotene) and vitamin C. The health benefits associated with each are multiple and well-documented. Apricots are rich in other antioxidants, too, including polyphenolic antioxidants like flavonoids. Diets rich in flavonoids and the other types of polyphenols found in apricots have been linked to reductions in heart disease in humans, as well as other potential health benefits. Antioxidants are responsible for some of the specific

effects listed below, but those only scratch the surface of the potential health benefits of diets rich in these important nutrients. Here are a few of the important antioxidant nutrients or nutrient groups found in apricots include quercetin, proanthocyanidins, catechins, epicatechins, hydroxycinnamics, gallic acid, caffeic acid, coumaric acid and ferulic acid.

The Fe content in apricots is helpful in preventing you from developing anemia. Anemia is a common blood-related condition wherein blood contains a lower level of RBC (Red Blood Corpuscles) and hence, a lower level of hemoglobin content in the body. It is often characterized by dizziness, weakness, fatigue, nausea and inability to carry out day to day activities due to persistent tiredness. According to the WHO, it is one of the most severe forms of nutritional disorders in the whole world. Young girls and especially the women are more prone to developing anemia than men because they lose blood every month during menstruation. Loss of blood also indicates loss of iron content and nutrients. Apricot contains non-heme iron which gets absorbed slowly, gradually and much more effectively thus protecting from Anemia.

Antioxidants are crucial nutrients that plays a vital role in development and protection from diseases. The major role of antioxidants is to protect from free radicals. Free radicals are responsible for many health issues like cancer, heart disease and many more. Apart from it, they possess unique benefits that you should consider. These are the top antioxidants present in apricots. Quercetin: Quercetin is flavonoid possess anti-cancer property. Proanthocyanidins possesses inflammatory property. Along with it protect from cardiovascular disease by vessel relaxation and LDL oxidation inhibition. Inhibit tumor growth and improve diabetes complication. Apricot contain catechins in low quantity compared to tea (Waterhouse, 2001).

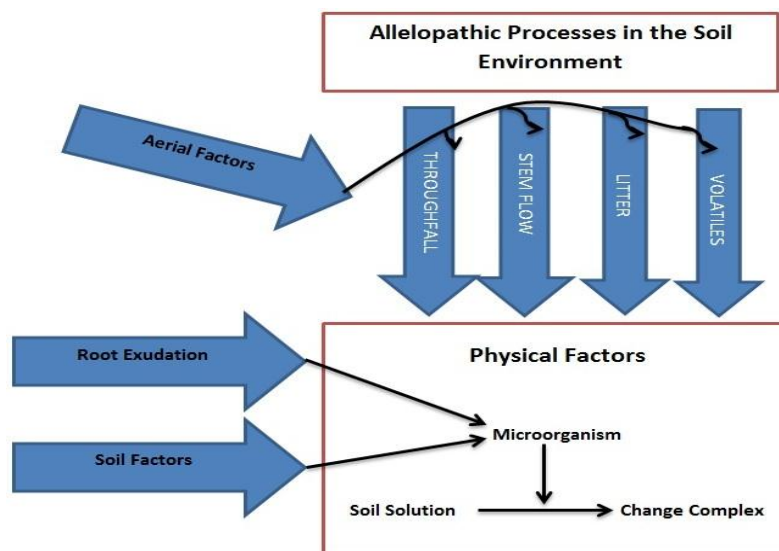


Figure 2: Apricot Seeds.

But you can benefit from cardiovascular diseases (coronary heart disease and stroke), cancer, neurodegenerative diseases (Alzheimer's disease and Parkinson's disease) and also in weight loss. Studies have shown that epicatechin plays protective role like insulin and significantly lowers diabetes type 2. It also relaxes heart muscles for better heart health. Numerous studies support hydroxycinnamic benefits from diabetes, Alzheimer's disease, cardiovascular diseases and chronic lung disease. Gallic acid has multiple properties like antimutagenic, antiangiogenic, anti-inflammatory and anticarcinogenic. It is used in treating diseases like cancer, depression, microbial infection, etc. Caffeic acid protects from DNA cell damage and maintains cells vitality. Also, it prevents heart failure by strengthening and preventing damage due to oxidative stress. Coumaric acid is top scavenger of ROS (Reactive Oxygen Species) thus protect from their side-effects. Ferulic acid Protects skin from UV rays and slow down the aging. Many Research has found that Lutein protects from AMD (age-related macular degeneration) and cataracts. Zea-xanthin protects eyesight from degenerative diseases. Beta-cryptoxanthin is a potent antioxidant that protects from free radicals and degenerative diseases. It studies it is found to protect smokers from lung cancer. Also it promotes healthy bone development. Apricot tends to be healthy fruit option due to its high nutrient content (Bassi & Selli., 1990). It contains a perfect balance of vital nutrients that are required during development of child. It is a good source of essential nutrients like Ca, Si, K, Fe and P. It is also a good source of calorie required for proper nourishment. So it tends to be highly beneficial. Eating too much apricot can cause interference in reaping its benefits. It can also cause allergic reactive people who are sensitive to sulphites. Unripe apricot can cause stomach upset. There is a though of concern for pregnant women while eating apricot. It is believed that consuming apricot is not good for pregnant women!.

As vision enhancer

Apricots are rich in the carotenoids and xanthophylls, nutrients that researchers believe may help protect eyesight from aging-related damage To give an example of how this works, one of these nutrients (lutein) appears to be able to protect the retina—the part of the eye that picks up the visual image from the environment—from damage caused by blue light. Additionally, researchers have linked regular intake of fruit with less risk of vision loss with aging. This benefit is found in people who eat three or more servings of fruit each day. Three servings of fruit may sound like a lot to eat each day, but by simply snacking on an apricot, tossing a banana into our morning smoothie, and topping off a cup of yogurt or green salad with one-half cup of berries, you've reached this goal.

As inflammation reducer

Apricots are a strong dietary source of catechins, a broad family of flavonoid phytonutrients (you may be familiar

with these phytonutrients since they are often cited for the benefits provided by green tea). A single apricot will provide you with 4-5 grams from catechins. These phytonutrients are potent anti-inflammatory nutrients and researchers have looked extensively at their health effects. Researchers have discovered that catechins can inhibit the activity of an enzyme called COX-2 (cyclooxygenase-2), one of the critical steps in the process of inflammation. Much of this research on catechin benefits involves animal rather than human studies. But we have seen human research where diets rich in catechins—not specifically from apricots but from other catechin-rich foods like tea or cocoa—have led to significant beneficial changes. For instance, multiple studies have shown that catechin-rich foods can protect blood vessels from inflammation-related damage, leading to better blood pressure control.

Other Health Benefits

Dried and fresh apricot are one of the best sources of dietary fiber. Though fiber is good for the human body, apricots contain a special kind of fiber that is, even more, beneficial. Rich soluble fiber dissolves quickly in the body; it helps in absorbing essential nutrients. It melts into a gel-like substance and helps in breaking down fatty acids. Once fatty acids are broken down, they help in the excretion of digested food particles and easy bowel movement. The high amount of dietary fiber also helps in keeping you safe from gastrointestinal disorders. It ensures a regular emptying out of intestines and protects from constipation and constipation induced piles. Apricots have a high amount of soluble fiber which aids digestion function and protects from constipation and other gastrointestinal disorders Kalt et. al., 1999). The high amount of soluble fibers is also beneficial to the heart health. The high fiber content is useful in reducing the LDL or bad cholesterol content in the body, thus lowering our risk of developing CVDs (cardiovascular diseases). At the same time, it also helps you increase the levels of HDL or good cholesterol.

Apricot, scientifically known as *Prunus armeciaca*, is a nutritious fruit belonging to the *Rosacea* family. Its scientific name is derived from Armenia, where it is believed to have originated. It has been cultivated in India for more than 3000 years. It is a small, orange colored fruit with a soft, tangy flesh and a thin skin. Apricots are typically yellow or orange in color with a slight red tinge on one side. Its taste lies somewhere between plums and peaches, fruits to which it is closely related. The seed is enclosed in the hard shell, often called a “stone”. Apricot is a versatile fruit and can be enjoyed in many ways. Read on further to know about the health, skin and hair benefits of this tangy fruit.

The impressive health benefits of apricots are due to the wide range of nutrients present in it. Apricot is rich in vitamins like beta-carotene, Vitamin A, C E and K. It is rich in minerals viz. Fe, K, Mn, Mg and P. is also a good source of antioxidants, dietary fiber and flavonoids.

As electrolyte aficionado

Potassium (K) in Apricots further balances the electrolyte and ensures that the muscles of our heart work to the best of their ability and remain healthy. The antioxidants stunt the age-related heart diseases and weaknesses. The antioxidants, potassium and fiber in Apricots optimize the health of entire cardiovascular system including heart. Fruits like apricots and those belonging to the same family are high in K content. Optimum levels of K are extremely beneficial to our body. When K combines with Na-salt, it regulates the water levels within and between cells. This water or fluid is called electrolyte, responsible for carrying neuro-transmissions and is also required to keep the blood pressure levels stable. Deficiency of K is known to be deterrent to the body as it increases the possibility of developing hypertension. Hypertension, in its most severe forms, can lead to the possibility of heart attacks (Kim et. al., 2003).

Apricot Juice

The nutrients present in apricot juice promote hair growth and stalls hair fall. If you need strong bones, drink apricot juice! It contains a significant amount of calcium, iron, copper, phosphorous and manganese, which are essential for strong bones. It also helps to prevent age related bone problems like osteoporosis. Apricot is a rich source of vitamin C and helps to improve skin elasticity. It also helps to make hair strong and beautiful. Apricot is a rich source of fiber. Generally, all the fiber present in a fruit is lost during the process of juicing. But that is not the case with apricot! Apricot juice retains most of the fiber and helps relieve constipation. The laxative property of the fruit ensures smoother bowel movements. Apricot is a wonder fruit that helps to keep your heart healthy and strong. It protects the heart from strokes, heart attacks, and atherosclerosis. The vitamin C content in the fruit protects the heart from free radicals, while the potassium relaxes the blood vessels and arteries, lowering blood pressure. The dietary fiber in apricot helps to clear the vessels and arteries by scrapping the cholesterol and reducing the strain on heart.

Apricot juice helps to prevent cancer. The antioxidant and the carotenoids help to treat cancer. It also cuts down free radical in the body. Apricot juice consists of lycopene, which helps to prevent cancer. Anemia is a common problem that plagues women of all ages. Rich in iron and copper, apricot helps to create hemoglobin in the body. It helps to fight the symptoms that come with anemia, such as fatigue, metabolic functioning, weakness, light-headedness, and digestive issues. With lutein, zeaxanthin, and carotenoids, apricot helps to prevent any kind eye disorder. Studies show that eye disorders like cataract, muscle degeneration, and glaucoma is significantly reduced by the consumption of apricot juice. It also helps to improve the vision. Apricot contains a good amount of Mg & P.

These minerals help to enhance the functioning of the brain and also work to keep blood pressure at normal level. Most pregnant women are plagued with morning sickness. Consumption of apricot juice helps to settle nausea and indigestion. The tangy juice of apricot also provides extra calcium, iron, minerals, vitamins and antioxidants needed by pregnant women. Consumption of apricot and its juice has been linked with longevity. The vitamin A in the fruits has anti-aging properties. Studies have shown that people who consume apricots in whole or as juice has longer and a healthier life span than others. Apricot is known as nectar of God, and rightfully so! With so much to offer, apricot nectar juice is sure a blessing from the heaven above.

Apricot Kernel Oil

Apricot kernel oil is obtained from the kernels (seeds) of Apricots. After eating these delicious fruits, the seeds are used to make this light oil. Apricot kernel oil is great for use as massage oil as it is very light and makes the skin soft. Apricot kernels themselves are quite healthy and are being researched for a number of health conditions including cancer. Apricot kernel oil is quite similar to almond oil and its applications are also similar. This oil has a deep, nutty flavor which makes it an excellent ingredient for desserts and other recipes. Apricot kernel oil is extracted from seeds of Apricot (*Prunus armeniaca*).

Apricot kernel oil possesses many therapeutic properties which make it suitable for its various uses.

- Emollient – Apricot seed oil is a brilliant emollient (moisturizer).
- Anti – Inflammatory – It reduces inflammation when applied topically or when ingested.
- Anti-Aging – It provides nutrition and support to the skin so that aging is reduced.
- Anti – Bacterial – This effect is made use of to treat clothes and other products to keep bacteria away.
- Anti-Septic – reduces risk of infection in open wounds and cuts.
- Antioxidant – prevents the skin from damage by free radicals (Bartolini et. al., 2015).

Cosmetic Applications

Apricot seed oil contains high fatty acids, Vitamin E and A which can be used to moisturize and nourish dry and mature skin. This oil is popularly used in cosmetics like creams, soaps, and skin lotions. The oil gets easily absorbed into the skin without leaving any oily residue. Hence, this is also used for massage and as sunbathing oil. You can use this as a base with other aromatherapy oils.

Rub our hair by mixing this with other oils like Aonla, coconut, and olive to cure a dry and flaky scalp. It is very good for damaged control and chemical treatment of hair. This will restore the shine of our hair.

This can be used as a moisturizer for dry areas such as elbows, knees, feet and hands. This will make our skin extra soft and smooth. This oil can give you best results when used as a night moisturizer. Mix it with any other essential oil that suits you and massage gently. Please don't forget to cleanse and tone our face before doing this. This will help you to get rid of clogged pores, a shiny nose and will also moisturize dry skin.

Apricot seed oil is very light and gentle on the skin. This is used to moisturize normal and oily skin. The texture of this oil is very light so it can be used as a face serum. Apricot kernel oil doesn't give a greasy coat on the application. This also rehydrates our skin. Natural apricot seed oil contains gamma linoleic acid that is useful to firm and tone our skin. This also contains Vitamin A and E to soothe and slow down the aging process. It has nourishing properties and an anti-inflammatory effect to soothe eczema. Apricot seed oil gets very quickly absorbed into the skin, which is the best property of any massage oil. This also increases the benefits of massage to reduce stress, pain and inflammation. This oil is very mild and non-irritating, and can even be used for children and infants.

Apricots are rich in many plant antioxidants. Some of these are the vitamin antioxidants so familiar to regular users of this site. Others are more difficult to obtain from other foods, and may be responsible for specific health benefits (Arts *et al.*, 2001). Overall, consider the apricot to be a great food that provides you with the protective effects of antioxidants while adding very few calories to daily total.

Usage of apricot oil skin and hair care

Apricot kernel oil is generally light yellow in color. It can also be slightly darker yellow depending on the variety of apricots and the extraction process. There is a slight nutty aroma in this oil. The taste is nutty, somewhat like almonds. Apricot kernel oil can be used for a variety of personal uses and many home remedies. It is also used in alternative medicine for treatment of cancer, although it has not been proved. Apricot kernel oil is good for people with sensitive skin. It is non-irritant and soothing for the skin. It is light and quickly makes the skin soft and smooth. Apricot oil percolates deep into the skin. It is easy to apply on the skin as it quickly spreads on the skin. It soothes irritated skin. A massage with apricot kernel oil is good for dry, parched skin. One can use it after a shower to seal the moisture into the skin. Since it is light, it does not feel too oily. Once it is absorbed into skin, it provides moisturization for a long time. Apricot kernel oil is one of the best carrier oils for massage. It penetrates nicely into the skin and also improves the delivery of essential oils and other herbal agents. This oil is also good for infusing with herbs and absorbing their essence. It can be utilized for various kinds of massage that require an oil. Apricot oil is loved by many people around the world for their hair care. When applied to the hair shafts, it helps to detangle

hair. These are the health benefits that organic apricot oil provides to hair.

- It promotes hair growth because of the nutrients in it, especially Vitamin E.
- It reduces dry scalp problems.
- It helps to achieve gorgeous shiny hair without any greasiness.
- When used as a hot oil treatment, it conditions the hair and provides them nutrition.
- It softens the hair, so that they are more manageable and easily combed.

Apricot oil can be applied just like almond oil for healing under eye skin. It aids in reducing dark circles, puffiness and helps to strengthen the skin around this region. With regular application of apricot kernel oil, one can reduce the appearance of fine lines and wrinkles around the eyes. Apricot kernel oil is nice face oil, especially when compared to other heavier oils. It helps to improve skin tone, nourish the skin and lower the appearance of aging signs, like wrinkles, lines and blemishes. Consumption of apricot kernel oil can be healthier for the heart and the cardiovascular system. This oil has demonstrated ability to lower the risk of myocardial infarction (heart attack) in rats and can possibly perform the same function in humans. One can take apricot oil in food as a salad dressing and by using it for cooking certain recipes that go well with the flavor of this oil. Apricot oil is great for use in homemade skin care products like facial toners, scrubs, dry and wet shampoo and exfoliants.

Apricot leaf juice is useful for treating scabies, sunburn and eczema. Apricot scrub reduces blackheads, unclogs the pores and deep cleanses the skin, preventing the occurrence of acne. Apricot kernel oil is very useful for sensitive skin. It is also used in baby products because of its mild and gentle nature. Apricot oil is commonly used for massaging the body and skin. It is used in aromatherapy massages to keep the skin healthy and to balance the nervous system. Do not forget to consult your doctor before using it, especially if you have sensitive skin. The hydrating properties of apricot kernel oil make it a natural moisturizer. The high levels of linoleic acid present in this oil maintain the moisture balance of the skin. It is lightweight oil that gets absorbed into the skin, without leaving any greasiness behind. This oil is suited for all skin types, including oily and acne-prone skin. You can also add a few drops of this oil to your moisturizer or serum. Regular consumption of apricot helps to maintain the elasticity and suppleness of the skin. Vitamin E in apricot helps to delay the signs of ageing. It also tones and firms the skin. You can use apricot paste as a facial mask to soften the skin. Apricot contains oleic acid and Vitamin A, which prevent skin damage. The anti-inflammatory properties of apricot are helpful for soothing minor skin conditions like eczema and dry skin. The wide arrays of nutrients present in apricot make it very beneficial for the hair. Some of the benefits of apricot for the hair include:

Several hair products claim to improve the growth and texture of the hair, but only a handful of these work. Instead of trying harmful and chemical-laden hair products, you can try apricot kernel oil to improve the health of your hair. Regular consumption of apricot can do wonders to your hair. It promotes sebum production in the scalp, keeping it conditioned and moisturized. Add a few drops of apricot kernel oil to your shampoo and conditioner to make the hair soft, smooth and manageable. It is also used as treatment oil before chemical treatments. You can also use apricot kernel oil to manage frizzy hair. Take a few drops of apricot oil and smoothen through the hair. Regular application of apricot oil can help to make the hair shiny and soft. Massage your scalp with apricot oil to keep the hair roots nourished and conditioned. It also stimulates the follicles, stimulating hair growth. Apricot kernel oil is very beneficial for treating scalp conditions like an itchy scalp, dandruff, eczema and psoriasis. The benefits of dried apricots stem from the fact that the drying process strips the fruit of its water content, without altering the nutritional value. As a result, the nutritive value of apricots is concentrated into a much more potent form, enhancing its benefits. Dried apricots are long lasting and are consumed widely as a nutritious snack.

Dry apricot contains a relatively high concentration of iron than fresh apricot. The type of iron supplied by dried apricot is known as non-heme iron. The non-heme iron takes a long time to get absorbed in the body. Consume dried apricots with Vitamin C rich foods to increase the iron absorption rate. Half a cup of dried apricots provides nearly 12% of the recommended dietary allowance of iron. Dried apricots contain high levels of antioxidants and other potent phytonutrients like lutein, zeaxanthin and beta cryptoxanthin. These compounds provide protection from free radicals and reactive oxygen species (ROS) that can cause ageing, cancer and other harmful diseases. The total antioxidant or ORAC value of raw apricot is 1115 umol TE per 100 grams. Dried apricots have a high content of Vitamin A, E and beta-carotene. Half cup serving of dried apricots provides 14% of the recommended amount of Vitamin A. Dried apricot contains high amounts of carbohydrates. In fact, half cup of dried apricots yields 3 times more calories than fresh apricots. Dried apricots act as a natural laxative to flush out unwanted waste from the body. It also reacts with the body's digestive juices, producing a more alkaline environment to aid digestion. Choose organic dried

apricots instead of the artificially dried variety. Organic dried apricot is brown in color and is not at all subjected to chemical treatment. Thus, organic dried apricots will help you reap the most benefits, without leading to any side effects. For best results, consume 4 to 6 servings of dried apricots daily. Apricot kernels contain an oil content of around 40 to 50%. The oil is extracted by the cold press method and refining the dried seeds of this fruit.

It is composed of unsaturated fats, which include oleic acid and linoleic acid. Apricot oil is generally used in the manufacturing of cosmetics. It is added to soap, shower gels, moisturizers and conditioners.

Besides its use as a healing agent and a home remedy for skin care, apricot kernel oil has many more uses. It is used in some recipes where it really brings out better flavor. However it is generally used only as a salad dressing on a regular basis. Moreover, it has also got some industrial applications. Apricot oil is used as an ingredient in soaps. One can use it in homemade soap recipes to have a lesser oily and slippery oil. It makes nice base oil for the soap, in combination with coconut oil and palm oil, which are very common in soap making. Apricot oil adds a slight nutty aroma to the oil. It is also a good carrier for essential oils which are used in soap making like lemon essential oil, lavender oil and jasmine essential oil. Apricot kernel oil is being evaluated for its potential to generate biodiesel and the results so far look good. Especially the oil from wild apricot varieties can be used for this purpose.

Fatty Acid profile of Apricot kernel oil

The most important part about nutrition of any oil is its fatty acid profile that is the fats that it contains. Apricot kernel oil is rich in **oleic acid** and **linoleic acid**. This is a breakdown of the fatty acids present in apricot kernel oil (Table 3).

All the nutrition data is for 100 gm of apricot kernel oil.

- Saturated fatty acids – 6.3 gm
- Monounsaturated fatty acids (MUFA) – 60 gm
- Polyunsaturated fatty acids (PUFA) – 29.3 gm

This shows that overall apricot kernel oil is very healthy heart wise. It has a very small amount of saturated fats.

Table 3: Fatty Acid Profile: Apricot Kernel Oil.

Nutrient	Percentage	Property
Gamma Linoleic Acid (18:3)	–	PUFA
Stearic Acid (18:0)	0.5 %	Saturated fat
Palmitic Acid (16:0)	5.8 %	Saturated fat
Palmitoleic Acid (16:1)	1.5 %	MUFA
Oleic Acid (18:1)	58.5 %	MUFA
Linoleic Acid (18:2)	29.3 %	PUFA
Alpha Linolenic Acid(18:3)	–	PUFA
Erucic Acid (22:1)	–	MUFA

Gadoleic Acid (20:1)	–	MUFA
Behenic Acid (22:0)	–	Saturated fat
Arachidic Acid (20:0)	–	Saturated fat

(Source: USDA)

From this data on the fatty acid nutritional value of apricot kernel oil, we infer that the oil is rich in omega – 9 (oleic acid) fatty acid. This is mainly responsible for the oil's powerful emollient property. The oil is also rich in omega – 6 (linoleic acid). This makes it important to have omega sources in diet to match up with the omega 6 intake. This is important because our body needs a healthy ratio of omega – 3 to omega – 6 fatty acid in order to keep inflammation in check. Besides healthy fats, apricot kernel oil is also rich in one particular

nutrient, Vitamin E. 100 gm of apricot kernel oil provides about 20 % of RDI of Vitamin E.

Chemical properties of Apricot Kernel Oil

Besides the nutrients, there are some chemical properties of oil which are of great significance. They tell us about the broad chemical behavior of oil. One of the most important of such properties is ORAC (oxygen radical absorbance capacity). It is a measure of how many oxygen free radicals a substance can mop up, which is equivalent to its antioxidant power (Table 4).

Table 4: Chemical Properties: Apricot Kernel Oil.

Nutrient	Percentage	Property
Density	0.910 g/ml	great for massage oil
Storage temperature	–	Ideal temperature for storage
Comedogenicity	2	Pore clogging potential (0 – 5)
ORAC	–	Antioxidant Power
pH	4.3	Measure of Acidity
Peroxide Value	less than 0.1	Measure of Initial Rancidity
Saponification Value	191.4	Measure of the average carbon chain length
Iodine Value	107	Measure of unsaturation of oil
Free Fatty Acids	0.015 %	Percentage of volatile oils

Side Effects, Safety and Toxicity Issues

Apricot kernel oil is generally safe to use topically. However, when used internally, there is one thing to note. Apricot kernels contain a substance called amygdalin. This is converted by the body into cyanide, which is poisonous. This can lead to respiratory failure and may even be fatal. Amygdalin is usually removed from oil products. This is done to ensure that the oil product contains much less amygdalin than the safety limit. This is the case with almond oil, apricot oil and peach oil. However, one should be absolutely sure that the oil product has been processed to remove this poisonous substance. There is currently no information about the interactions of apricot oil with medication or other herbal products. However, this oil should be avoided by people who are suffering from acne or are prone to acne. That is because it has a comedogenicity of 2. This means that the oil is mildly comedogenic and it can clog skin pores. This may result in acne breakouts and blackheads. Commercially grown dried apricots may be treated with S-containing compounds during processing to extend their shelf life.

Allergies are a possible side effect of eating apricots in high amounts. Dried apricots are found to contain sulfites. Sulfites can have serious impact on the health, inducing asthmatic attacks. Thus, sulfite-sensitive people should avoid consuming dried apricots. [Sulfur dioxide (SO₂) is used as a preservative in the dried fruit industry to keep fruits from losing their original colour and taste however it is a poisonous chemical and can be lethal if

exposed to in high levels. What is the percentage of SO₂, used as a preservative in the process of drying, in dried fruits such as apricots and figs, where the percentage of SO₂ will be found with calculating the mass of barium sulfate precipitate (BaSO₄) per fruit by first oxidizing the sulfur in sulfite ions (SO₃²⁻) to sulfate ions (SO₄²⁻) by adding 30 mL of 3% hydrogen peroxide (H₂O₂) and then precipitating the sulfate ions by adding barium chloride (BaCl₂) drop by drop?" It was experimented on naturally dried figs, artificially dried figs, naturally dried apricots, artificially dried yellow apricots, artificially dried brown apricots to compare the percentages of SO₂ in both naturally and artificially dried fruits. Although higher levels of SO₂ was expected in artificially dried fruits (yellow apricots, the highest as more SO₂ would be used to keep the light colour) and close to none expected in naturally dried ones, the lowest percentage was observed in artificially dried yellow apricots. The highest amount was found in artificially dried figs, followed by naturally dried apricots, naturally dried figs and then artificially dried brown apricots. The data did not give the results as expected but research showed that there is still enough SO₂ in all dried fruit groups experimented on to possibly cause sulfite-sensitive individuals problems. The research should be expanded to many more food groups for the sake of general human health (A thesis on CHEMISTRY EXTENDED ESSAY "Determining the percentage of SO₂, used as a preservative in the process of drying in dried fruits such as apricots.

CONCLUSION

Apricot is an excellent source of antioxidants. Free radicals are usually caused due to pollution, sunrays and other environmental conditions. They hinder the process of cell growth, leading to changes in the DNA of the cells. This leads to the formation of cancer cells in the body. Therefore, consume apricots on a regular basis to protect yourself from cancer. Besides, studies have also revealed that apricot seeds contain a compound called B17, which helps in the treatment of cancer. It contains high levels of Vitamin A and C, which boost the immune system, fighting cancer causing cells. The antioxidants in apricots slow down the process of aging by facilitating faster cell production that replaces the layer of dead and worn out cells. It renews the skin layers and removes the fine wrinkles giving our skin a taut appearance. Vitamin A also ensures that the skin is free from acne and other such general skin problems. The antioxidants in apricot make skin youthful, healthy and delay the appearance of ageing on face. The high amount of dietary fiber that the apricot fruit is gifted with is useful for those people who are looking at losing a few kilos. High fiber content improves the digestive and excretory systems in the body and helps improve the rate of metabolism. To add fantastic character, apricot also contains an extremely small amount of calories. Apricots can restore the electrolyte balance and fill our stomach without adding the calories that eventually build up the weight of the body. Fiber, low calories and mineral content of apricot make them an ideal snack for people on strict diet and facilitates the weight loss as well.

Ground apricot kernel oil is used to get rid of dead skin cells, allowing your skin to renew itself. The exfoliating action of apricot oil can help to get rid of fine lines and wrinkles. Apricot oil can also help you to get an even skin tone. It removes and exfoliates damaged skin, revealing the new and lighter skin cells beneath. It is also useful for eliminating skin blemishes. The anti-inflammatory properties of apricot oil may help to treat acne and skin redness. The flesh of apricot is particularly beneficial for treating acne-prone skin. The health benefits of apricots can be attributed to the high concentration of nutrients present in it. It inhibits the blood supply to the eyes, causing macular degeneration. The high levels of β -carotene improve blood flow to the eyes, reversing age-related macular degeneration. It contains an antioxidant called Zea xanthin, which provides light filtering functions, thus improving vision. Apricots contain a high amount of pectin, a soluble fiber, which helps in the treatment of constipation. It is often recommended to patients suffering from irritable bowel syndrome and constipation. Fiber bulks up the stool, making it easier to transport through the bowels. It activates the peristaltic motion of the digestive tract, regulating the bowel movements. The high levels of fiber in apricot are also vital for colon health.

Apricots contain all the necessary nutrients required for healthy bone growth. Thus, eating apricots regularly will

ensure the growth and development of the bones. It will also prevent age-related conditions, including osteoporosis. The anti-inflammatory properties of apricot reduce inflammation in the body, relieving arthritis pain and gout. Potassium in apricot helps to maintain the fluid balance in the body, ensuring that energy is equally distributed throughout the organs. A healthy balance of electrolytes ensures that you have more energy and stamina to deal with day-to-day activities. Apricot oil is known to cure earaches. Drop a few drops of apricot oil into the affected ear canal for quick relief. Apricot is an excellent fruit for maintaining heart health. Research has found that people who eat foods rich in Vitamin C are less susceptible to heart diseases. The high levels of dietary fiber remove the excess cholesterol from the arteries, reducing strain on the heart. It protects the LDL (low-density lipoprotein) from oxidation, preventing heart diseases and stroke. Potassium in apricot regulates the balance of intracellular and extracellular water levels, thereby regulating blood pressure. Half a cup of apricot provides the body with 10% of the recommended amount of potassium.

Low calorie fruit will make an excellent addition to your weight loss regime. The insoluble fiber in apricot absorbs water and keeps the stomach full for a longer time. Fiber also promotes quick movement of food through the digestive tract. Apricot oil is believed to be anti-asthmatic in nature. It is very beneficial for treating respiratory disease and its related symptoms. The oil has expectorant and stimulating qualities, which helps to relieve pressure and stress from the respiratory system. This helps to prevent asthma attacks. Apricot is an excellent source of iron, a mineral which plays a very important role in the formation of hemoglobin. In addition, apricot also contains copper, which aids in iron absorption. This improves the blood flow in the body, preventing anemia.

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REFERENCES

1. Omar Alajil, Vidya R. Sagar, Charanjit Kaur, Shalini Gaur Rudra, R. R. Sharma, Rajeev Kaushik, Mahendra K. Verma, Maharishi Tomar, Manoj Kumar, and Mohamed Mekhemar Nutritional and Phytochemical Traits of Apricots (*Prunus armeniaca* L.) for Application in Nutraceutical and Health Industry, *Foods*, 2021; 10(6): 1344.
2. Deepak Shrivastav and Suman Lata A Review on Phytochemical and Pharmacological Studies of Fruit *Prunus armeniaca* Linn, *International Journal of Pharmaceutical & Biological Archives*, 2019; 10(4): 242-250.
3. Erdogan-Orhan, I. and Kartal, M. Insights into research on phytochemistry and biological activities

- of *Prunus armeniaca* L. (apricot), *Food Res Intern*, 2011; 44: 1238-1243.
4. Leccese A, Bartolini S, Viti R. Total antioxidant capacity and phenolics content in fresh apricots, *Acta Alim*, 2008; 37: 65-76.
 5. Bartolini, S., Leccese, A., Iacona, C., Andreini, L. and Viti, R. Influence of rootstock on fruit entity, quality and antioxidant properties of fresh apricots (cv. 'Pisana'), *New Zeal J of Crop and Hort Sci*, 2014; 42: 265-274.
 6. Arts, M.J.T.J., Dallinga, J.S., Voss, H.P., Haenen, G.R.M.M. and Bast, A. A new approach to assess the total antioxidant capacity using the TEAC assay, *Food Chem*, 2004; 88: 567-570.
 7. Waterhouse, A.L. Determination of total phenolics: Current Protocols in Food Analytical Chemistry. John Wiley & Sons, New York., 2001.
 8. Bassi, D. and Selli, R. Evaluation of fruit quality in peach and apricot. *Adv Hort Sci*, 1990; 2: 107-111.
 9. Kalt, W., Forney, C.F., Martin, A. and Prior, R.L. Antioxidant Capacity, Vitamin C, Phenolics, and Anthocyanins after Fresh Storage of Small Fruits, *J Agric Food Chem*, 1999; 47: 4638-4644.
 10. Kim, D., Jeong, S.W. and Lee, C.Y. Antioxidant capacity of phenolic phytochemicals from various cultivars of plums, *Food Chem*, 2003; 81: 321-326.
 11. Bartolini, S., Leccese, A. and Viti, R. Quality and Antioxidant Properties of Apricot Fruits at Ready-to-Eat: Influence of the Weather Conditions under Mediterranean Coastal Area, *J Food Process Technol*, 2015; 7: 538. doi:10.4172/2157-7110.1000538.
 12. Baytop, T. Türkiye'de Bitkilerle Tedavi. Istanbul: Istanbul Eczacilik Fakültesi Yayinlari, 1999.
 13. Chopra, R.N., Nayar, L. and Chopra, I.C. Glossary of Indian Medicinal Plants. New Delhi: Council of Scientific and Industrial Research, 1956; 204.
 14. Krishnamurty, A. The Wealth of India: Raw Materials. New Delhi: Publications and Information Directorate, Council of Scientific and Industrial Research, 1969; 256-61.
 15. Dang, R.L., Narayanan, R. and Rao, P.S. Kumaon apricot kernel oil: Its composition and utilization. *Ind Oil Seeds J.*, 1964; 8: 110-5.
 16. Gezer, Y. and Dikilitas, S. The study of work process and determination of some working parameters in an apricot pit processing plant in Turkey. *J Food Eng*, 2002; 53: 111-4.
 17. Deepak Shrivastav and Suman Lata A Review on Phytochemical and Pharmacological Studies of Fruit *Prunus armeniaca* Linn., *International Journal of Pharmaceutical & Biological Archives*, 2019; 10(4): 242-250.
 18. Varsha, R., Jain, A. and Chaudhary, J. *Prunus armeniaca* (Apricot): An overview. *Int J Pharm Pharm Sci.*, 2012; 5: 3964-6.
 19. Yasaman Vahedi-Mazdabadi, Elahe Karimpour-Razkenari, Tahmineh Akbarzadeh, Hania Lotfian, Mohammad Touseh, Neda Roshanravan, Mina Saeedi and Alireza Ostadrahimia Anti-cholinesterase and Neuroprotective Activities of Sweet and Bitter Apricot Kernels (*Prunus armeniaca* L.), *Iran J Pharm Res.*, 2020; 19(4): 216-224.