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## Review Article

### A BRIEF REVIEW ON: HAZELNUTS

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#### ABSTRACT

Different types of nuts like almonds, brazil nuts, hazelnuts, peanuts, pine nuts, walnuts and cashews are present all over the world. Hazelnut is the nut of the hazel deriving from species of the genus *Corylus*, especially the nuts of the species *Corylus avellana*. It is the second most expensive nut and needs cold and hilly terrain with a few days of sub-zero temperature. Therefore, Himachal Pradesh, Jammu and Kashmir, Silguri, Uttarakhand & North-East states make the best choice in India. It takes three to five years for hazelnut plants to grow and yield fruit. Hazelnuts are rich in monounsaturated fatty acids, antioxidant bioactive substances & rich source of oleic acid (about 80%), which decreased risk of cardiovascular disease. It is used as antioxidant, hypocholesterolemic, cardioprotective, anticancer, anti-inflammatory & in production of biodiesel. Turkey is the biggest market of the hazel nut in the world. The present article provides an overview about the significant of hazelnut.

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#### INTRODUCTION

A nut spreads after the winter weather via small mammals, birds and human relocation. There are two types of nuts cultivated in all over the world i.e. tree nuts and peanuts. Naturally tree nuts are dry fruits with one seed like almonds, hazelnuts, walnuts etc. Almonds, hazelnuts, walnuts, Brazil nuts, pine nuts and pistachios are communal & required edible tree nut. Hazel nuts are rich source of proteins, carbohydrates, unsaturated fatty acid, vitamins and essential minerals. They are used as a human food since primitive days and have been cultivated at least since Roman times. Peanuts is an examples of groundnuts, have a parallel nutrient outline like tree nuts (Welna *et al*, 2008; Hu *et al*, 1999; Vaughan *et al*, 1998, Brufau *et al*, 2006; Ros *et al*, 2006).

The genus *Corylus*, source of hazel nut contains a wide variety of deciduous shrub and tree species that are important components of many moderate forests across the Northern Hemisphere. It is widely distributed in Europe & Asia (Fig 1) (Peltre *et al*, 1988; Caligiani *et al*, 2014; Sabeti *et al*, 2006, FAOSTAT *et al*, 2006; Demir *et al*, 2000).

##### Biology of *Corylus avellana*

The word hazelnut is derived from the Anglo-Saxon word *haesel* (bonnet). Hazelnut is a member of genus *Corylus*,

species *avellana* a and belongs to family Betulaceae (Table 1). It is a multi-stemmed shrubs, 3-10 m tall, have weeping or twisted branches. Leaves are quite differing in their thickness and branching bulk. Average lengths of leaves are 5-10 cm with different shape, oval to round. Nuts develop in bunches of 1-12, generally in shape of spherical or oval. Particular nut is covered in double layered shell. Maturity of nuts takes minimum 7 - 8 months after fertilization.

The floral biology of hazelnut is distinct from other plantation crops. Unlike other cultivated plant, hazelnut plants are diploid ( $2n = 2x = 22$ ), hermaphrodite, air-pollinated and flowering in midwinter, from December to March in the Northern hemisphere. Pollen tubes grow to the base of the styles and rest for five months. The ovary becomes mature in the spring. Fertilization occurs when the nut is about one-half of the mature size (Amaral, 2006; Bennet *et al*, 1991; Smolyaninova, 1936, Kasapligil, 1972; Thompson *et al*, 1996).

Economically as well as commercially, maximum hazelnut cultivars are from Europe in the present era. In spite of its superior quality, production, larger size and thinner shells, it cannot resist the severe winters & eastern filbert blight fungal disease (Rushforth, 1999, Boccacci and Botta, 2009, Palme and Vendramin, 2002, Chenab Industries).

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## Chemical Constituents

Hazelnuts are good source of fats like other nuts i.e. almond, cashew etc. The lipid fraction forming the major part of hazelnuts is composed of non polar and polar constituents. Triacylglycerols are the major nonpolar lipids representing nearly 100% of the total nonpolar lipids in hazelnut oil. It is good source of monounsaturated fatty acid (MUFA) & polyunsaturated fatty acid (PUFA). It contains predominately palmitic acid, Stereic acid, linoleic acid & linolenic acid. The omega-3 fatty acids are not synthesized by the human body. It is obtained exclusively from the diet.  $\alpha$ -linolenic acid is precursor for omega-3 fatty acids. Hazelnut is good source of that PUFA (Mehmet *et al*, 2005, Ciemniowska *et al*, 2011, Alasalvar *et al*, 2003, Kornstriner *et al*, 2013, Hardman, 2002, Amaral *et al*, 2006, Gunes *et al*, 2010, Whelan *et al*, 2006).



Figure 1 Hazel Plant with nut

Amino acids like glutamic acid, arginine, alanine and aspartic acid are present in hazelnut (Alasalvar *et al*, 2003, Dmytryshyn *et al*, 2004, Koksal *et al*, 2006, Feldman, 2002).

It is also good source of vitamin E & B<sub>1</sub>, B<sub>2</sub> & B<sub>6</sub> complex (Table 2) (Feldman, 2002, Chen *et al*, 2005, Tapiero *et al*, 2002).

Various studies concluded that hazelnuts is excellent source of the minerals like potassium, phosphorus, calcium, magnesium, boron, copper, manganese and selenium (Alasalvar *et al*, 2003,

Feldman, 2002, Cristifori *et al*, 2008, Schmitzer *et al*, 2011, Cosmulescu *et al*, 2013, Rude *et al*, 2012, Hambidge *et al*, 1986, Demignei *et al*, 2004, Tripathi *et al*, 2013, Souci *et al*, 2013, Simsek and Aykut *et al*, 2007, Hunt *et al*, 1997, Ismail *et al*, 2012).

Table 1 Brief description of Hazel nut

<i>Corylusavellana Linn.</i>	
Kingdom	Plantae
Clade	Angiosperms
Order	Eudicots
Family	Betulaceae
Genus	<i>Corylus</i>
Common name	Filbert, Hazel Nut, European Nut
Latin name	<i>Corylusavellana Linn</i>
Kashmiri Name	Thangi, Thankoli, Warawi, Wiri,
English Name	Hazelnut, Cobnut
Hindi Name	Findak, Bindak
Punjabi Name	Funduj

Table 2 Composition of Phytoconstituents in 100gm edible part of Hazelnut

S. No	Phytoconstituent	Weight
1	Protein	14.95 g
2	Total lipid	60.75 g
3	Carbohydrate	16.70 g
4	Fiber (Total dietary)	9.70 g
5	Iron	4.70 mg
6	Magnesium	163 mg
7	Zinc	2.45 mg
8	Copper	1.72 mg
9	Selenium	4 $\mu$ g
10	Vitamin E	15.18 g
11	Lysine	0.42 g
12	Arginine	2.21 g
13	Saturated	4.46 g
14	MUFA	45.67 g
15	PUFA	7.92 g
16	Phytosterol	96 mg

## Uses

Hazelnut oil decreases the cholesterol level in blood and also controls adverse effects of hypertension (Durak, 1999, Boshtam *et al*, 2002, Xu and Hanna, 2009, Tey *et al*, 2011).<sup>45-48</sup> The presence of MUFA and PUFA in hazelnut is good for healthy heart. Daily diet of hazelnut satisfactory decrease High Density Lipoprotein (HDL) & increase Low Density Lipoprotein (LDL) in the blood plasma. Phenolic components of hazelnut reduced the MDA level & increase antioxidant activity in plasma. These factors directly alter the plasma lipid profile in the body. Hazel nut can be further evaluated for cure & prevention of heart disease (Durak, 1999, Orem *et al*, 2008). As a rich source of minerals like potassium, phosphorus, calcium, magnesium, copper, manganese and selenium, hazelnut is effective remedy to maintain a healthy nerve function & other body system balanced (Ozdemir *et al*, 2001, Ozkutlu *et al*, 2011).

This plant has a venotonic action being used on varicose veins and edema caused by venous inadequacy (Riethmuller *et al*, 2013).

Antimutagenicity and anticancer activity of fresh hazelnut were evaluated strong with respect of positive control sodium-azide (as a carcinogenic compound), while dried hazelnut potential was moderate. In future hazelnut can be used as aspects of anticancer drug (Masoumi *et al*, 2014, Venkateswaran *et al*, 2002, Haewen & John, 2011).

Some evidence indicates that it helps to reduce the risk of type 2 diabetes (Dhein *et al*, 2003).  $\alpha$ -Tocopherol may also be protective against intellectual deterioration and Alzheimer's disease (Martin, 2003). Hazelnuts also used in cosmetics product & pharmaceuticals. Hazelnuts oil also used in massaging & cooking (Kornstriner *et al*, 2013).

Hazelnuts are widely used in the food industry such as chocolate, confectionery and baking, ice-cream, dairy products and can be added to a wide array of dishes from cereals and breads, to yogurts, soups, salads, and from main dishes to confections (Costa *et al*, 2013, Fallico *et al*, 2003). Nutella is a brand of sweetened hazelnut cocoa spread (Nutella).

Ferrero Rocher<sup>®</sup> is delicious butter in which hazelnut is the main ingredient. Cadbury<sup>®</sup> is world popular chocolate in which hazelnut as one of the main ingredients. Hazelnut is a chief component of the vodka based liqueur, Frangelico.

In recent years, Petrol & Diesel is the main energy sources. Like CNG (Compressed Natural Gas), Hazelnut oil based biodiesel is good sources of energy. It had an average heat for approximately ignition of 40.23 kJ/g that is accounted for approximately 88% of energy content of diesel fuel. Chemical content of hazelnut oil diesel was the approximately similar as natural oil (Xu and Hanna, 2009).

Hazelnut lipase enzyme is quite stable at the higher temperatures, alkaline pH's, and for four months of storage time. For various researchers of biotechnological field, it can be more effective enzyme (Ismail *et al*, 2012).

Hazelnut kernel contains a high concentration of oil, and may be used to increase the dietary consumption of oleic acid for those persons lacking of mono- unsaturated fats (Jauch *et al*, 1989).

Filbert one is the principal flavor compound of hazelnuts. It is used in perfumery as generally recognized as safe (GRAS) for use in foods (Zarbin *et al*, 1998).

## CONCLUSION

Green vegetable, fruits & non-vegetarian meal are mostly included in Indian culture. But nut is randomly involved in our daily meal. Different studies emphasize that hazelnuts are rich in fatty acids & regular intake of hazelnut decreases the risk of heart disease. It is also used in treatment of other diseases and also in preparation of biodiesels & cosmetics products. We can conclude that hazelnut is very beneficial for human being.

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