



ETHANOBOTANICAL AND PHARMACOLOGICAL REVIEW ON *ARACHIS HYPOGAEA*

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ABSTRACT

Arachis hypogaea commonly called as peanut belongs to the family Fabaceae. It is a dual purpose legume crop mainly used as food and oil seed. Most part of the peanut have some commercial uses like antioxidants, anti-inflammatory, anti tumor etc. this plant contains various chemical constituents like flavonoids, phenols, phytoosterols, alkaloids and stilbenes.

KEYWORDS: *Arachis hypogaea*, stilbenes, legumes, haemorrhage, bronchitis.

INTRODUCTION

The peanut (*Arachis hypogaea*), also known as the groundnut is a legume crop grown mainly for its edible seeds. It is widely grown in the tropics and subtropics, important to both small and large commercial producers. Peant is classified as a legume also as a Grain. The peanut belongs to the botanical family Fabaceae (or Leguminosae), commonly known as the legume, bean, or pea family. The peanut was first cultivated in the valleys of Peru. It is called as an annual herbaceous plant. It grows upto 30 to 50 cm (1.0 to 1.6 ft) tall. There are different varieties like Virginia group, Spanish group, Runner group, Valencia group, Tennessee red and Tennessee white. *Hypogaea* means "under the earth", after pollination, the flower stalk elongates causing it to bend until the ovary touches the ground. Continued stalk growth then pushes the ovary underground where the mature fruit develops into a legume pod. Pods are 3 to 7 cm (1.2 to 2.8 in) long, containing 1 to 4 seeds.^[1]



Figure no. 1: *Arachis hypogaea* plant, flower and seeds.

PLANT PROFILE

Scientific classification

- BOTANICAL NAME: *Arachis hypogaea*
- KINGDOM: Plantae
- DIVISION: Magnoliophyta
- CLASS: Magnoliopsida
- ORDER: Fabales

- FAMILY: Fabaceae
- SUBFAMILY: Faboideae
- TRIBE: Aeschynomeneae
- GENUS: *Arachis*
- SPECIES: *A. hypogaea*

VERNACULAR NAMES

- Arabic: foul sudani
- English: peanut, ground nut
- Hindi: moongaphalee
- Malayalam: nilakkatala
- Tamil: verkkatala

COMMON NAME: peanut, ground nut, earth nut.

SYNONYMS: *Arachis nambyquarae* Hoehne.

HISTORY

The *Arachis* genus is native to South America, east of the Andes, around Peru, Bolivia, Argentina, and Brazil. Cultivated peanuts (*A. hypogaea*) arose from a hybrid between two wild species of peanut, thought to be *A. duranensis* and *A. ipaensis*. The initial hybrid would have been sterile, but spontaneous chromosome doubling restored its fertility, forming what is termed an amphidiploid or allotetraploid. Genetic analysis suggests the hybridization may have occurred only once and gave rise to *A. monticola*, a wild form of peanut that occurs in a few limited locations in northwestern Argentina, or in southeastern Bolivia, where the peanut landraces with the most wild-like features are grown today,^[1] and by artificial selection to *A. hypogaea*.^[3]

BOTANICAL DESCRIPTION

The peanut or groundnut (*Arachis hypogaea*) is a species in the legume family (Fabaceae). It is an annual herbaceous plant growing 30 to 50 cm (1.0 to 1.6 ft) tall. *Hypogaea* means "under the earth", after pollination, the flower stalk elongates causing it to bend until the ovary touches the ground. Continued stalk growth then pushes the ovary underground where the mature fruit develops into a legume pod. Pods are 3 to 7 cm (1.2 to 2.8 in) long, containing 1 to 4 seeds.^[4]

It has a taproot. Its stem is cylindrical and hairy. Leaves are pinnate with two pairs of leaflets borne on a cylindrical and grooved petiole. The flowers are yellow, complete, papilionate and sessile. Flowering occurs on 24-30 days after sowing. The flowers open between 6-8 am and fertilization is completed before mid day. The gynophore is commonly referred to as peg. The peg carrying the ovary pushes itself into the soil. It is only after entering the soil that ovary begins to develop and takes up horizontal position. At the same time, the pod begins to enlarge. The fruit contains 1-5 seeds. The shell of the pod which contains the seed is morphologically the pericarp and the thin skin that covers the seed or nut

is the test. The nut is composed of 2 cotyledons, which contain oil and other food materials.



Figure no. 2: *Arachis hypogaea* plant.

ORIGIN AND DISTRIBUTION

The center of origin of groundnut is north-eastern Nigeria and northern Cameroon. It is found in the wild from central Nigeria eastwards to southern Sudan and is now cultivated throughout tropical Africa and to a lesser extent in tropical parts of the Americas, Asia and Australia. World production of groundnut reached a record of about 21 million tonnes. The most important groundnut producing countries in the world are India, China, USA, West Africa, Sudan, and Nigeria etc. India ranks first in the world in area (8.5 million hectares contributes about 40 % of the total world's area) and production (8.4 million tonnes contributes about 33 % of the total world's production). The average productivity of India is only about 988 kg/ha. Among all oilseed crops, groundnut accounts for more than 40-50 % in area and 60 to 70 % in production in the country. Among oilseed crops, groundnut has first place in the country. Its cultivation in India is mainly confined to the States of Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh, Rajasthan, Punjab and Orissa. About 80 % of the total area and 84 % of the total production in the country are confined to first five States. The highest productivity of groundnut (1604 kg/ha) is in State of Tamil Nadu, while in Gujarat the productivity is about 1190 kg/ha.^[5]

NUTRITION VALUE

Peanuts are rich in nutrients providing over 30 essential nutrients and phytonutrients. Peanuts are a source of niacin, foliate, fiber, magnesium, vitamin E, manganese and phosphorus. They are free of trans-fats and sodium and contain about 25% protein (a higher proportion than in any true nut). Peanut is considered as low sodium

food. Groundnut are free from cholesterol and contains less than 20% saturated fatty acids.^[6]

NUTRIENTS

Peanuts are rich in essential nutrients. In a reference amount of 100-gram (3+1/2-ounce), peanuts provide 2,385 kilojoules (570 kilocalories) of food energy, and are an excellent source (defined as more than 20% of the Daily Value, DV) of several B vitamins, vitamin E, several dietary minerals, such as manganese (95% DV), magnesium (52% DV) and phosphorus (48% DV), and dietary fiber (right table). The fats are mainly polyunsaturated and monounsaturated (83% of total fats when combined).

Some studies show that regular consumption of peanuts is associated with a lower specific risk of mortality from

certain diseases.^{[17][18]} However, the study designs do not allow cause and effect to be inferred. According to the US Food and Drug Administration, "Scientific evidence suggests but does not prove that eating 1.5 ounces per day of most nuts (such as peanuts) as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease.

Macronutrients

Proteins

Peanut are an excellent source of plant-based proteins, offering 25.8 g per 100g of peanuts, or around half of a person's daily protein needs. The peanut seed contains 32 different proteins. protein found in peanut are listed below

Protein superfamily	Protein family	Biological function
Cupins	Globulin-Vicilin-Type (7 S globulin)	
Prolamin	Globulin-Glycinin-type (11 S globulin) Globulin-Glycinin-type (11 S globulin) Albumins-Conglutin (2 S Albumin)	Trypsin inhibitor
Profiling	profilin	Regulate polymerisation of actin
Beta v 1 Family	Pathogenesis-Related Protein	Plant protection pathogen invasion
Glucosyl transferase GT-C	Oleosin	Structural stability in plant oil bodies
Scorpion toxin-like knottin	Defensins	Host defence peptides

Lipids

Most of the fatty acids present in peanut oil are present as triacylglycerols (TAG) at approximately 93.3 to 95.8% of weight. TAG content is dependent upon seed maturation and increases incrementally until full maturation. Peanut oil has a high oleic content, which is associated with good oxidative and frying stabilities. Peanut oil is a non-drying oil, which does not harden when exposed to air and solidifies from 0 to 3°C.

Carbohydrates

Oil or dry roasted peanuts contain approximately 21.51 g of carbohydrates per 100 g (USDA, Food Composition Database, 2017) with starch as the major carbohydrate.

However, peanut research has demonstrated that peanut carbohydrate content is dependent upon cultivar, maturation, and geographic location.

CHEMICAL CONSTITUENTS

Arachis hypogea contain various chemical constituents like flavonoids, phenolic acids, phytosterols, alkaloids and stilbenes. Stilbenes are natural phenolic defence compounds occurring in number of different plant species that possess antimicrobial and antioxidant activities against phytopathogens. The stilbenes that have been reported for several varieties from *A. hypogaea* in different organs from the plant, such as leaves, roots, and seeds, seem to be derived from trans-resveratrol.

CHEMICAL CONSTITUENTS ^[2]	
PHENOLS	Resvetratrol, Vanillic acid, Ferulic acid, Chlorogenic acid, p-caumarinic acid
FLAVANOIDS	Dihydro quercetin, chrysoeriol, genistein, quercetin
PHYTOSTEROL	β-sitosterol, Campesterol, stigmasterol
TRITERPENES	Cycloartanol, cycloartanol
ALKALOIDS	Arachine, myosmine,
FATTY ACIDS	Palmitic, stearic, linoleic, arachidic

Flavonoids exist in all parts of the peanut plant. They act as natural pesticide some provide potent odors or bitter flavors as a defence system. Quercetin and rutin are

common flavonoids present. Contains various minerals like aluminum, sulfur, boron, cadmium, zinc, cobalt, copper, iron, selenium, sodium (seeds), calcium (seeds)

and leaves), magnesium, phosphorus, potassium (plant). various amino acids like aspartic acid, glutamic acid, alanine, arginine, cystine, phenylalanine, glycine, histidine, isoleucine, leucine, lysine, methionine, proline, serine, Tyrosine, threonine, tryptophan and valine also present.

USES

The traditional use of peanuts for a medicinal purpose has been reported since ancient times. Eating 42 g of nuts per day may reduce the risk of heart disease. Peanut skins are used to treat chronic hemorrhage and bronchitis. Groundnut extracts have been used in the management of diabetic patients. In fact, *Arachis* is used to lower cholesterol, aid weight loss, and prevent cardiovascular diseases and cancer. Some therapeutic effects have been reported in peanut extract, such as antioxidatives, antibacterials, antifungal and anti-inflammatory activities.

Resveratrol is a stilbene-type aromatic phytoalexin found in peanuts reported to exhibit several physiological activities including anti-cancer activities *in vitro* and in experimental animal models, as well as in humans. Peanut consumption improves indices of cardiovascular disease risk in healthy adults.^[7]

Antimicrobial activity: Peanut shells contain large amounts of the flavonoid decomposition compound 5, 7-dihydroxychromone (DHC). DHC was found to inhibit the growth of two pathogenic fungi *Rhizoctonia solani* and *Sclerotium rolfsii*. DHC released from peanut shells in suppressing pathogenic fungal infection and competing plant growth but not for *Bradyrhizobium* growth promotion.^[1]

Anti-inflammatory: Resveratrol exhibits its anti-inflammatory activity via different pathways that are mostly centered on COX-1 and COX-2. In addition to inhibition of COX-1 and COX-2 expression, through upstream suppression of the activity of NF- κ B and I- κ B kinase, 52 resveratrol reduced the production of prostaglandin E2 (PGE2) and the formation of ROS in Lipopolysaccharide (LPS)-activated microglial cells. The presence of resveratrol in peanut shows anti-inflammatory activity.^[8]

Anti-cancer activity: Resveratrol is a stilbene-type aromatic phytoalexin found in peanuts reported to exhibit several physiological activities including anti-cancer activities *in vitro* and in experimental animal models, as well as in humans.

Antioxidant activity: Groundnut could be a potential source of natural antioxidant that could have great importance as therapeutic agents in preventing or slowing the progress of ageing and age associated oxidative stress related degenerative diseases. Further investigation on the isolation and characterization of the antioxidant constituents is however required.^[8]

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